TOWN OF NEEDHAM
MASSACHUSETTS

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

PLANNING BOARD

APPLICATION FOR SITE PLAN REVIEW

Project Determination: (circle one) (Major Project) Minor Project

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

Location of Property 609 Webster Street, Needham MA
Name of Applicant Town of Needham
Applicant's Address 1471 Highland Avenue, Needham MA
Phone Number (781) 455-7500

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

Property Owner's Name Town of Needham
Property Owner's Address 1471 Highland Avenue, Needham MA 02492
Telephone Number (781) 455-7500

Characteristics of Property: Lot Area 14.15 acres Present Use Educational
Map #226 Parcel #10 Zoning District Single Residence B

Description of Project for Site Plan Review under Section 7.4 of the Zoning By-Law:
The Town of Needham seeks an amendment of the Major Project Site Plan Special Permit applicable to the Needham High School, 609 Webster Street, to allow for the renovation of four (4) existing tennis courts, the addition of four (4) new tennis courts, and installation of stormwater management improvements and ADA accessible walkways.

Signature of Applicant (or representative) _____
Address if not applicant Christopher Heep, 40 Grove Street-Suite 190, Wellesley MA 02482
Telephone # (617) 804-2422
Owner's permission if other than applicant _____

SUMMARY OF PLANNING BOARD ACTION
Received by Planning Board _____ Date 2/27/24
Hearing Date _____ Parties of Interest Notified of Public Hearing _____
Decision Required by _____ Decision/Notices of Decision sent _____
Granted _____

Denied _____ Fee Paid _____ Fee Waived _____
Withdrawn _____

NOTE: Reports on Minor Projects must be issues within 35 days of filing date.

Harrington Heep

Christopher H. Heep
d: 617.804.2422
cheep@harringtonheep.com

February 26, 2024

BY EMAIL (lnewman@needhamma.gov)
Planning Board
Town of Needham
Public Services Administration Building
500 Dedham Avenue
Needham, MA 02492

Re: Request to Amend Major Project Site Plan Special Permit No. 2004-01
High School Tennis Court Renovation

Dear Planning Board Members:

I am pleased to submit this application for an amendment of Major Project Site Plan Special Permit No. 2004-01 on behalf of the Town of Needham (the "Applicant") to authorize the comprehensive redesign and renovation of the Needham High School tennis courts. The new tennis courts and associated site improvements are shown on the plans submitted herewith, and includes a complete redesign, replacement, and expansion of the existing tennis courts.

The Major Project Site Plan Special Permit applicable to this property is dated April 6, 2004 (the "Decision") and has previously been amended multiple times.[1] The Decision covers the High School property located at 609 Webster Street, which is located in the Single Residence B zoning district, is shown on Needham Town Assessors' Plan No. 226 as Parcel No. 10, and contains a total of 14.15 acres. The Decision and subsequent amendments allowed for renovations and improvements to the High School but did not authorize any particular work to expand the tennis courts (none was proposed at the time). Accordingly, this application now seeks an amendment of the Decision to authorize renovation of the four (4) existing on-site tennis courts and installation of four (4) additional tennis courts as shown on the site plans. This application does not propose any new buildings, does not involve any changes to the existing parking or vehicular circulation, and does not involve any structural changes to the High School building itself.

The Project

The proposed tennis courts redesign is shown on the plan set entitled "Town of Needham Needham High School Tennis Court Renovation Needham, Massachusetts 02492," dated February 6, 2024 and prepared by Activitas of 70 Milton Street, Dedham, MA, that is submitted along with this application. The key features of the new tennis courts include the following:

[1] The Planning Board has issued Amendments to the Decision dated January 5, 2010, December 6, 2011, October 27, 2015, July 19, 2016, August 9, 2016, November 28, 2017 and August 7, 2018.

- The High School will be adding four new tennis courts bringing the total number of courts from four (4) to eight (8). The existing four tennis courts will also be renovated and upgraded to match the newly installed courts.

- The site will feature new concrete sidewalks and a set of granite stairs leading to the new court area that will provide pedestrian access from the parking lot to all eight courts. A centrally located patio will be installed between the original and new courts that will be covered by a raised shade.

- The courts will be secured by typical 4-foot and 12-foot chain link fences that enclose four sets of courts (two courts in each fenced in set) that provide entry through gates accessible from the new walkways.

Compliance with MPSP Review Criteria

The proposed renovation of the High School is consistent with all the approval criteria for a Major Project Site Plan Special Permit under Section 7.4.6 of the Zoning Bylaw. Each criterion is discussed below.

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

The redesigned tennis courts will have no detrimental impacts on adjoining premises. The portion of the site is already in use as tennis courts, and the redesign of the site does not create any detrimental impacts on the surrounding area. The High School is not proposing any lighting associated with the tennis courts and the site will be improved with an underground drain line, area drains, and a new infiltration system within the parking lot area designed to keep water on the Property with no negative impact on neighboring lands. See Sheet L2.1 of the Plan Set and Stormwater Management and Erosion Control Report.

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

Convenience and safety of vehicular and pedestrian movement within the site has been adequately provided for. The project does not alter the parking lot other than installing new granite curbing in the areas adjacent to where the walkways will be installed. The new sidewalks will improve pedestrian movement at the site and will provide safe and convenient access to all courts and court entrances.

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

The plans do not propose adding to or altering the High School parking lot in any way other than providing access to the to the site by way of the new sidewalks, and the temporary disturbance for the installation of the subsurface infiltration system.

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

Disposal of refuse and other waste will be adequately provided for. The project is not a major generator of refuse and other wastes, and the volume of refuse generated is not anticipated to increase relative to the current use of the tennis courts. Disposal will be in accordance with applicable law and established practice for this site.

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

The tennis courts are designed with careful consideration of existing structures and open space, and will fit within the general character of the High School property. In particular, the four (4) renovated courts will be in the same location on the High School property as the existing courts. The four (4) new courts will be located outside of the 25-foot side and rear setback required in the Single Residence B zoning district, thus there will be no encroachment or crowding of adjoining property owners' land. The land surrounding the tennis courts will be improved with new walkways, benches, and a patio to encourage use of the tennis courts and to provide convenient access and an enjoyable environment to the students and spectators.

(f) Mitigation of adverse impacts on the Town's resources including the effect on the Town's water supply and distribution system, sewer collection and treatment, fire protection, and streets; and may require when acting as the Special Permit Granting Authority or recommend in the case of minor projects, when the Board of Appeals is acting as the Special Permit Granting authority, such appropriate conditions, limitation, and safeguards necessary to assure the project meets the criteria of a through f.

The project will have no adverse impacts on the Town's resources. The site is already in use as the High School's tennis courts, and the redesign and renovation of the space will not create any new impacts on the Town's water supply and distribution system, sewer, fire protection or streets. The Stormwater Management and Erosion Controls Report submitted with this application details the mitigation provided to address the construction of the new tennis courts.

Based on the foregoing, the proposed development complies with all standards and criteria set forth in the provisions of the Zoning By-Law, and the requested amendment is in harmony with the purposes and intent of the By-Law and will have minimal adverse impacts on the surrounding area. The Applicant respectfully requests that the Decision be amended to incorporate the plan set submitted herewith showing the renovated tennis courts and associated site improvements.

Application Materials

This application includes the following materials:

a. Plans entitled "Town of Needham Needham High School Tennis Court Renovation Needham, Massachusetts 02492," dated February 6, 2024 and prepared by Activitas of 70 Milton Street, Dedham, MA.

Title Sheet & Index
Sheet EX1.1 – Existing Conditions Plan
Sheet SP1.1 – Site Preparation Plan
Sheet SP1.2 – Site Preparation Detail Sheet
Sheet L1.1 – Layout and Materials Plan
Sheet L2.1 – Grading and Utility Plan
Sheet L3.1 – Detail Sheet I
Sheet L3.2 – Detail Sheet II
Sheet L3.3 – Detail Sheet III

b. Stormwater Management and Erosion Control Report dated February 6, 2024 prepared by Activitas.

Pursuant to Section 7.4.4, the Applicant requests that the Planning Board waive the submission of any of the required information that is not submitted herewith. The Applicant also requests a waiver of the Planning Board's application fee on the ground that this is a Town project.

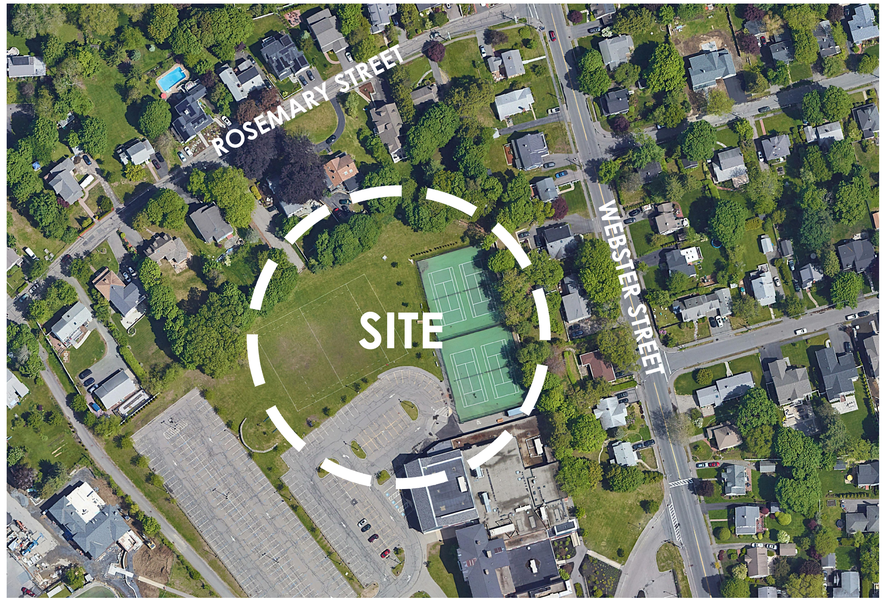
In addition, pursuant to Section 7.4.4 the Applicant hereby certifies that the project can be constructed, and the proposed use commenced without need for the issuance of any variance or other zoning relief from any provision of the By-Law by the Zoning Board of Appeals.

Thank you very much for your consideration of this application, and please let me know if I can provide any additional information prior to the Board's meeting on this request for an amendment of Major Project Site Plan Special Permit No. 2004-01.

Sincerely,

Christopher H. Heep

cc: K. Fitzpatrick
D. Gutekanst
T. Ryder
A. Rrapi



LOCUS MAP N.T.S.

LIST OF DRAWINGS

MAJOR PROJECT SITE PLAN APPROVAL | FEBRUARY 6, 2024

TOWN OF NEEDHAM

NEEHDAM HIGH SCHOOL
TENNIS COURT RENOVATION

NEEDHAM, MASSACHUSETTS 02492

LOT AREA: 14.55 ACRES | MAP# 226 | PARCEL# 199 | ZONING DISTRICT: SINGLE RESIDENCE B

OWNER

Town of Needham
1471 Highland Avenue
Needham, MA 02492
(781) 455-7940

LANDSCAPE ARCHITECT/CIVIL ENGINEER

Activitas
70 Milton Street
Dedham, MA 02026
(781) 326-2600

TOWN OF NEEDHAM
NEEDHAM HIGH SCHOOL TENNIS COURT RENOVATION

MAJOR PROJECT SITE PLAN APPROVAL | FEBRUARY 6, 2024

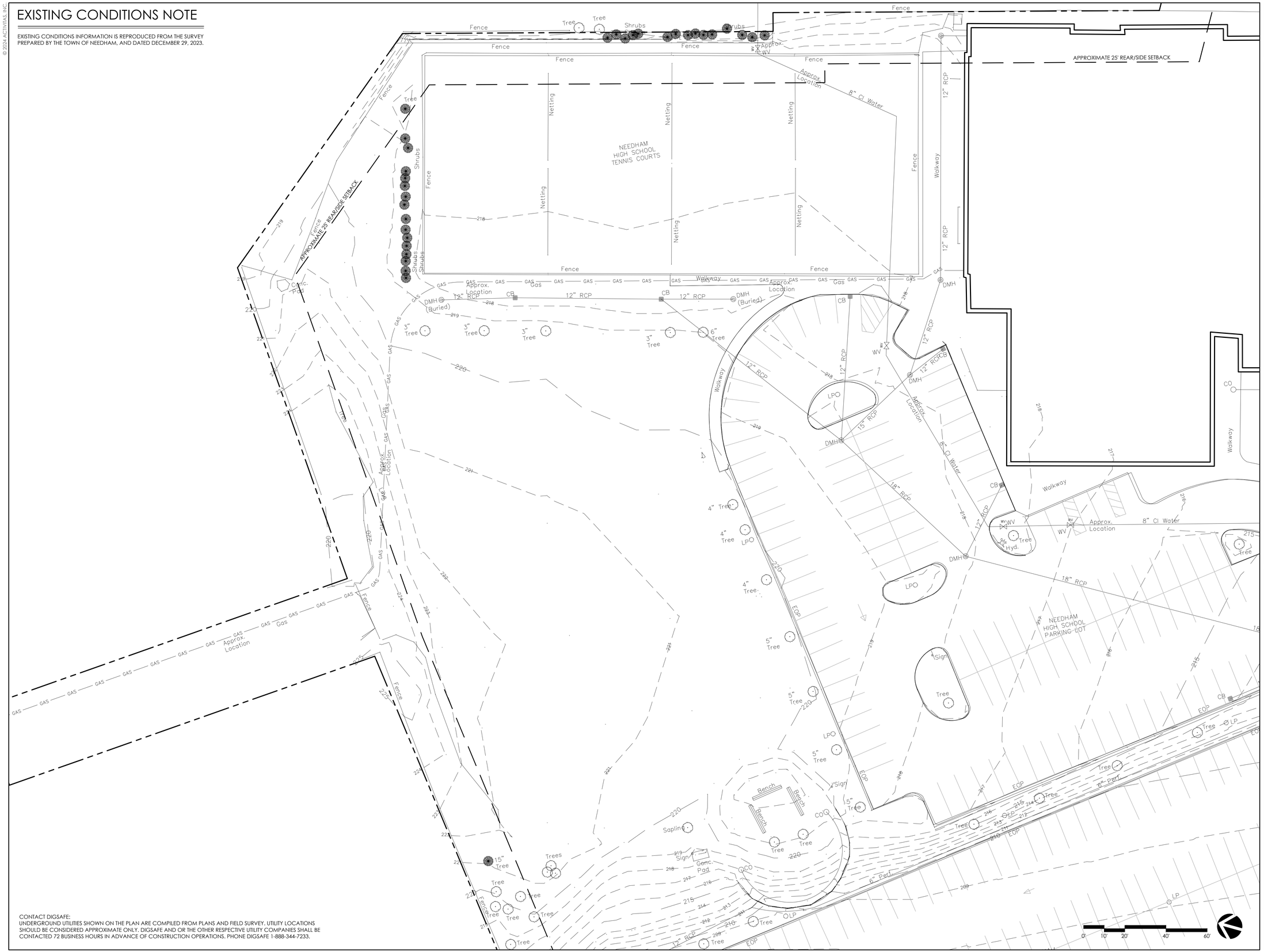
REVISIONS: PROJECT NO. 23016.00

NO.	DATE	SHEETS REVISED	NOTES

ACTIVITAS
landscape architecture | civil engineering

EXISTING CONDITIONS NOTE

EXISTING CONDITIONS INFORMATION IS REPRODUCED FROM THE SURVEY PREPARED BY THE TOWN OF NEEDHAM, AND DATED DECEMBER 29, 2023.



CONTACT DIGSAFE:
UNDERGROUND UTILITIES SHOWN ON THE PLAN ARE COMPILED FROM PLANS AND FIELD SURVEY. UTILITY LOCATIONS SHOULD BE CONSIDERED APPROXIMATE ONLY. DIGSAFE AND OR THE OTHER RESPECTIVE UTILITY COMPANIES SHALL BE CONTACTED 72 BUSINESS HOURS IN ADVANCE OF CONSTRUCTION OPERATIONS. PHONE DIGSAFE 1-888-344-7233.

ACTIVITAS
landscape architecture | civil engineering
70 Milton Street | Dedham, MA 02026-2915
(781) 326-2600 | activitas.com

CONSULTANTS

TOWN OF NEEDHAM

NEEDHAM, MA

NEEDHAM HIGH SCHOOL TENNIS COURT RENOVATION

Major Project Site Plan Approval
February 6, 2024

REVISIONS:

NO.	DATE	DESCRIPTION

SCALE:	1"=20'-0"
PROJECT NO.:	23016.00
FILE:	23016.00-EX1.1-EX_CONDITIONS_PLAN.dwg
DRAWN:	BJM
CHECKED:	JC

SEAL:

SHEET TITLE:

EXISTING CONDITIONS PLAN

SHEET NO:

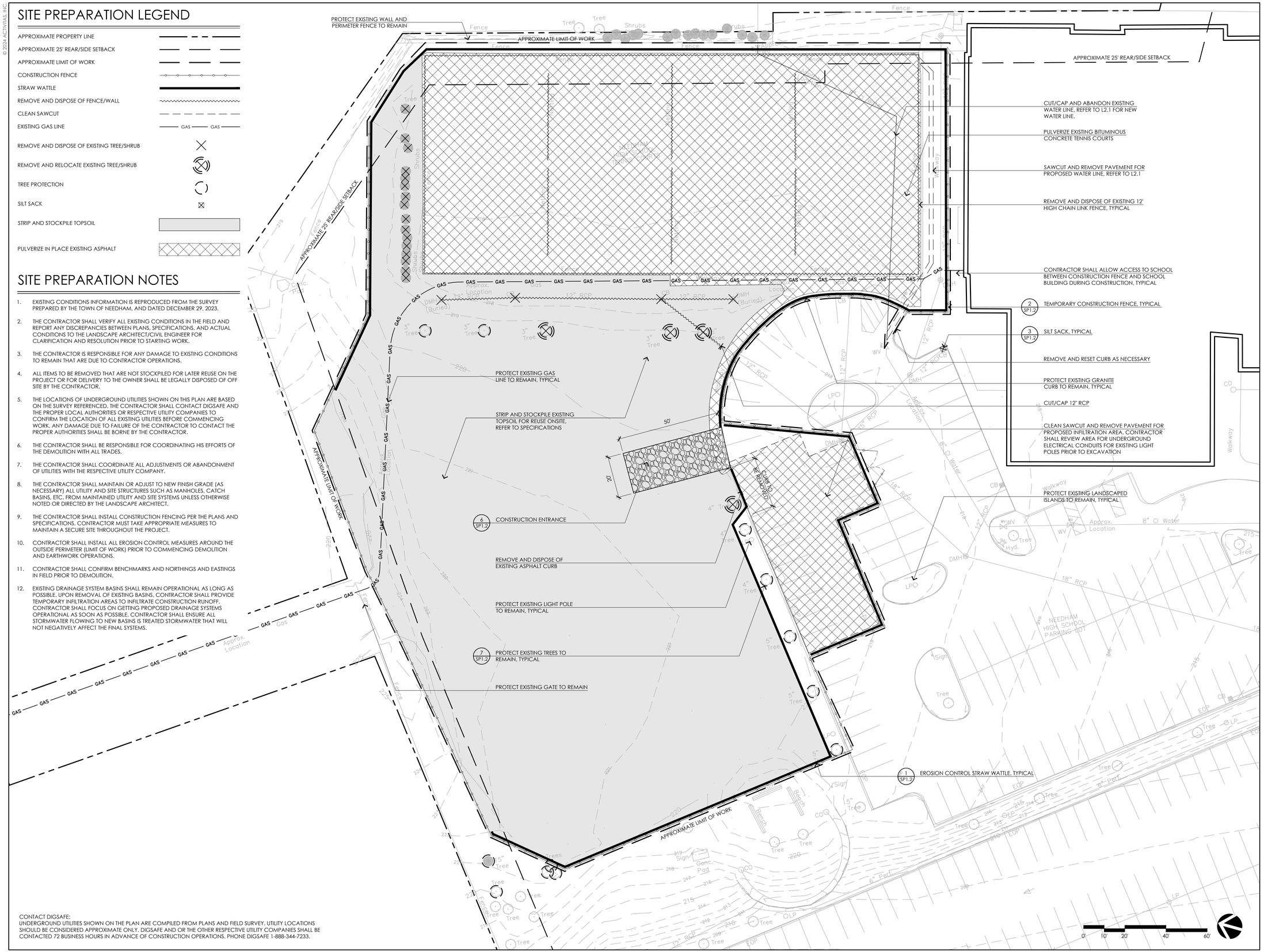
EX1.1

SITE PREPARATION LEGEND

- APPROXIMATE PROPERTY LINE
- APPROXIMATE 25' REAR/SIDE SETBACK
- APPROXIMATE LIMIT OF WORK
- CONSTRUCTION FENCE
- STRAW WATTLE
- REMOVE AND DISPOSE OF FENCE/WALL
- CLEAN SAWCUT
- EXISTING GAS LINE
- REMOVE AND DISPOSE OF EXISTING TREE/SHRUB
- REMOVE AND RELOCATE EXISTING TREE/SHRUB
- TREE PROTECTION
- SILT SACK
- STRIP AND STOCKPILE TOPSOIL
- PULVERIZE IN PLACE EXISTING ASPHALT

SITE PREPARATION NOTES

1. EXISTING CONDITIONS INFORMATION IS REPRODUCED FROM THE SURVEY PREPARED BY THE TOWN OF NEEDHAM, AND DATED DECEMBER 29, 2023.
2. THE CONTRACTOR SHALL VERIFY ALL EXISTING CONDITIONS IN THE FIELD AND REPORT ANY DISCREPANCIES BETWEEN PLANS, SPECIFICATIONS, AND ACTUAL CONDITIONS TO THE LANDSCAPE ARCHITECT/CIVIL ENGINEER FOR CLARIFICATION AND RESOLUTION PRIOR TO STARTING WORK.
3. THE CONTRACTOR IS RESPONSIBLE FOR ANY DAMAGE TO EXISTING CONDITIONS TO REMAIN THAT ARE DUE TO CONTRACTOR OPERATIONS.
4. ALL ITEMS TO BE REMOVED THAT ARE NOT STOCKPILED FOR LATER REUSE ON THE PROJECT OR FOR DELIVERY TO THE OWNER SHALL BE LEGALLY DISPOSED OF OFF SITE BY THE CONTRACTOR.
5. THE LOCATIONS OF UNDERGROUND UTILITIES SHOWN ON THIS PLAN ARE BASED ON THE SURVEY REFERENCED. THE CONTRACTOR SHALL CONTACT DIGSAFE AND THE PROPER LOCAL AUTHORITIES OR RESPECTIVE UTILITY COMPANIES TO CONFIRM THE LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK. ANY DAMAGE DUE TO FAILURE OF THE CONTRACTOR TO CONTACT THE PROPER AUTHORITIES SHALL BE BORNE BY THE CONTRACTOR.
6. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING HIS EFFORTS OF THE DEMOLITION WITH ALL TRADES.
7. THE CONTRACTOR SHALL COORDINATE ALL ADJUSTMENTS OR ABANDONMENT OF UTILITIES WITH THE RESPECTIVE UTILITY COMPANY.
8. THE CONTRACTOR SHALL MAINTAIN OR ADJUST TO NEW FINISH GRADE (AS NECESSARY) ALL UTILITY AND SITE STRUCTURES SUCH AS MANHOLES, CATCH BASINS, ETC. FROM MAINTAINED UTILITY AND SITE SYSTEMS UNLESS OTHERWISE NOTED OR DIRECTED BY THE LANDSCAPE ARCHITECT.
9. THE CONTRACTOR SHALL INSTALL CONSTRUCTION FENCING PER THE PLANS AND SPECIFICATIONS. CONTRACTOR MUST TAKE APPROPRIATE MEASURES TO MAINTAIN A SECURE SITE THROUGHOUT THE PROJECT.
10. CONTRACTOR SHALL INSTALL ALL EROSION CONTROL MEASURES AROUND THE OUTSIDE PERIMETER (LIMIT OF WORK) PRIOR TO COMMENCING DEMOLITION AND EARTHWORK OPERATIONS.
11. CONTRACTOR SHALL CONFIRM BENCHMARKS AND NORTHINGS AND EASTINGS IN FIELD PRIOR TO DEMOLITION.
12. EXISTING DRAINAGE SYSTEM BASINS SHALL REMAIN OPERATIONAL AS LONG AS POSSIBLE. UPON REMOVAL OF EXISTING BASINS, CONTRACTOR SHALL PROVIDE TEMPORARY INFILTRATION AREAS TO INFILTRATE CONSTRUCTION RUNOFF. CONTRACTOR SHALL FOCUS ON GETTING PROPOSED DRAINAGE SYSTEMS OPERATIONAL AS SOON AS POSSIBLE. CONTRACTOR SHALL ENSURE ALL STORMWATER FLOWING TO NEW BASINS IS TREATED STORMWATER THAT WILL NOT NEGATIVELY AFFECT THE FINAL SYSTEMS.



CONTACT DIGSAFE:
UNDERGROUND UTILITIES SHOWN ON THE PLAN ARE COMPILED FROM PLANS AND FIELD SURVEY. UTILITY LOCATIONS SHOULD BE CONSIDERED APPROXIMATE ONLY. DIGSAFE AND OR THE OTHER RESPECTIVE UTILITY COMPANIES SHALL BE CONTACTED 72 BUSINESS HOURS IN ADVANCE OF CONSTRUCTION OPERATIONS. PHONE DIGSAFE 1-888-344-7233.

ACTIVITAS
landscape architecture | civil engineering
70 Milton Street | Dedham, MA 02026-2915
(781) 326-2600 | activitas.com

CONSULTANTS

TOWN OF NEEDHAM
NEEDHAM, MA
NEEDHAM HIGH SCHOOL TENNIS COURT RENOVATION

Major Project Site Plan Approval
February 6, 2024

REVISIONS:

NO.	DATE	DESCRIPTION

SCALE:	1"=20'-0"
PROJECT NO.:	23016.00
FILE:	23016.00-SP1.1-SP_PLAN.dwg
DRAWN:	BJM
CHECKED:	JC

SEAL:

COMMONWEALTH OF MASSACHUSETTS
MEGAN E. BUCZYNSKI
CIVIL
No. 47382
REGISTERED PROFESSIONAL ENGINEER

2/6/23

SHEET TITLE:

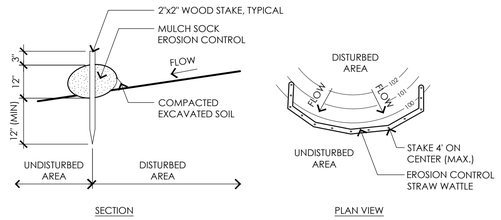
SITE PREPARATION PLAN

SHEET NO:

SP1.1

NOTES:

1. PLACE EROSION CONTROL MULCH SOCK ON LEVEL GRADE. EXTEND BOTH ENDS OF THE TUBE AT LEAST 8'-0" UPSLOPE AT 45 DEGREES TO THE MAIN ALIGNMENT.
2. REMOVE DEPOSITS WHEN SEDIMENT ACCUMULATION IS ONE THIRD THE HEIGHT OF THE EXPOSED EROSION CONTROL MULCH SOCK.
3. EROSION CONTROL STRAW WATTLE SHALL REMAIN IN WORKING ORDER UNTIL THE SITE IS STABILIZED. ADDITIONAL EROSION CONTROLS SHALL BE INSTALLED AS NEEDED TO PREVENT SILT FROM LEAVING THE SITE AT NO ADDITIONAL COST TO THE OWNER.
4. ALL CONTROLS SHALL BE SET 5' FROM BOTTOM TOE OF SLOPE

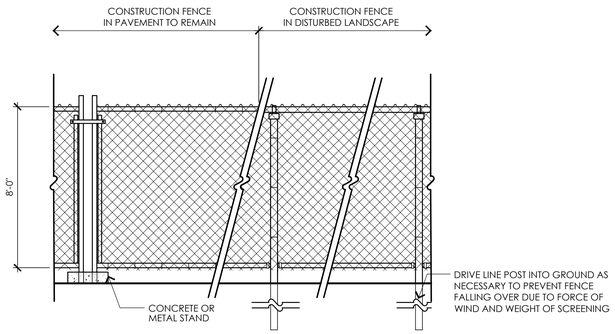


1 EROSION CONTROL STRAW WATTLE

NOT TO SCALE

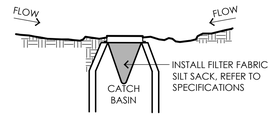
NOTES:

1. TEMPORARY CONSTRUCTION FENCE SHALL BE PROVIDED AT PROJECT LIMITS AS SHOWN AND SPECIFIED.



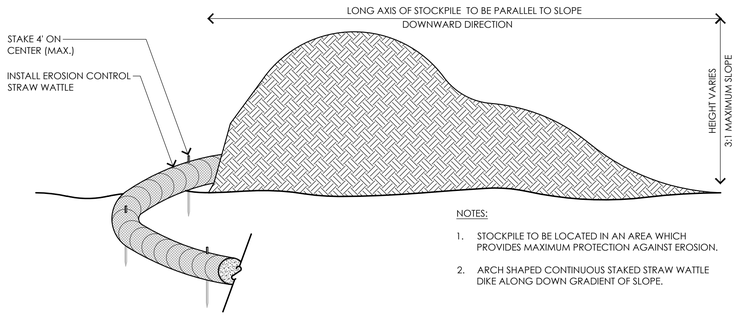
2 TEMPORARY CONSTRUCTION FENCE

NOT TO SCALE



3 SILT SACK

NOT TO SCALE

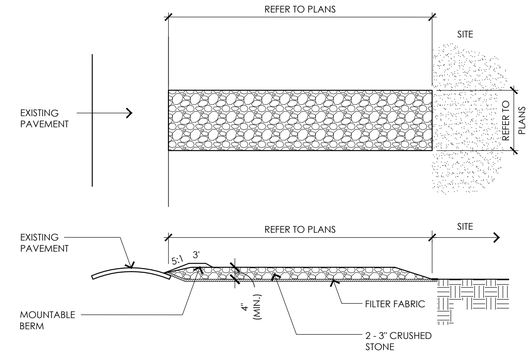


NOTES:

1. STOCKPILE TO BE LOCATED IN AN AREA WHICH PROVIDES MAXIMUM PROTECTION AGAINST EROSION.
2. ARCH SHAPED CONTINUOUS STAKED STRAW WATTLE DIKE ALONG DOWN GRADIENT OF SLOPE.

4 TEMPORARY MATERIAL STOCKPILE

NOT TO SCALE

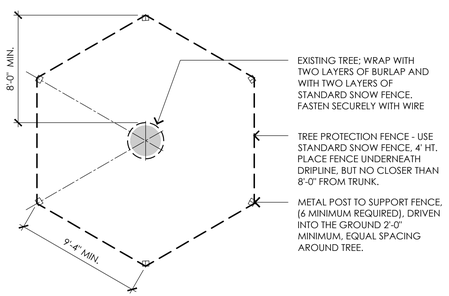


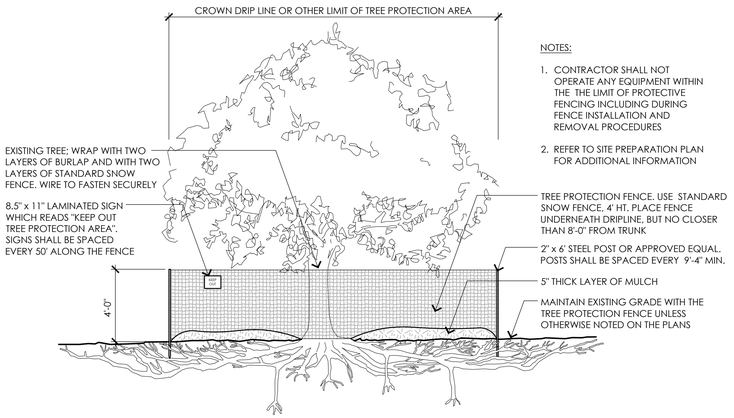
NOTES:

1. THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION WHICH SHALL PREVENT TRACKING OR FLOWING OF SEDIMENT INTO THE STREET. THIS MAY REQUIRE PERIODIC TOP DRESSING WITH ADDITIONAL STONE AS CONDITIONS DEMAND AND REPAIR OR CLEANOUT OF ANY MEASURES USED TO TRAP SEDIMENT. ALL SEDIMENT SPILLED, DROPPED, WASHED AND/OR TRACKED ONTO PUBLIC RIGHTS-OF-WAYS MUST BE REMOVED IMMEDIATELY. MOUNTABLE BERM SHALL BE PERMITTED. PERIODIC INSPECTION AND MAINTENANCE SHALL BE PROVIDED.
2. CONTRACTOR SHALL WASH WHEELS OF VEHICLES AT CONSTRUCTION ENTRANCE PRIOR TO VEHICLES EXITING SITE TO PREVENT SOIL MATERIAL FROM BEING TRACKED FROM THE SITE.
3. PERIODIC INSPECTION AND MAINTENANCE SHALL BE PROVIDED BY CONTRACTOR.

5 CONSTRUCTION ENTRANCE

NOT TO SCALE





NOTES:

1. CONTRACTOR SHALL NOT OPERATE ANY EQUIPMENT WITHIN THE THE LIMIT OF PROTECTIVE FENCING INCLUDING DURING FENCE INSTALLATION AND REMOVAL PROCEDURES
2. REFER TO SITE PREPARATION PLAN FOR ADDITIONAL INFORMATION

SECTION VIEW

6 EXISTING TREE PROTECTION

NOT TO SCALE

ACTIVITAS
landscape architecture | civil engineering
70 Milton Street | Dedham, MA 02026-2915
(781) 326-2600 | activitas.com

CONSULTANTS

TOWN OF NEEDHAM

NEEDHAM, MASSACHUSETTS

NEEDHAM HIGH SCHOOL TENNIS COURT RENOVATION

Major Project Site Plan Approval
February 6, 2024

REVISIONS:

NO.	DATE	DESCRIPTION

SCALE:	AS NOTED
PROJECT NO.:	23016.00
FILE:	23016.00-SP1.2-SP_DET_1.dwg
DRAWN:	BJM
CHECKED:	JC

SEAL:

COMMONWEALTH OF MASSACHUSETTS
MEGAN E. BUCZYNSKI
CIVIL
No. 47392
REGISTERED PROFESSIONAL ENGINEER

2/6/23

SHEET TITLE:

SITE PREPARATION DETAIL SHEET

SHEET NO:

SP1.2

LAYOUT AND MATERIALS LEGEND

APPROXIMATE PROPERTY LINE	
APPROXIMATE 25' REAR/SIDE SETBACK	
APPROXIMATE LIMIT OF WORK	
CHAIN LINK FENCE	
CHANNEL DRAIN	
BITUMINOUS CONCRETE PAVEMENT	
CEMENT CONCRETE PAVEMENT	
UNIT PAVERS	
4' CHAIN LINK FENCE DIMENSION	4' CLF
12' CHAIN LINK FENCE DIMENSION	12' CLF
CHANNEL DRAIN	C.D.
VERTICAL GRANITE CURB	V.G.C

LAYOUT AND MATERIALS NOTES

1. EXISTING CONDITIONS INFORMATION IS REPRODUCED FROM THE SURVEY PREPARED BY THE TOWN OF NEEDHAM, AND DATED DECEMBER 29, 2023.
2. THE LOCATIONS OF UNDERGROUND UTILITIES SHOWN ARE BASED ON THE SURVEY REFERENCED ABOVE. THE CONTRACTOR SHALL NOTIFY DIGSAFE AND THE PROPER LOCAL AUTHORITIES OR RESPECTIVE UTILITY COMPANIES TO CONFIRM THE LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK. ANY DAMAGE DUE TO FAILURE OF THE CONTRACTOR TO CONTACT THE PROPER AUTHORITIES SHALL BE BORNE BY THE CONTRACTOR.
3. CONTRACTOR(S) SHALL THOROUGHLY FAMILIARIZE THEMSELVES WITH ALL CONSTRUCTION DOCUMENTS, SPECIFICATIONS, AND SITE CONDITIONS PRIOR TO BIDDING AND PRIOR TO CONSTRUCTION.
4. ANY DISCREPANCIES BETWEEN DRAWINGS, SPECIFICATIONS, AND SITE CONDITIONS SHALL BE REPORTED IMMEDIATELY TO THE OWNER'S REPRESENTATIVE FOR CLARIFICATION AND RESOLUTION PRIOR TO BIDDING OR CONSTRUCTION.
5. WHILE THE CONTRACTOR MAY USE THE ELECTRONIC DRAWINGS FOR LAYOUT PURPOSES, IT IS HIS RESPONSIBILITY TO CHECK ALL LAYOUT IN THE FIELD TO CONFIRM CONFORMITY WITH THE PROJECT DRAWINGS, SPECIFICATIONS, AND APPROVED SHOP DRAWINGS AND SUBMITTALS. USE OF ONLY THE ELECTRONIC DRAWINGS WITHOUT A SITE CHECK OF LAYOUT IS NOT ACCEPTABLE.

CONTACT DIGSAFE:
UNDERGROUND UTILITIES SHOWN ON THE PLAN ARE COMPILED FROM PLANS AND FIELD SURVEY. UTILITY LOCATIONS SHOULD BE CONSIDERED APPROXIMATE ONLY. DIGSAFE AND OR THE OTHER RESPECTIVE UTILITY COMPANIES SHALL BE CONTACTED 72 BUSINESS HOURS IN ADVANCE OF CONSTRUCTION OPERATIONS. PHONE DIGSAFE 1-888-344-7233.

ACTIVITAS
landscape architecture | civil engineering
70 Milton Street | Dedham, MA 02026-2915
(781) 326-2600 | activitas.com

CONSULTANTS

TOWN OF NEEDHAM

NEEDHAM, MA

NEEDHAM HIGH SCHOOL TENNIS COURT RENOVATION

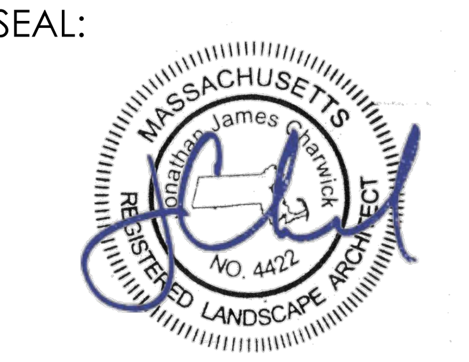
Major Project Site Plan Approval
February 6, 2024

REVISIONS:

NO.	DATE	DESCRIPTION

SCALE:	1"=20'-0"
PROJECT NO.:	23016.00
FILE:	23016.00-L1.1-LM_PLAN.dwg
DRAWN:	BJM
CHECKED:	JC

SEAL:



2/6/2024

SHEET TITLE:

LAYOUT AND MATERIALS PLAN

SHEET NO:

L1.1

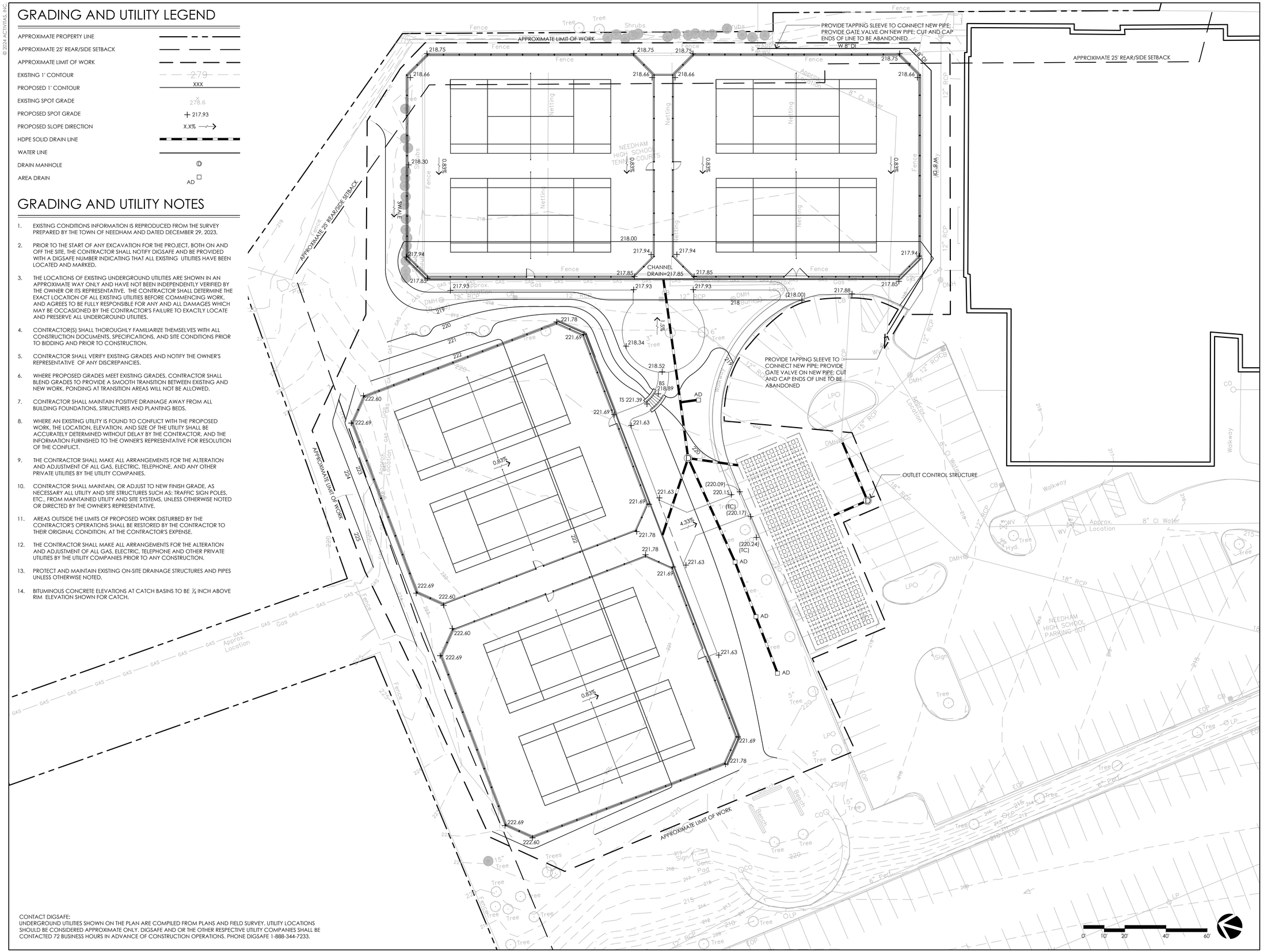
GRADING AND UTILITY LEGEND

APPROXIMATE PROPERTY LINE	
APPROXIMATE 25' REAR/SIDE SETBACK	
APPROXIMATE LIMIT OF WORK	
EXISTING 1' CONTOUR	279
PROPOSED 1' CONTOUR	XXX
EXISTING SPOT GRADE	278.6
PROPOSED SPOT GRADE	+ 217.93
PROPOSED SLOPE DIRECTION	X.X%
HDPE SOLID DRAIN LINE	
WATER LINE	
DRAIN MANHOLE	
AREA DRAIN	AD

GRADING AND UTILITY NOTES

1. EXISTING CONDITIONS INFORMATION IS REPRODUCED FROM THE SURVEY PREPARED BY THE TOWN OF NEEDHAM AND DATED DECEMBER 29, 2023.
2. PRIOR TO THE START OF ANY EXCAVATION FOR THE PROJECT, BOTH ON AND OFF THE SITE, THE CONTRACTOR SHALL NOTIFY DIGSAFE AND BE PROVIDED WITH A DIGSAFE NUMBER INDICATING THAT ALL EXISTING UTILITIES HAVE BEEN LOCATED AND MARKED.
3. THE LOCATIONS OF EXISTING UNDERGROUND UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY AND HAVE NOT BEEN INDEPENDENTLY VERIFIED BY THE OWNER OR ITS REPRESENTATIVE. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK, AND AGREES TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MAY BE OCCASIONED BY THE CONTRACTOR'S FAILURE TO EXACTLY LOCATE AND PRESERVE ALL UNDERGROUND UTILITIES.
4. CONTRACTOR(S) SHALL THOROUGHLY FAMILIARIZE THEMSELVES WITH ALL CONSTRUCTION DOCUMENTS, SPECIFICATIONS, AND SITE CONDITIONS PRIOR TO BIDDING AND PRIOR TO CONSTRUCTION.
5. CONTRACTOR SHALL VERIFY EXISTING GRADES AND NOTIFY THE OWNER'S REPRESENTATIVE OF ANY DISCREPANCIES.
6. WHERE PROPOSED GRADES MEET EXISTING GRADES, CONTRACTOR SHALL BLEND GRADES TO PROVIDE A SMOOTH TRANSITION BETWEEN EXISTING AND NEW WORK. PONDING AT TRANSITION AREAS WILL NOT BE ALLOWED.
7. CONTRACTOR SHALL MAINTAIN POSITIVE DRAINAGE AWAY FROM ALL BUILDING FOUNDATIONS, STRUCTURES AND PLANTING BEDS.
8. WHERE AN EXISTING UTILITY IS FOUND TO CONFLICT WITH THE PROPOSED WORK, THE LOCATION, ELEVATION, AND SIZE OF THE UTILITY SHALL BE ACCURATELY DETERMINED WITHOUT DELAY BY THE CONTRACTOR, AND THE INFORMATION FURNISHED TO THE OWNER'S REPRESENTATIVE FOR RESOLUTION OF THE CONFLICT.
9. THE CONTRACTOR SHALL MAKE ALL ARRANGEMENTS FOR THE ALTERATION AND ADJUSTMENT OF ALL GAS, ELECTRIC, TELEPHONE, AND ANY OTHER PRIVATE UTILITIES BY THE UTILITY COMPANIES.
10. CONTRACTOR SHALL MAINTAIN, OR ADJUST TO NEW FINISH GRADE, AS NECESSARY ALL UTILITY AND SITE STRUCTURES SUCH AS: TRAFFIC SIGN POLES, ETC., FROM MAINTAINED UTILITY AND SITE SYSTEMS, UNLESS OTHERWISE NOTED OR DIRECTED BY THE OWNER'S REPRESENTATIVE.
11. AREAS OUTSIDE THE LIMITS OF PROPOSED WORK DISTURBED BY THE CONTRACTOR'S OPERATIONS SHALL BE RESTORED BY THE CONTRACTOR TO THEIR ORIGINAL CONDITION, AT THE CONTRACTOR'S EXPENSE.
12. THE CONTRACTOR SHALL MAKE ALL ARRANGEMENTS FOR THE ALTERATION AND ADJUSTMENT OF ALL GAS, ELECTRIC, TELEPHONE AND OTHER PRIVATE UTILITIES BY THE UTILITY COMPANIES PRIOR TO ANY CONSTRUCTION.
13. PROTECT AND MAINTAIN EXISTING ON-SITE DRAINAGE STRUCTURES AND PIPES UNLESS OTHERWISE NOTED.
14. BITUMINOUS CONCRETE ELEVATIONS AT CATCH BASINS TO BE ¼ INCH ABOVE RIM ELEVATION SHOWN FOR CATCH.

CONTACT DIGSAFE:
UNDERGROUND UTILITIES SHOWN ON THE PLAN ARE COMPILED FROM PLANS AND FIELD SURVEY. UTILITY LOCATIONS SHOULD BE CONSIDERED APPROXIMATE ONLY. DIGSAFE AND OR THE OTHER RESPECTIVE UTILITY COMPANIES SHALL BE CONTACTED 72 BUSINESS HOURS IN ADVANCE OF CONSTRUCTION OPERATIONS. PHONE DIGSAFE 1-888-344-7233.



ACTIVITAS
landscape architecture | civil engineering
70 Milton Street | Dedham, MA 02026-2915
(781) 326-2600 | activitas.com

CONSULTANTS

TOWN OF NEEDHAM

NEEDHAM, MA

NEEDHAM HIGH SCHOOL TENNIS COURT RENOVATION

Major Project Site Plan Approval
February 6, 2024

REVISIONS:

NO.	DATE	DESCRIPTION

SCALE:	1"=20'-0"
PROJECT NO.:	23016.00
FILE:	23016.00-L2.1-G_PLAN.dwg
DRAWN:	BJM
CHECKED:	JC

SEAL:

COMMONWEALTH OF MASSACHUSETTS
MEGAN E. BUCZYNSKI
CIVIL
No. 47392
REGISTERED PROFESSIONAL ENGINEER

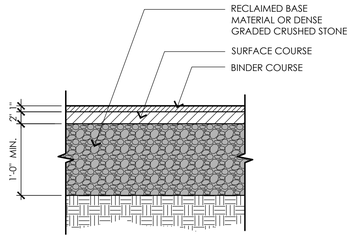
2/6/23

SHEET TITLE:

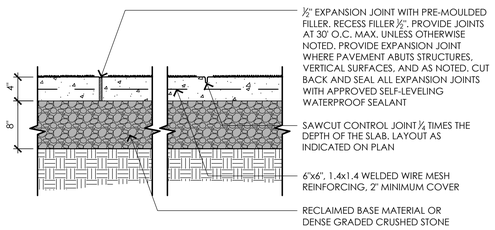
GRADING AND UTILITY PLAN

SHEET NO:

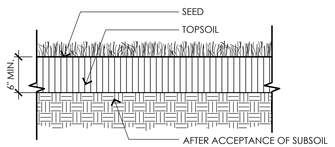
L2.1



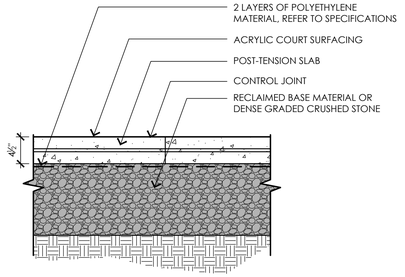
1 BITUMINOUS CONCRETE PAVEMENT
NOT TO SCALE



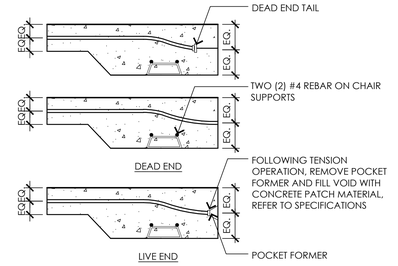
2 CEMENT CONCRETE PAVEMENT
NOT TO SCALE



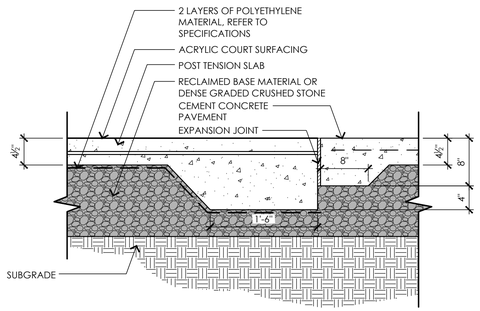
3 LOAM AND SEED
NOT TO SCALE



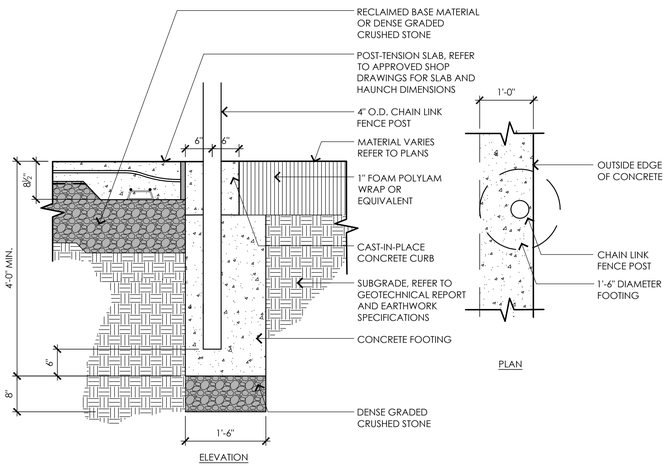
4 POST-TENSION CONCRETE
NOT TO SCALE



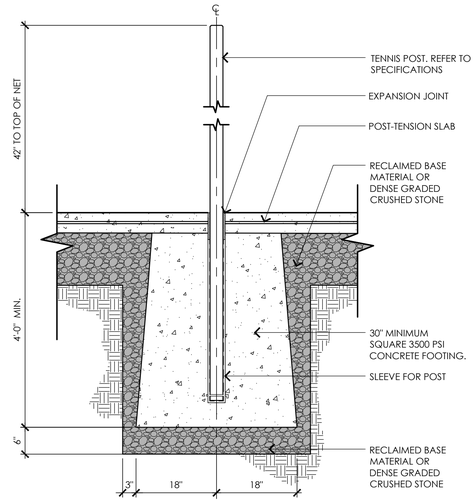
5 POST-TENSION EDGE DETAIL
NOT TO SCALE



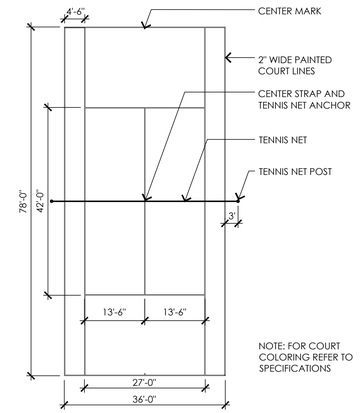
6 POST-TENSION CONCRETE EDGE AT CEMENT CONCRETE PAVEMENT
NOT TO SCALE



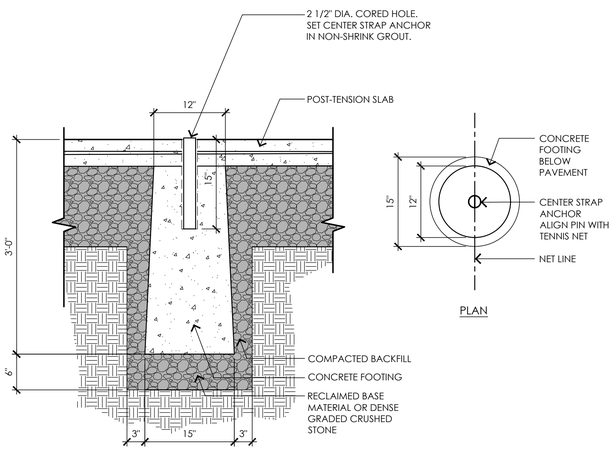
7 CHAIN LINK FENCE POST AT PERIMETER OF TENNIS COURTS
NOT TO SCALE



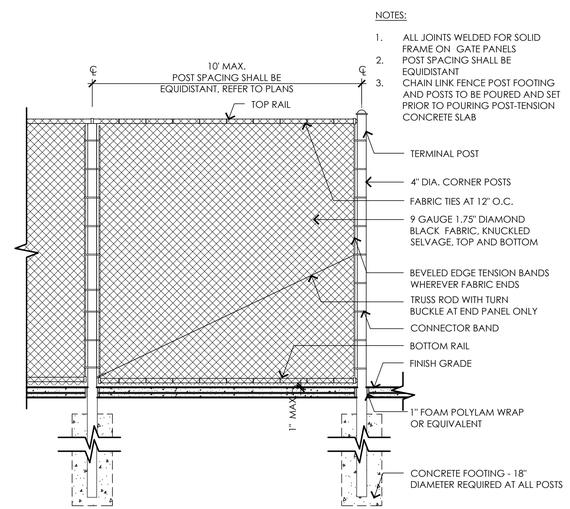
8 TENNIS NET POST
NOT TO SCALE



9 TENNIS COURT STRIPING LAYOUT
NOT TO SCALE



10 CENTER STRAP ANCHOR
NOT TO SCALE



11 12' HIGH CHAIN LINK FENCE
NOT TO SCALE

ACTIVITAS
landscape architecture | civil engineering
70 Milton Street | Dedham, MA 02026-2915
(781) 326-2600 | activitas.com

CONSULTANTS

TOWN OF NEEDHAM
NEEDHAM, MA
NEEDHAM HIGH SCHOOL TENNIS COURT RENOVATION

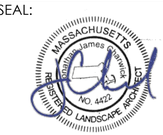
Major Project Site Plan Approval
February 6, 2024

REVISIONS:

NO.	DATE	DESCRIPTION

SCALE:	AS NOTED
PROJECT NO.:	23016.00
FILE:	23016.00-L4.1-DET_1.dwg
DRAWN:	BJM
CHECKED:	JC

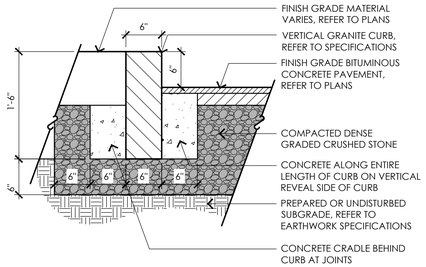
SEAL:



2/6/2024

SHEET TITLE:
DETAIL SHEET I

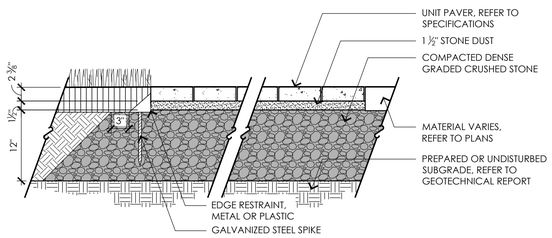
SHEET NO:
L3.1



1 VERTICAL GRANITE CURB

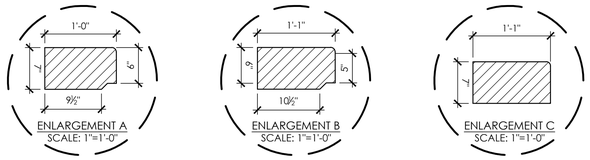
NOT TO SCALE

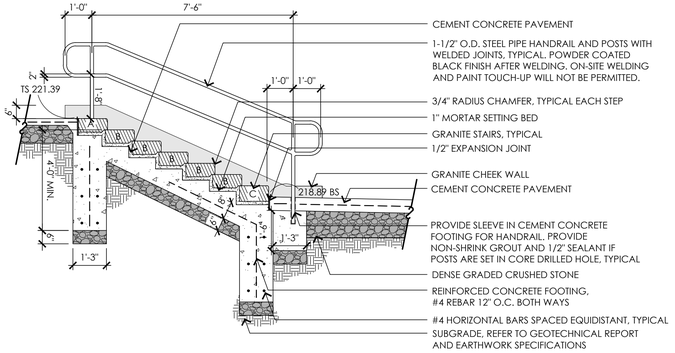
PAVER PATTERN ENLARGEMENT



2 UNIT PAVERS

NOT TO SCALE





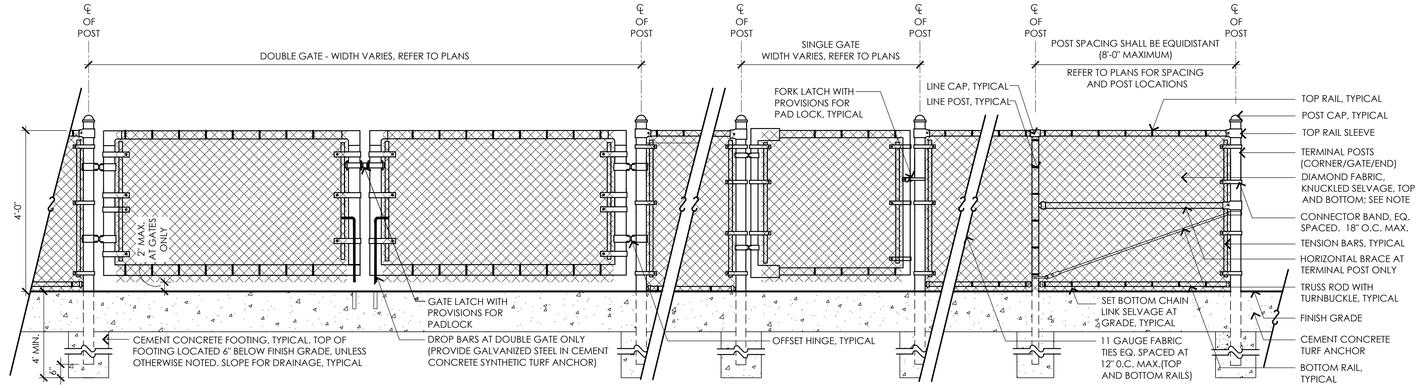
3 GRANITE STAIRS, CHEEK WALLS AND RAILINGS

NOT TO SCALE

NOTES:

1. FENCE FABRIC TOP SHALL BE EVEN WITH TOP OF TOP RAIL.
2. GATES SHALL SWING 180° DEGREES SO THAT WHEN FULLY OPEN GATE PANELS SHALL BE PARALLEL TO CHAIN LINK FENCE.
3. PROVIDE PROVISIONS FOR PAD LOCKS ON ALL GATES.
4. TOP OF CONCRETE FENCE POST FOOTING SHALL BE BELOW FINISH GRADE AND SHALL HAVE SLOPE TO PROMOTE POSITIVE DRAINAGE, TYPICAL.
5. REFER TO SPECIFICATIONS FOR POST, RAIL, AND FABRIC INFORMATION.
6. REFER TO SPECIFICATIONS FOR WINDSCREEN REQUIREMENTS.
7. WINDSCREEN TO BE FURNISHED AND INSTALLED BY OTHERS.

TERMINAL	48"x18"
LINE	48"x15"

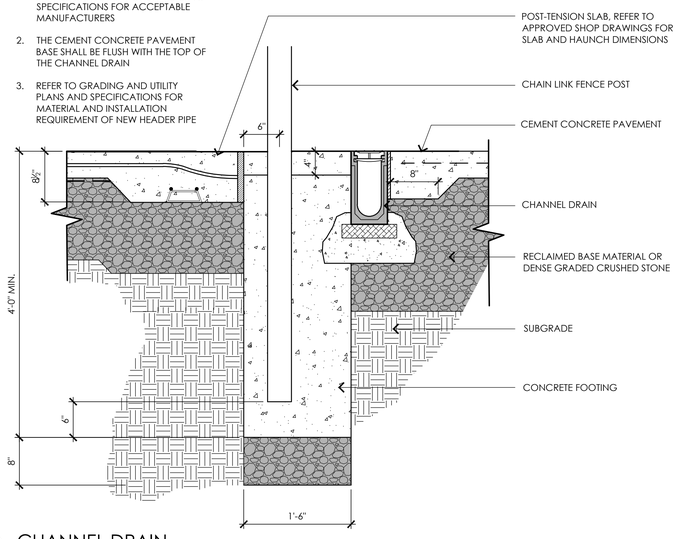


4 4' HIGH CHAIN LINK FENCE AND GATES

NOT TO SCALE

NOTES:

1. DESIGN OF CHANNEL DRAINS VARY PER MANUFACTURER, CHANNEL DRAIN SHOWN FOR GRAPHIC AND INSTALLATION INTENT ONLY. REFER TO SPECIFICATIONS FOR ACCEPTABLE MANUFACTURERS
2. THE CEMENT CONCRETE PAVEMENT BASE SHALL BE FLUSH WITH THE TOP OF THE CHANNEL DRAIN
3. REFER TO GRADING AND UTILITY PLANS AND SPECIFICATIONS FOR MATERIAL AND INSTALLATION REQUIREMENT OF NEW HEADER PIPE



5 CHANNEL DRAIN

NOT TO SCALE

ACTIVITAS
landscape architecture | civil engineering
70 Milton Street | Dedham, MA 02026-2915
(781) 326-2600 | activitas.com

CONSULTANTS

TOWN OF NEEDHAM

NEEDHAM, MA

NEEDHAM HIGH SCHOOL TENNIS COURT RENOVATION

Major Project Site Plan Approval
February 6, 2024

REVISIONS:

NO.	DATE	DESCRIPTION

SCALE:	AS NOTED
PROJECT NO.:	23016.00
FILE:	23016.00-L4.1-DET_1.dwg
DRAWN:	BJM
CHECKED:	JC

SEAL:

2/6/2024

SHEET TITLE:

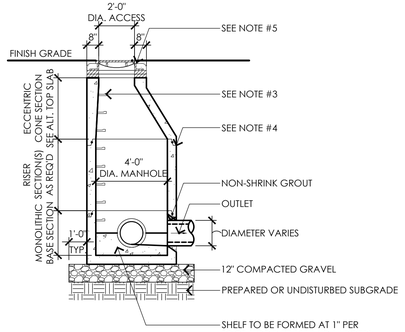
DETAIL SHEET II

SHEET NO:

L3.2

NOTES:

1. ALL SECTION SHALL BE DESIGNED FOR HS-20 LOADING.
2. PROVIDE "V" KNOCKOUTS FOR PIPES WITH 1" MAX. CLEARANCE TO OUTSIDE OF PIPE. MORTAR ALL PIPE CONNECTIONS.
3. COPOLYMER MANHOLE STEPS SHALL BE INSTALLED AT 12" O.C. FOR THE FULL DEPTH OF THE STRUCTURE.
4. JOINT SEALANT BETWEEN PRECAST SECTIONS SHALL BE PREFORMED BUTYL RUBBER.
5. DRAIN MANHOLE FRAME SHALL BE SET IN FULL MORTAR BED. ADJUST TO GRADE WITH CLAY BRICK AND MORTAR (2 BRICK COURSES MINIMUM 5 BRICK COURSES MAXIMUM).

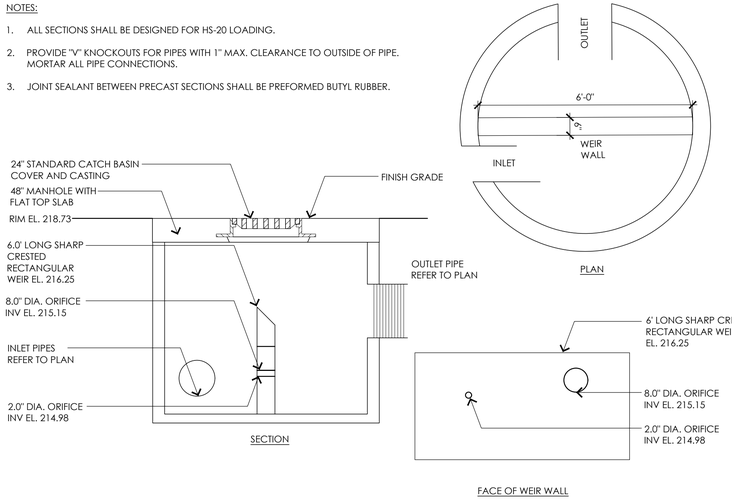


1 DRAIN MANHOLE

NOT TO SCALE

NOTES:

1. ALL SECTIONS SHALL BE DESIGNED FOR HS-20 LOADING.
2. PROVIDE "V" KNOCKOUTS FOR PIPES WITH 1" MAX. CLEARANCE TO OUTSIDE OF PIPE. MORTAR ALL PIPE CONNECTIONS.
3. JOINT SEALANT BETWEEN PRECAST SECTIONS SHALL BE PREFORMED BUTYL RUBBER.

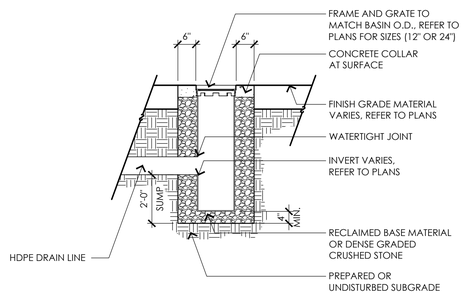


2 OUTLET CONTROL STRUCTURE

NOT TO SCALE

NOTES:

1. GRATES SHALL BE DUCTILE IRON PER ASTM A536 GRADE 70-50-05.
2. FRAMES SHALL BE DUCTILE IRON PER ASTM A536 GRADE 70-50-05.
3. DRAINAGE CONNECTION STUB JOINT TIGHTNESS SHALL CONFORM TO ASTM D3212 FOR CORRUGATED HDPE.

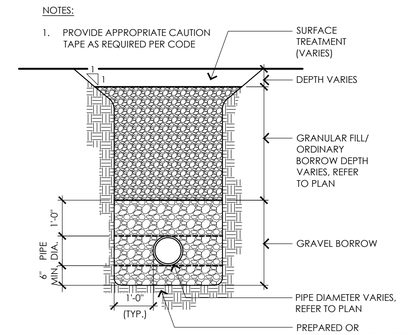


3 AREA DRAIN

NOT TO SCALE

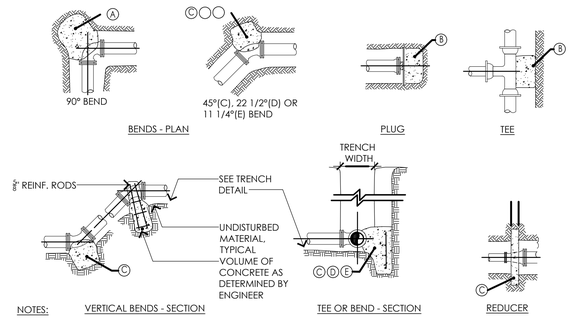
NOTES:

1. PROVIDE APPROPRIATE CAUTION TAPE AS REQUIRED PER CODE



4 UTILITY TRENCH

NOT TO SCALE



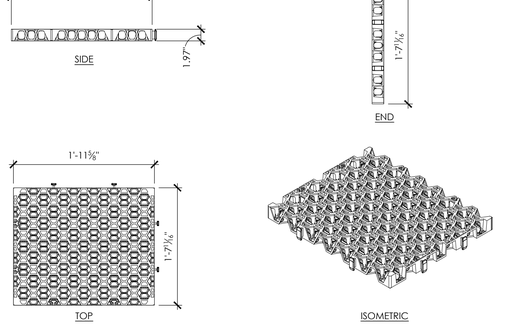
THRUST BLOCK SCHEDULE SQUARE FEET OF CONCRETE THRUST BLOCKING BEARING ON UNDISTURBED MATERIAL												
REACTION TYPE	PIPE SIZE											
	4"	6"	8"	10"	12"	14"	16"	18"	20"	24"	30"	36"
Ⓐ	1.78	4.38	7.84	11.14	16.52	21.82	30.82	36.04	48.12	69.28	107.66	154.78
Ⓑ	1.30	3.10	5.52	8.38	12.18	16.74	21.78	27.74	34.02	48.98	76.12	109.44
Ⓒ	0.96	2.38	4.24	6.02	9.32	11.82	16.68	19.42	26.04	37.50	58.26	83.76
Ⓓ	0.50	1.2	2.16	3.08	4.74	6.02	8.50	9.94	13.28	19.12	29.70	42.70
Ⓔ	0.26	0.60	1.08	1.54	2.38	3.04	4.24	5.02	6.66	9.58	14.90	21.42
OTHER TEST PRESSURES FOR THE ABOVE REACTIONS	ABOVE DIMENSIONS ARE MINIMUM THRUST BLOCK SIZES. THEY HAVE BEEN CALCULATED USING A PRESSURE OF 200 PSI. TEST PRESSURE TO BE 150 PSI MIN. OR AS REQUIRED BY BWSC. SQUARE FEET OF CONCRETE THRUST BLOCKING FOR OTHER TEST PRESSURES IS DIRECTLY PROPORTION TO THE ABOVE TABLE. FOR INSTANCE, AT 225 PSI TEST PRESSURE ABOVE NUMBERS SHOULD BE MULTIPLIED BY 1.125 (225 PSI / 200 PSI = 1.125).											

NOTES:

1. POUR THRUST BLOCKS AGAINST UNDISTURBED MATERIAL. WHERE TRENCH WALL HAS BEEN DISTURBED, EXCAVATE LOOSE MATERIAL AND EXTEND THRUST BLOCK TO UNDISTURBED MATERIAL. NO JOINTS SHALL BE COVERED WITH CONCRETE.
2. ON BENDS AND TEES, EXTEND THRUST BLOCKS FULL LENGTH OF FITTING.
3. PLACE SOLID CONCRETE BLOCKS IN FRONT OF ALL PLUGS BEFORE POURING THRUST BLOCK.
4. REQUIREMENTS OF THE ABOVE TABLE PRESUME MINIMUM SOIL BEARING OF 1 TON PER SQUARE FOOT, AND MAY BE VARIED BY THE ENGINEER TO MEET OTHER CONDITIONS ENCOUNTERED.
5. MEGA-LUG RETAINER GLANDS ARE REQUIRED FOR ALL MECHANICAL JOINTS. THESE GLANDS DO NOT REDUCE THE REQUIREMENTS FOR THRUST RESTRAINT.
6. ALL FITTINGS SHALL BE WRAPPED IN POLYETHYLENE OR BUILDING PAPER PRIOR TO INSTALLATION OF CONCRETE RESTRAINT.
7. THREADED ROD SHALL BE ANSI A242 FY50 PIPE RESTRAINT NUTS TO MATCH AWWA C111. THREADED RODS AND NUTS TO BE FIELD COATED WITH BITUMINOUS PAINT.
8. THRUST RESTRAINT IS REQUIRED FOR ALL TEES, BENDS, REDUCERS, CAPS, PLUGS, OR CROSSES.
9. INSTALL LIFT HOOKS INTO THRUST BLOCKS AT END CAPS AND PLUGS.

5 THRUST BLOCKS

NOT TO SCALE



6 R-TANK XD PANEL

NOT TO SCALE

ACTIVITAS
landscape architecture | civil engineering
70 Milton Street | Dedham, MA 02026-2915
(781) 326-2600 | activitas.com

CONSULTANTS

TOWN OF NEEDHAM

NEEDHAM, MA

NEEDHAM HIGH SCHOOL TENNIS COURT RENOVATION

Major Project Site Plan Approval
February 6, 2024

REVISIONS:

NO.	DATE	DESCRIPTION

SCALE:	AS NOTED
PROJECT NO.:	23016.00
FILE:	23016.00-L4.1-DET_1.dwg
DRAWN:	BJM
CHECKED:	JC

SEAL:

COMMONWEALTH OF MASSACHUSETTS
MEGAN E. BUCZYNSKI
CIVIL
No. 47392
REGISTERED PROFESSIONAL ENGINEER

2/6/23

SHEET TITLE:

DETAIL SHEET II

SHEET NO:

L3.3

STORMWATER MANAGEMENT AND EROSION CONTROL REPORT

Date: 6 February 2024

Applicant: Town of Needham
1471 Highland Ave
Needham, MA 02494

Prepared By: Ben McDonough, EIT
Civil Designer
Activitas Inc.
70 Milton Street
Dedham, MA 02026

Project Address: Needham High School
609 Webster Street
Needham, MA 02494

Reviewed By: Megan Buczynski, PE
Principal Civil Engineer
Activitas Inc.
70 Milton Street
Dedham, MA 02026

Project: Needham High School Tennis Court Renovation

PROJECT OVERVIEW

The Town of Needham would like to renovate the tennis facility at Needham High School located at 609 Webster Street in Needham. The proposed work will include:

- Renovation of four (4) existing tennis courts
- Construction of four (4) new tennis courts
- Renovation / improvements to team and spectator areas
- Construction of handicap accessible walkways to all courts

COMPLIANCE WITH STORMWATER STANDARDS

The Town of Needham utilizes the policy, criteria and information including specifications and standards of the latest edition of the Massachusetts Department of Environmental Protection Stormwater Handbook (MA Stormwater Handbook) and the Town of Needham Stormwater Bylaw (Article 7). The report below outlines how each of the MA Stormwater Standards and requirements set forth in the Needham Stormwater Bylaw are met, satisfying regulatory requirements.

Standard 1: No New Untreated Discharges

The MA Stormwater Handbook requires that projects demonstrate that there are no new untreated discharges and that new discharges will not cause erosion or scour to downstream wetlands or water of the Commonwealth.

Computations and strategies shown for Standards 4 through 6 in this report demonstrate that there will be no new untreated discharges from the site.

Standard 2: Peak Rate Attenuation

Standard 2 was defined with the understanding that development typically includes an increase in impervious surface and that with that increase in impervious surface a greater volume of runoff will be generated. To mitigate this increase in volume to avoid downstream flooding, Standard 2 requires that stormwater management systems be designed so that post-development peak discharge rates don't exceed pre-development peak discharge rates for the 2-yr, 10-yr, and 100-yr storm events.

The Town of Needham has implemented a recharge requirement in the Stormwater Bylaw to further reduce the volume of flow from a project in comparison to the existing condition (refer to Standard 3 for these calculations). The Town has noted that the existing downstream stormwater system is often overtaxed in storm events and the recharge requirement was implemented to help mitigate this issue. On this project site, by implementing the additional recharge requirement, the volume of stormwater to leave the site is below the existing condition volumes. It should be noted that while the rate of runoff is slightly greater than existing, in this case because we are reducing the actual volume, we are meeting the intent of this Standard which is to reduce off-site flooding due to the project. Additionally, in reviewing the watershed which flows to Rosemary Lake, this project site is located on the lower portion of the watershed and the small increase in rate may be beneficial to move water through the stormwater system earlier in a storm event. The calculations in this section will show how the recharge requirement decreases the runoff volume entering the municipal system.

2.1 Site Description

The Needham High School Tennis project site is a 2.09-acre area containing four tennis courts, grassed areas, and walkways. The area is bordered by houses to the north, east, and west, and the Needham High School building and parking areas to the south. The tennis courts are situated on the highest terrace of the high school site around elevation 225.00 and the adjacent parking lot area is down gradient near El. 219.00. The surrounding area to the south continues to slope down gradient.

2.1.1 Soil Conditions

The Natural Resources Conservation Service (NRCS) maps soils in the vicinity of the project site as Woodbridge-Urban land complex, 3-15 percent slopes (623C), refer to the attached NRCS Soil

Report. This soil has a hydrologic rating of C/D. For the purposes of this analysis, a hydrologic rating of C has been used in the analysis.

2.1.2 Rainfall

In accordance with the MA Stormwater Standards, rainfall data is from the TP-40 Rainfall Frequency Atlas of the United States. The following depths were used in the HydroCAD model for the 2-yr, 10-yr, and 100-yr storm events:

Table 2.1: Rainfall Data

Storm Event	Rainfall Depth
2-yr	3.2"
10-yr	4.7"
100-yr	6.7"

*See Rainfall Data attachment for rainfall data

2.2 Hydrologic Model Description

The drainage analysis was performed using the Soil Conservation Service (SCS) TR-55 and TR-20 methodologies and the computer program HydroCAD 10.20-3c by HydroCAD software Solutions, LLC.

2.2.1 Existing Conditions

The existing site is divided in two drainage areas, EX-1, and EX-2, which flow to two different sections of the municipal system, EPLE and WPLE, respectively. See the Pre-Development Plan Attachment (Fig. 1) for a breakdown of the existing area. These two sections of the system eventually combine and flow to Rosemary Lake which is considered Discharge Point 1 modeled DP-1E in HydroCAD.

Drainage Area EX-1 is a 79,516-sf area consisting of the existing four (4) tennis courts, the adjacent grassed areas, and bituminous concrete walkways. Runoff from EX-1 sheet flows to the south and is collected by the existing drainage system west of the existing tennis courts which ties into the eastern system in the parking lot (EPLE).

Drainage Area EX-2 is a 11,584-sf area consisting of a portion of a grassed area to the west of the tennis courts. Runoff from EX-2 sheet flows southwest off site down a slope to a drainage system in the parking lot that flows to the west (WPLE).

As noted above, these two drainage systems flow to DP-1E Rosemary Lake.

2.2.2 Proposed Conditions

In the proposed conditions the two drainage areas (PR-1 and PR-2) are maintained, but runoff from a larger portion of the overall area will now flow towards EPLP. See the Post-Development Plan Attachment (Fig. 2) for a breakdown of the proposed area.

Drainage Area PR-1 is an 88,675-sf area that consists of the existing four (4) tennis courts, the four (4) new tennis courts, spectator areas, handicap accessible walkways, and grassed areas. Runoff from this area flows from the east edge of the existing tennis courts to the west edge of the existing tennis courts where it is collected by a channel drain and connects to the proposed detention basin. Runoff from the new tennis courts flows from north to south and is collected by a channel drain and connects to the proposed detention basin. Runoff from adjacent landscape areas is collected in area drains and sent to the proposed detention basin. The detention basin, modeled as Pond 1P in HydroCAD, outlets to an outlet control structure and flows to the east parking lot system (EPLP) which eventually flows to Rosemary Lake, modeled DP-1P in HydroCAD. See HydroCAD report for details.

Pond 1P was designed to provide adequate storage to meet the Town of Needham 1" recharge requirement. The proposed system uses the R-Tank System as provided by Ferguson and crushed stone with a 35% void ratio. To meet the recharge requirements over C-soils, a large footprint, but low-profile system was designed. Refer to HydroCAD for the layout of the system. Runoff from PR-1 flows into this system and then is released through an outlet control structure that ties into the existing parking lot drainage system (EPLP).

Drainage Area PR-2 is a 2,245-sf area consisting of a small grass area to the south of the new tennis courts that flows downhill and is not collected in the new drainage infrastructure. This runoff continues to flow to the parking area to the south which flows into the drainage system to the west (WPLP) which eventually flows to Rosemary Lake, modeled as DP-1P in HydroCAD. See HydroCAD report for details.

Table 2.2: Existing & Proposed Conditions Takeoff Areas (sf)

	Impervious CN=98	Grass CN=79	Total Area	Average CN
EX-1	36,378	43,138	79,516	88
EX-2	0	11,584	11,584	79
PR-1	66,254	22,421	88,675	92
PR-2	0	2,425	2,425	79

2.2.3 Drainage Analysis Results

Table 2.3 documents the results of the hydrologic analysis. As noted previously, the total volume in all the storms decreases meeting the intent of Standard 2. While the rates are slightly above existing conditions, the volumes are less and therefore the intent of the standard is met.

Table 2.3: Summary of Runoff Rates (cfs) & Volumes (cf)

		2 Year		10 Year		100 Year	
		Rate (cfs)	Volume (cf)	Rate (cfs)	Volume (cf)	Rate (cfs)	Volume (cf)
DISCHARGE POINTS	DP-1E	4.57	14,523	7.72	24,885	11.95	39,296
	DP-1P	5.99	13,577	8.92	24,430	12.77	39,224

Standard 3: Stormwater Recharge

3.1 Stormwater Recharge Calculation

The Stormwater Standards indicate that at a minimum, the annual recharge from the post development site shall approximate the annual recharge from pre-development conditions based on soil type. Since Group C soils have a high runoff potential and lownfiltration rates, the Stormwater Standards give us a Volume to Recharge coefficient, F, of 0.25" for C-soils. The required recharge volume, the stormwater volume that must be infiltrated, equals the recharge volume multiplied by the total area within the NRCS Hydrologic Group that is impervious. The Town of Needham requires post construction measures to provide a minimum combined volumetric capacity to recharge one (1) inch of rainfall depth over the total increase in impervious area of the property.

$$R_v = F\ x\ Impervious\ Area$$

*F for Town Regulations is 1-inch

$$R_v = (1.0in)\ x\ \left(\frac{1\ ft}{12\ in}\right) x\ (\ 29{,}672\ sf)$$

$$R_v = 2{,}472\ cf$$

Pond-1P has a detention volume of 3,200 cf. Therefore, the required recharge volume will be fully infiltrated.

3.2 Drawdown Time

The MA Stormwater Handbook requires that recharge volume have a drawdown time of 72 hours or less. The time required to dewater a recharge system may be estimated by the following equation:

$$Time_{drawdown} = \frac{V_{RS}}{(K)\ x\ \left(\frac{1ft}{12in}\right) x\ (A_R)}$$

$$V_{RS} = Volume\ of\ recharge\ storage\ system\ (cf)$$

$$K = Rawls\ Rate\ \left(\frac{in}{hr}\right)$$

$$A_R = Surface\ area\ of\ recharge\ system\ (sf)$$

The drawdown time for the detention system associated with the infiltration basin (Pond-1P):

$$Time_{drawdown} = \frac{3{,}200\ cf}{\left(\frac{0.17\ in}{hr}\right) x\ \left(\frac{1\ ft}{12\ in}\right) x\ (3{,}434\ sf)}$$

$$Time_{drawdown} = 65.76\ hours$$

The drawdown time of 65.76 hours for Pond-1P is below the 72-hour maximum as set by the MA Stormwater Handbook and therefore the standard has been met.

Standard 4: Required Water Quality Volumes

Stormwater management standards will be designed to remove 80% of the average annual post-construction load of Total Suspended Solids (TSS). The MA Stormwater Handbook states that this standard is met when:

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

The MA Stormwater Handbook requires a water quality volume equal to 0.5-inch of runoff times the total impervious area of the post development site.

$$V_{WQ} = 0.5\ in\ x\ \frac{1\ ft}{12\ in}\ x\ Total\ Impervious$$

$$V_{WQ} = 0.5\ in\ x\ \frac{1\ ft}{12\ in}\ x\ 66{,}254\ sf$$

$$V_{WQ} = 2{,}760.58\ cf$$

Pond-1P has a cumulative storage volume of 3,200 cf which meets the required Water Quality Volume calculated above.

Standard 5: Land Uses with Higher Potential Pollutant Loads

This project is not considered a land use with Higher Potential Pollutant loads therefore Standard 5 is not applicable to this project.

Standard 6: Critical Areas

Runoff from this project does not discharge to any critical areas and therefore is not subject to additional treatment required by Standard 6.

Standard 7: Redevelopment

For the purposes of the Stormwater Management Standards, redevelopment projects are defined to include development, rehabilitation, and expansion on previously developed sites provided the redevelopment results in no net increase in impervious area. Since this project increases the total net impervious area on the site, this project does not meet the definition of a redevelopment as defined in the MA Stormwater Standards. Due to this, all the stormwater standards must be met and have been met as demonstrated in this report.

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

Construction period pollution prevention and erosion and sedimentation control will be implemented at the project site to control construction related impacts during construction and land disturbance activities. Refer to the Site Preparation Plan for location of erosion and sediment controls. In addition as the project will disturb over 1-acre of land the General Contractor will be required to submit for an obtain an EPA NPDES Construction General Permit for the proposed construction. As part of this submission the General Contractor will be required to develop a Stormwater Pollution Prevention Plan (SWPPP) for the project and submit to the project engineer for review and approval.

Standard 9: Operation and Maintenance Plan

The proposed project is owned by the Town of Needham. Stormwater structures and other stormwater best management practices should be maintained as directed in the Operations

and Maintenance Plan. An Operation and Maintenance Plan has been included as an attachment.

Standard 10: Prohibition of Illicit Discharges

Illicit Discharge Compliance Statement

"Per the requirements of Standard 10 of the Massachusetts Stormwater Management Standards it shall be stated that No Illicit Discharges exist at Needham High School located at 609 Webster Street, Needham, Massachusetts."

If you have any questions or comments on the enclosed information, please do not hesitate to contact me directly at (617) 981-9845 or by email at bjm@activitas.com.

Respectfully,

ACTIVITAS

Ben McDonough, EIT
Civil Designer
bjm@activitas.com

cc: Jon Charwick, Activitas, Inc.
Meg Buczynski, Activitas, Inc.

Attachments: MA Stormwater Checklist
NRCS Soil Report
Rainfall Data
Pre-Development Plan
Post-Development Plan
HydroCAD Report
Operation & Maintenance Plan

ACTIVITAS
landscape architecture | civil engineering

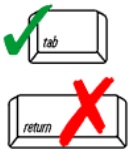
MA Stormwater Checklist

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

A. Introduction

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



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

The Stormwater Report must include:

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

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

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

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

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

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

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

B. Stormwater Checklist and Certification

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

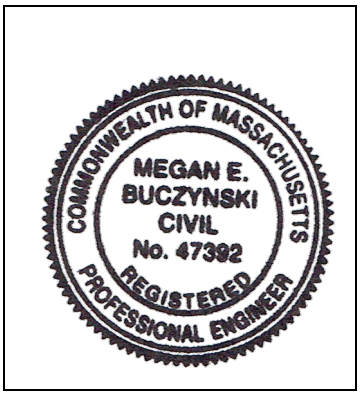
Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the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

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

Registered Professional Engineer's Certification

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

Registered Professional Engineer Block and Signature



M E Buczynski 2/5/2024

Signature and Date

Checklist

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

☐ New development

☐ Redevelopment

☒ Mix of New Development and Redevelopment

Checklist for Stormwater Report

Checklist (continued)

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

- ☒ No disturbance to any Wetland Resource Areas
- ☐ Site Design Practices (e.g. clustered development, reduced frontage setbacks)
- ☐ Reduced Impervious Area (Redevelopment Only)
- ☐ Minimizing disturbance to existing trees and shrubs
- ☐ LID Site Design Credit Requested:
  - ☐ Credit 1
  - ☐ Credit 2
  - ☐ Credit 3
- ☐ Use of “country drainage” versus curb and gutter conveyance and pipe
- ☐ Bioretention Cells (includes Rain Gardens)
- ☐ Constructed Stormwater Wetlands (includes Gravel Wetlands designs)
- ☐ Treebox Filter
- ☐ Water Quality Swale
- ☐ Grass Channel
- ☐ Green Roof
- ☐ Other (describe): _____

Standard 1: No New Untreated Discharges

- ☒ No new untreated discharges
- ☐ Outlets have been designed so there is no erosion or scour to wetlands and waters of the Commonwealth
- ☐ Supporting calculations specified in Volume 3 of the Massachusetts Stormwater Handbook included.

Checklist for Stormwater Report

Checklist (continued)

Standard 2: Peak Rate Attenuation

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

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

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

Standard 3: Recharge

☐ Soil Analysis provided.

☒ Required Recharge Volume calculation provided.

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

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

☒ Static ☐ Simple Dynamic ☐ Dynamic Field[1]

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

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

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

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

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

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

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

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

Checklist for Stormwater Report

Checklist (continued)

Standard 3: Recharge (continued)

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

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

Standard 4: Water Quality

The Long-Term Pollution Prevention Plan typically includes the following:

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

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

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

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

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

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

Checklist for Stormwater Report

Checklist (continued)

Standard 4: Water Quality (continued)

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

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

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

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

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

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

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

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

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

☐ All exposure has been eliminated.

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

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

Standard 6: Critical Areas

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

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

Checklist for Stormwater Report

Checklist (continued)

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

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

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

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

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

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

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

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

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

Checklist for Stormwater Report

Checklist (continued)

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

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

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

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

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

Standard 9: Operation and Maintenance Plan

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

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

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

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

Standard 10: Prohibition of Illicit Discharges

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

☒ An Illicit Discharge Compliance Statement is attached;

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

ACTIVITAS
landscape architecture | civil engineering

NRCS Soil Report

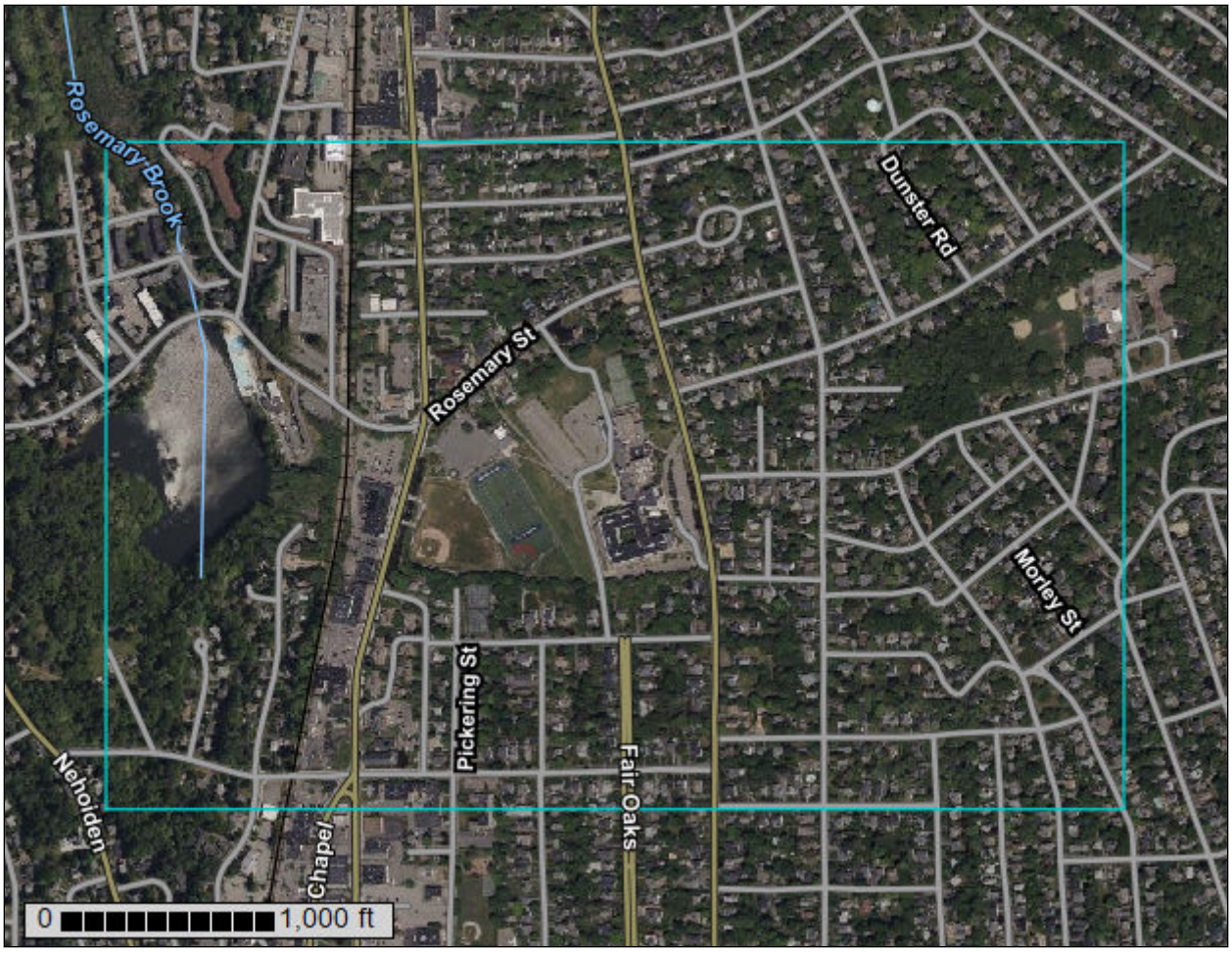
United States Department of Agriculture

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 Norfolk and Suffolk Counties, Massachusetts



November 28, 2023

Custom Soil Resource Report
Soil Map

Map Scale: 1:8,040 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 100 200 400 600

Feet: 0 350 700 1400 2100

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 19N WGS84

Custom Soil Resource Report
Map—Hydrologic Soil Group

Table—Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
1	Water		13.4	3.9%
31A	Walpole sandy loam, 0 to 3 percent slopes	B/D	2.1	0.6%
51	Swansea muck, 0 to 1 percent slopes	B/D	2.8	0.8%
52	Freetown muck, 0 to 1 percent slopes	B/D	5.7	1.7%
103B	Charlton-Hollis-Rock outcrop complex, 3 to 8 percent slopes	A	36.0	10.5%
253D	Hinckley loamy sand, 15 to 35 percent slopes	A	15.2	4.5%
255C	Windsor loamy sand, 8 to 15 percent slopes	A	1.2	0.3%
305B	Paxton fine sandy loam, 3 to 8 percent slopes	C	13.3	3.9%
305D	Paxton fine sandy loam, 15 to 25 percent slopes	C	13.5	3.9%
602	Urban land, 0 to 15 percent slopes		47.5	13.9%
623C	Woodbridge-Urban land complex, 3 to 15 percent slopes	C/D	58.0	16.9%
626B	Merrimac-Urban land complex, 0 to 8 percent slopes	A	115.6	33.8%
654	Udorthents, loamy	A	5.8	1.7%
655	Udorthents, wet substratum		12.2	3.6%
Totals for Area of Interest			**342.3**	**100.0%**

Rating Options—Hydrologic Soil Group

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

ACTIVITAS
landscape architecture | civil engineering

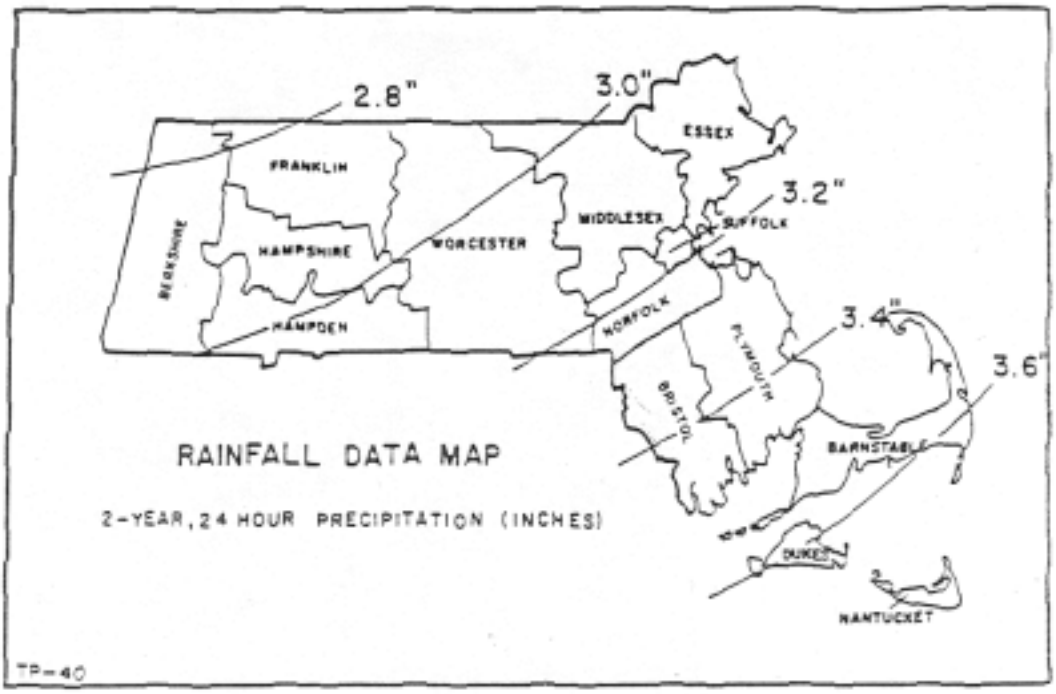
Rainfall Data

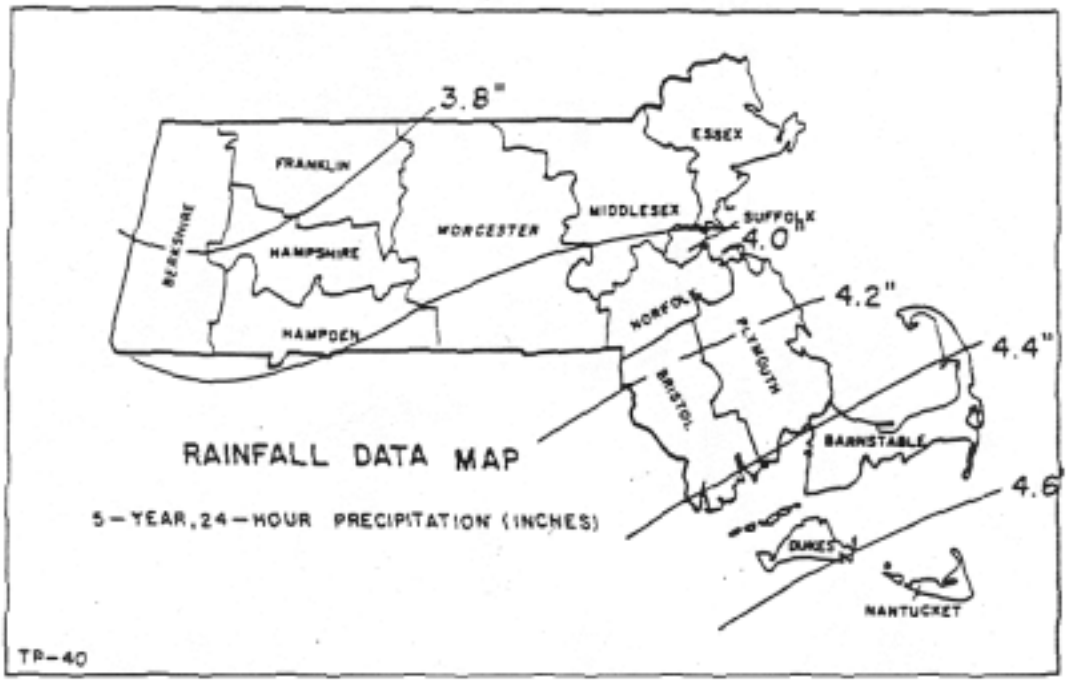
F-1. Rainfall Data for Massachusetts from *Rainfall Frequency Atlas of the United States* (TP-40)

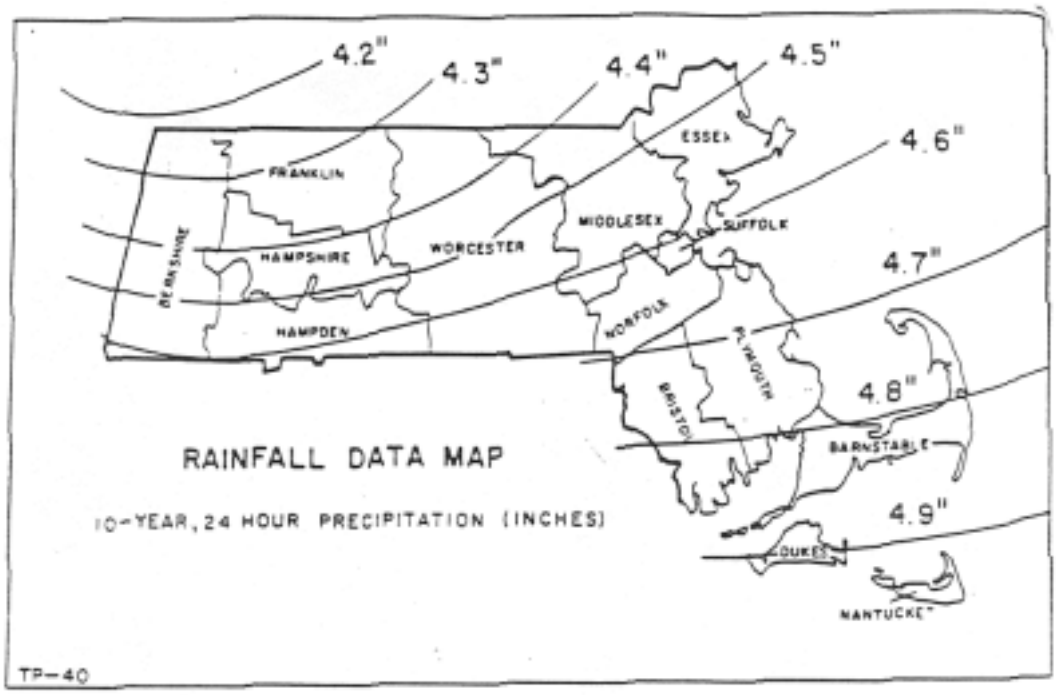
- Users of this Handbook should note that current MA DEP written guidance (see DEP Waterlines newsletter -- Fall 2000) requires the use of TP-40 Rainfall Data for calculations under the Wetlands Protection Regulations and the Stormwater Management Policy. More stringent design storms may be used under a local bylaw or ordinance. However, DEP will continue to require the use of TP-40 in any case it reviews under the Wetlands Protection Act and Stormwater Management Policy.

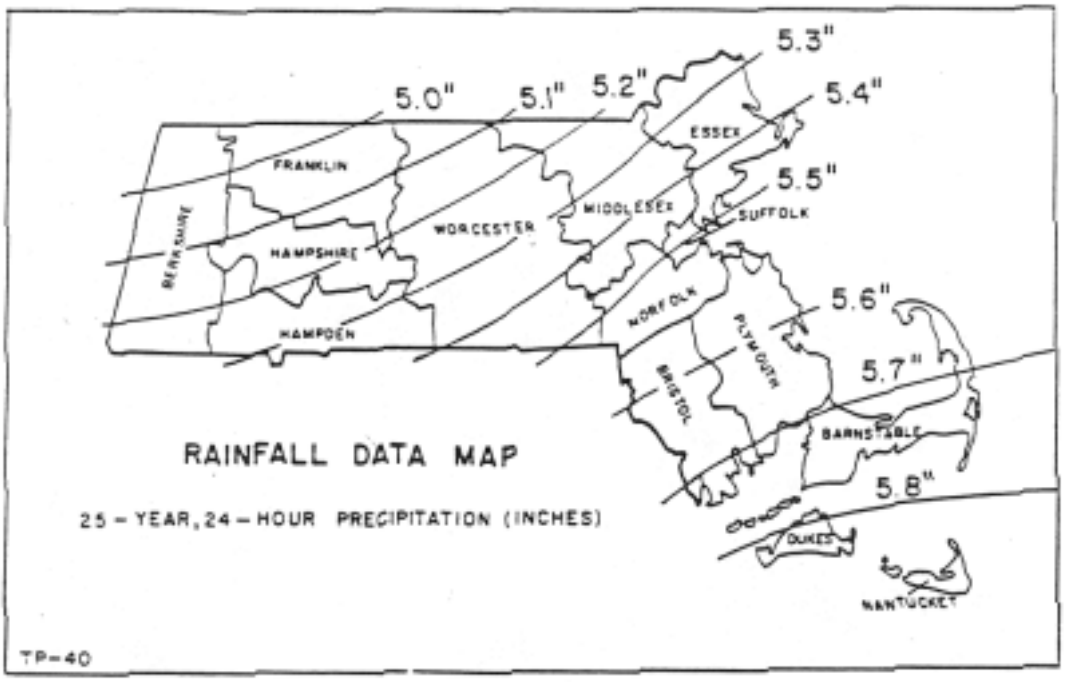
Adjusted Technical Paper 40 Design Storms for 24-hour Event by County

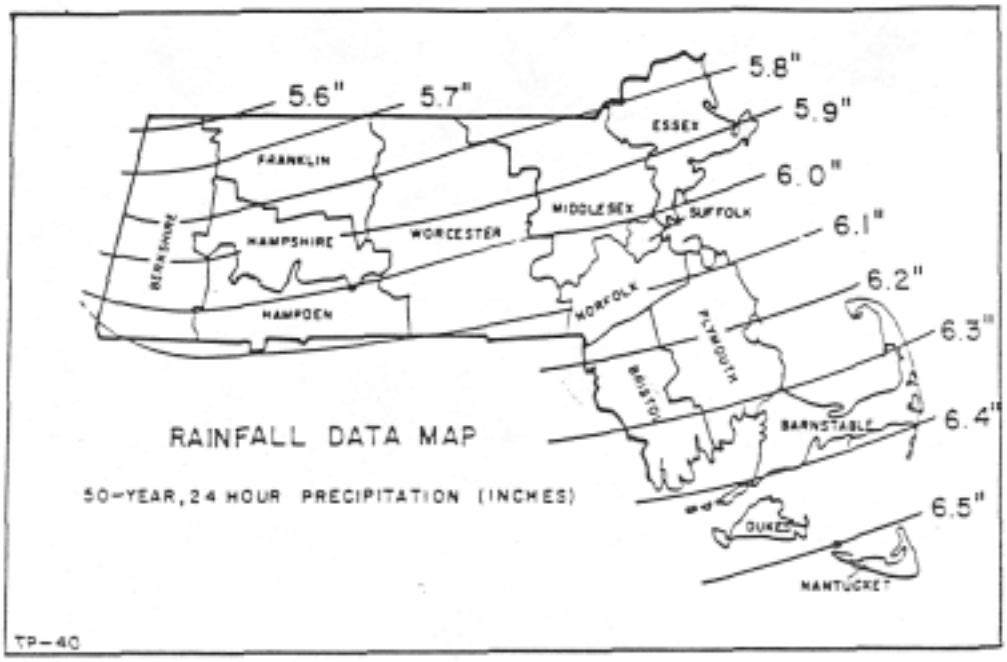
County Name	1-yr 24-hr	2-yr 24-hr	5-yr 24-hr	10-yr 24-hr	25-yr 24-hr	50-yr 24-hr	100-yr 24-hr
Barnstable	2.5	3.6	4.5	4.8	5.7	6.4	7.1
Berkshire	2.5	2.9	3.8	4.4	5.1	5.9	6.4
Bristol	2.5	3.4	4.3	4.8	5.6	6.3	7.0
Dukes	2.5	3.6	4.6	4.9	5.8	6.5	7.2
Essex	2.5	3.1	3.9	4.5	5.4	5.9	6.5
Franklin	2.5	2.9	3.8	4.3	5.1	5.8	6.2
Hampden	2.5	3.0	4.0	4.6	5.3	6.0	6.5
Hampshire	2.5	3.0	3.9	4.5	5.2	5.9	6.4
Middlesex	2.5	3.1	4.0	4.5	5.3	5.9	6.5
Nantucket	2.5	3.6	4.6	4.9	5.8	6.5	7.2
Norfolk	2.5	3.2	4.1	4.7	5.5	6.1	6.7
Plymouth	2.5	3.4	4.3	4.7	5.6	6.2	7.0
Suffolk	2.5	3.2	4.0	4.6	5.5	6.0	6.6
Worcester	2.5	3.0	4.0	4.5	5.3	5.9	6.5

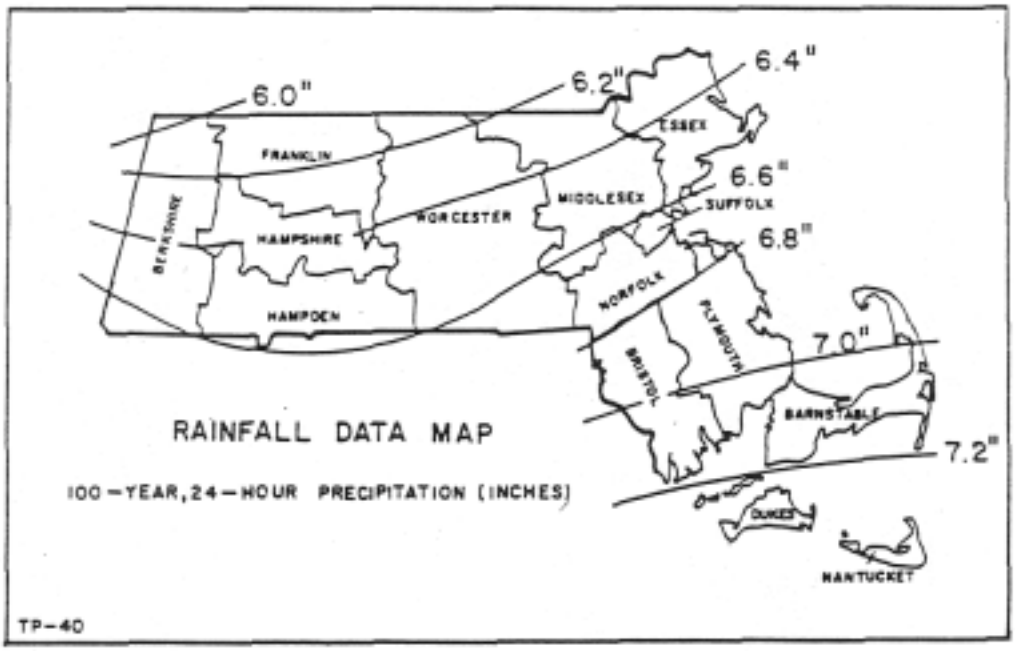

2.8"
3.0"
3.2"
3.4"
3.6"
ESSEX
FRANKLIN
MIDDLESEX
SUFFOLK
BERKSHIRE
HAMPSHIRE
WORCESTER
NORFOLK
HAMPDEN
PLYMOUTH
BRISTOL
BARNSTABLE
DUKES
NANTUCKET
RAINFALL DATA MAP
2-YEAR, 24 HOUR PRECIPITATION (INCHES)
TP-40


3.8"
4.0"
4.2"
4.4"
4.6"
ESSEX
FRANKLIN
MIDDLESEX
SUFFOLK
BERKSHIRE
HAMPSHIRE
WORCESTER
NORFOLK
HAMPDEN
PLYMOUTH
BRISTOL
BARNSTABLE
DUKES
NANTUCKET
RAINFALL DATA MAP
5-YEAR, 24-HOUR PRECIPITATION (INCHES)
TP-40


4.2"
4.3"
4.4"
4.5"
4.6"
4.7"
4.8"
4.9"
ESSEX
FRANKLIN
MIDDLESEX
SUFFOLK
BERKSHIRE
HAMPSHIRE
WORCESTER
HAMPDEN
NORFOLK
PLYMOUTH
BRISTOL
BARNSTABLE
DUKES
NANTUCKET
RAINFALL DATA MAP
10-YEAR, 24 HOUR PRECIPITATION (INCHES)
TP-40


5.0"
5.1"
5.2"
5.3"
5.4"
5.5"
5.6"
5.7"
5.8"
ESSEX
FRANKLIN
MIDDLESEX
SUFFOLK
BERKSHIRE
HAMPSHIRE
WORCESTER
HAMPDEN
NORFOLK
PLYMOUTH
BRISTOL
BARNSTABLE
DUKES
NANTUCKET
RAINFALL DATA MAP
25 - YEAR, 24 - HOUR PRECIPITATION (INCHES)
TP-40


5.6"
5.7"
5.8"
5.9"
6.0"
6.1"
6.2"
6.3"
6.4"
6.5"
FRANKLIN
ESSEX
MIDDLESEX
SUFFOLK
HAMPSHIRE
WORCESTER
BERKSHIRE
HAMPDEN
NORFOLK
PLYMOUTH
BRISTOL
BARNSTABLE
DUKES
NANTUCKET
RAINFALL DATA MAP
50-YEAR, 24 HOUR PRECIPITATION (INCHES)
TP-40


6.0"
6.2"
6.4"
6.6"
6.8"
7.0"
7.2"
FRANKLIN
ESSEX
MIDDLESEX
SUFFOLK
HAMPSHIRE
WORCESTER
BERKSHIRE
HAMPDEN
NORFOLK
PLYMOUTH
BRISTOL
BARNSTABLE
DUKES
NANTUCKET
RAINFALL DATA MAP
100-YEAR, 24-HOUR PRECIPITATION (INCHES)
TP-40

ACTIVITAS
landscape architecture | civil engineering

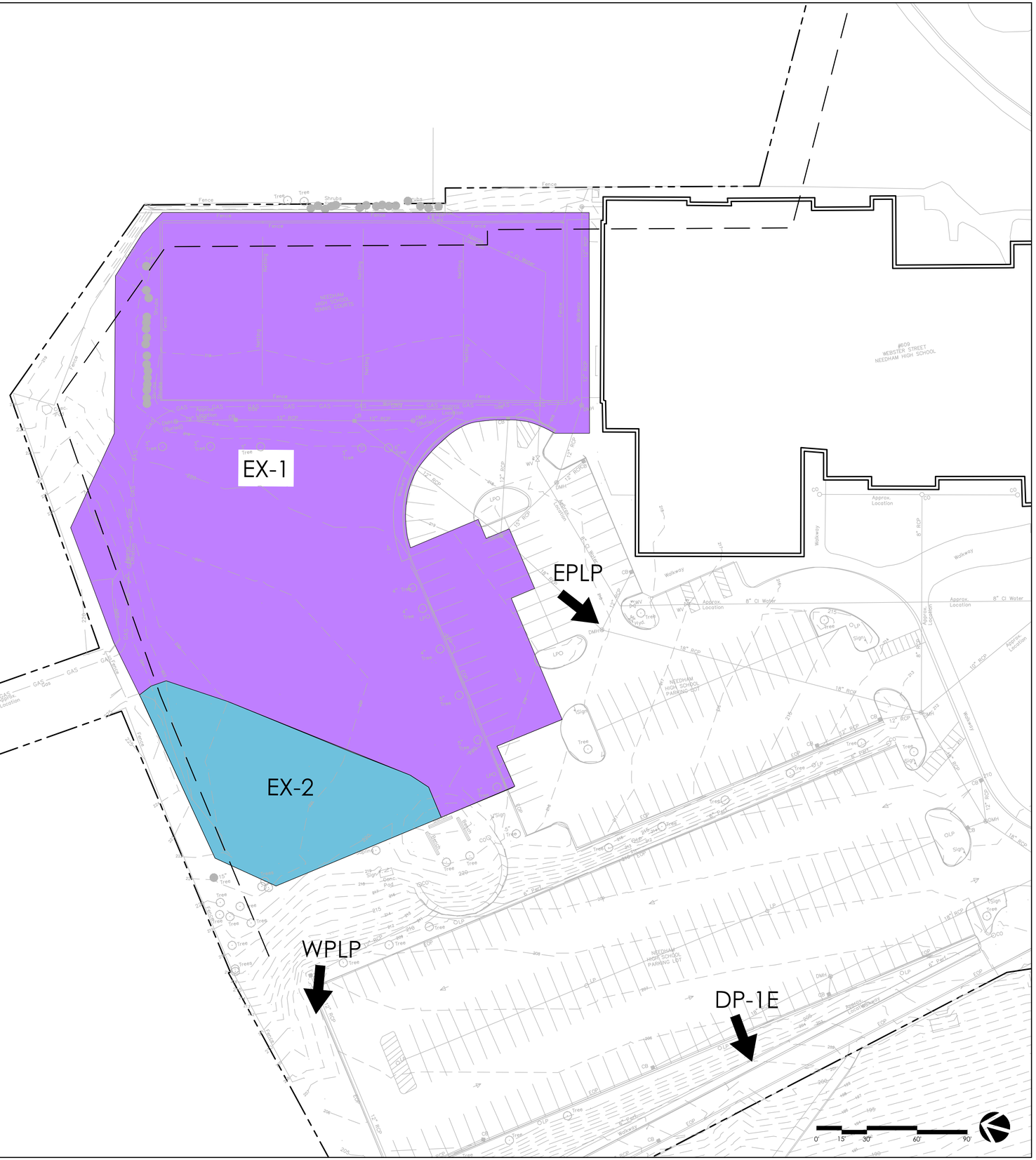
Pre-Development Plan

LEGEND

DRAINAGE AREA EX-1

DRAINAGE AREA EX-2

DISCHARGE POINT DP-X



CONTACT DIGSAFE:
UNDERGROUND UTILITIES SHOWN ON THE PLAN ARE COMPILED FROM PLANS AND FIELD SURVEY. UTILITY LOCATIONS SHOULD BE CONSIDERED APPROXIMATE ONLY. DIGSAFE AND OR THE OTHER RESPECTIVE UTILITY COMPANIES SHALL BE CONTACTED 72 BUSINESS HOURS IN ADVANCE OF CONSTRUCTION OPERATIONS. PHONE DIGSAFE 1-888-344-7233.

ACTIVITAS
landscape architecture | civil engineering
70 Milton Street | Dedham, MA 02026-2915
(781) 326-2600 | activitas.com

CONSULTANTS

TOWN OF NEEDHAM
NEEDHAM, MA
NEEDHAM HIGH SCHOOL TENNIS COURT RENOVATION

Major Project Site Plan Approval
February 6, 2024

REVISIONS:

NO.	DATE	DESCRIPTION

SCALE:	1"=30'-0"
PROJECT NO.:	23016.00
FILE:	23016.00-ECS_PLAN.dwg
DRAWN:	BJM
CHECKED:	JC

SEAL:

SHEET TITLE:

EXISTING CONDITIONS PLAN

SHEET NO:

EX1

ACTIVITAS
landscape architecture | civil engineering

Post-Development Plan

LEGEND

DRAINAGE AREA PR-1

DRAINAGE AREA PR-2

DISCHARGE POINT DP-X

CONTACT DIGSAFE:
UNDERGROUND UTILITIES SHOWN ON THE PLAN ARE COMPILED FROM PLANS AND FIELD SURVEY. UTILITY LOCATIONS SHOULD BE CONSIDERED APPROXIMATE ONLY. DIGSAFE AND OR THE OTHER RESPECTIVE UTILITY COMPANIES SHALL BE CONTACTED 72 BUSINESS HOURS IN ADVANCE OF CONSTRUCTION OPERATIONS. PHONE DIGSAFE 1-888-344-7233.

ACTIVITAS
landscape architecture | civil engineering
70 Milton Street | Dedham, MA 02026-2915
(781) 326-2600 | activitas.com

CONSULTANTS

TOWN OF NEEDHAM

NEEDHAM, MA

NEEDHAM HIGH SCHOOL TENNIS COURT RENOVATION

Major Project Site Plan Approval
February 6, 2024

REVISIONS:

NO.	DATE	DESCRIPTION

SCALE:	1"=30'-0"
PROJECT NO.:	23016.00
FILE:	23016.00-PCS_PLAN.dwg
DRAWN:	BJM
CHECKED:	JC

SEAL:

SHEET TITLE:

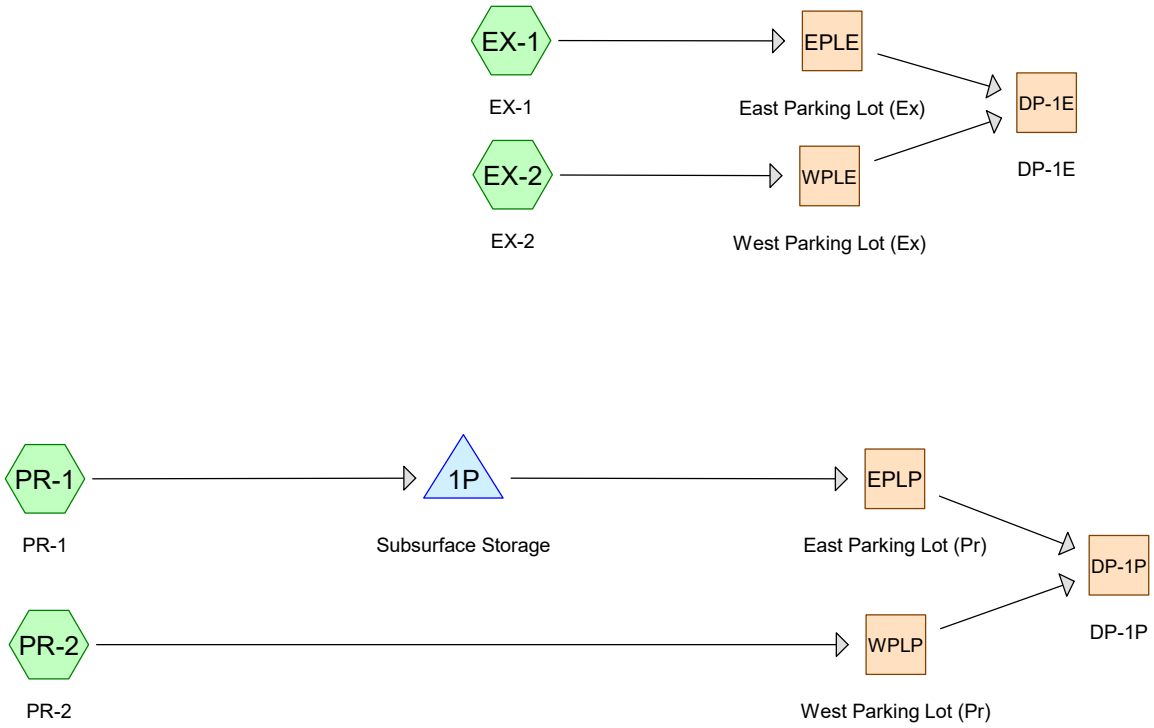
PROPOSED CONDITIONS PLAN

SHEET NO:

PR1

ACTIVITAS
landscape architecture | civil engineering

HydroCAD Report



Subcat Reach Pond Link

Routing Diagram for 23016-R_Tank_XD-MEB-240205
Prepared by Activitas, Inc, Printed 2/6/2024

Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-Year-Storm	Type III 24-hr		Default	24.00	1	3.20	2
2	10-Year-Storm	Type III 24-hr		Default	24.00	1	4.70	2
3	100-Year-Storm	Type III 24-hr		Default	24.00	1	6.70	2

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
57,147	79	50-75% Grass cover, Fair, HSG C (EX-1, EX-2, PR-2)
22,421	74	>75% Grass cover, Good, HSG C (PR-1)
102,632	98	Unconnected pavement, HSG C (EX-1, PR-1)
182,200	**89**	**TOTAL AREA**

Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
0	HSG A	
0	HSG B	
182,200	HSG C	EX-1, EX-2, PR-1, PR-2
0	HSG D	
0	Other	
182,200		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover
0	0	57,147	0	0	57,147	50-75% Grass cover, Fair
0	0	22,421	0	0	22,421	>75% Grass cover, Good
0	0	102,632	0	0	102,632	Unconnected pavement
0	**0**	**182,200**	**0**	**0**	**182,200**	**TOTAL AREA**

Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment EX-1: EX-1 Runoff Area=79,516 sf 45.75% Impervious Runoff Depth=2.00"
Tc=6.0 min CN=88 Runoff=4.17 cfs 13,233 cf

Subcatchment EX-2: EX-2 Runoff Area=11,584 sf 0.00% Impervious Runoff Depth=1.34"
Tc=6.0 min CN=79 Runoff=0.40 cfs 1,290 cf

Subcatchment PR-1: PR-1 Runoff Area=88,675 sf 74.72% Impervious Runoff Depth=2.35"
Tc=6.0 min CN=92 Runoff=5.36 cfs 17,370 cf

Subcatchment PR-2: PR-2 Runoff Area=2,425 sf 0.00% Impervious Runoff Depth=1.34"
Tc=6.0 min CN=79 Runoff=0.08 cfs 270 cf

Reach DP-1E: DP-1E Inflow=4.57 cfs 14,523 cf
Outflow=4.57 cfs 14,523 cf

Reach DP-1P: DP-1P Inflow=5.99 cfs 13,577 cf
Outflow=5.99 cfs 13,577 cf

Reach EPLE: East Parking Lot (Ex) Inflow=4.17 cfs 13,233 cf
Outflow=4.17 cfs 13,233 cf

Reach EPLP: East Parking Lot (Pr) Inflow=5.91 cfs 13,307 cf
Outflow=5.91 cfs 13,307 cf

Reach WPLE: West Parking Lot (Ex) Inflow=0.40 cfs 1,290 cf
Outflow=0.40 cfs 1,290 cf

Reach WPLP: West Parking Lot (Pr) Inflow=0.08 cfs 270 cf
Outflow=0.08 cfs 270 cf

Pond 1P: Subsurface Storage Peak Elev=216.60' Storage=3,199 cf Inflow=5.36 cfs 17,370 cf
Discarded=0.01 cfs 1,150 cf Primary=5.91 cfs 13,307 cf Outflow=5.93 cfs 14,457 cf

Total Runoff Area = 182,200 sf Runoff Volume = 32,163 cf Average Runoff Depth = 2.12"
43.67% Pervious = 79,568 sf 56.33% Impervious = 102,632 sf

Summary for Subcatchment EX-1: EX-1

Runoff = 4.17 cfs @ 12.09 hrs, Volume= 13,233 cf, Depth= 2.00"
Routed to Reach EPLE : East Parking Lot (Ex)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year-Storm Rainfall=3.20"

Area (sf)	CN	Description
43,138	79	50-75% Grass cover, Fair, HSG C
36,378	98	Unconnected pavement, HSG C
79,516	88	Weighted Average
43,138		54.25% Pervious Area
36,378		45.75% Impervious Area
36,378		100.00% Unconnected

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

Summary for Subcatchment EX-2: EX-2

Runoff = 0.40 cfs @ 12.10 hrs, Volume= 1,290 cf, Depth= 1.34"
Routed to Reach WPLE : West Parking Lot (Ex)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year-Storm Rainfall=3.20"

Area (sf)	CN	Description
11,584	79	50-75% Grass cover, Fair, HSG C
11,584		100.00% Pervious Area

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

Summary for Subcatchment PR-1: PR-1

Runoff = 5.36 cfs @ 12.09 hrs, Volume= 17,370 cf, Depth= 2.35"
Routed to Pond 1P : Subsurface Storage

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year-Storm Rainfall=3.20"

Area (sf)	CN	Description
66,254	98	Unconnected pavement, HSG C
22,421	74	>75% Grass cover, Good, HSG C
88,675	92	Weighted Average
22,421		25.28% Pervious Area
66,254		74.72% Impervious Area
66,254		100.00% Unconnected

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

Summary for Subcatchment PR-2: PR-2

Runoff = 0.08 cfs @ 12.10 hrs, Volume= 270 cf, Depth= 1.34"
Routed to Reach WPLP : West Parking Lot (Pr)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year-Storm Rainfall=3.20"

Area (sf)	CN	Description
2,425	79	50-75% Grass cover, Fair, HSG C
2,425		100.00% Pervious Area

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

Summary for Reach DP-1E: DP-1E

Inflow Area = 91,100 sf, 39.93% Impervious, Inflow Depth = 1.91" for 2-Year-Storm event
Inflow = 4.57 cfs @ 12.09 hrs, Volume= 14,523 cf
Outflow = 4.57 cfs @ 12.09 hrs, Volume= 14,523 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Summary for Reach DP-1P: DP-1P

Inflow Area = 91,100 sf, 72.73% Impervious, Inflow Depth = 1.79" for 2-Year-Storm event
Inflow = 5.99 cfs @ 12.06 hrs, Volume= 13,577 cf
Outflow = 5.99 cfs @ 12.06 hrs, Volume= 13,577 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Summary for Reach EPLE: East Parking Lot (Ex)

Inflow Area = 79,516 sf, 45.75% Impervious, Inflow Depth = 2.00" for 2-Year-Storm event
Inflow = 4.17 cfs @ 12.09 hrs, Volume= 13,233 cf
Outflow = 4.17 cfs @ 12.09 hrs, Volume= 13,233 cf, Atten= 0%, Lag= 0.0 min
Routed to Reach DP-1E : DP-1E

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Summary for Reach EPLP: East Parking Lot (Pr)

Inflow Area = 88,675 sf, 74.72% Impervious, Inflow Depth = 1.80" for 2-Year-Storm event
Inflow = 5.91 cfs @ 12.06 hrs, Volume= 13,307 cf
Outflow = 5.91 cfs @ 12.06 hrs, Volume= 13,307 cf, Atten= 0%, Lag= 0.0 min
Routed to Reach DP-1P : DP-1P

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Summary for Reach WPLE: West Parking Lot (Ex)

Inflow Area = 11,584 sf, 0.00% Impervious, Inflow Depth = 1.34" for 2-Year-Storm event
Inflow = 0.40 cfs @ 12.10 hrs, Volume= 1,290 cf
Outflow = 0.40 cfs @ 12.10 hrs, Volume= 1,290 cf, Atten= 0%, Lag= 0.0 min
Routed to Reach DP-1E : DP-1E

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Summary for Reach WPLP: West Parking Lot (Pr)

Inflow Area = 2,425 sf, 0.00% Impervious, Inflow Depth = 1.34" for 2-Year-Storm event
Inflow = 0.08 cfs @ 12.10 hrs, Volume= 270 cf
Outflow = 0.08 cfs @ 12.10 hrs, Volume= 270 cf, Atten= 0%, Lag= 0.0 min
Routed to Reach DP-1P : DP-1P

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Summary for Pond 1P: Subsurface Storage

Inflow Area = 88,675 sf, 74.72% Impervious, Inflow Depth = 2.35" for 2-Year-Storm event
Inflow = 5.36 cfs @ 12.09 hrs, Volume= 17,370 cf
Outflow = 5.93 cfs @ 12.06 hrs, Volume= 14,457 cf, Atten= 0%, Lag= 0.0 min
Discarded = 0.01 cfs @ 12.06 hrs, Volume= 1,150 cf
Primary = 5.91 cfs @ 12.06 hrs, Volume= 13,307 cf
Routed to Reach EPLP : East Parking Lot (Pr)

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 216.60' @ 12.06 hrs Surf.Area= 3,434 sf Storage= 3,199 cf

Plug-Flow detention time= 119.6 min calculated for 14,433 cf (83% of inflow)
Center-of-Mass det. time= 52.4 min (850.2 - 797.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	213.41'	1,053 cf	**33.53'W x 102.43'L x 1.57'H Field A** 5,392 cf Overall - 2,384 cf Embedded = 3,008 cf x 35.0% Voids
#2A	213.66'	2,145 cf	**Ferguson R-Tank XD 5** x 900 Inside #1 Inside= 19.7"W x 9.8"H => 1.21 sf x 1.97'L = 2.4 cf Outside= 19.7"W x 9.8"H => 1.35 sf x 1.97'L = 2.6 cf 900 Chambers in 18 Rows
#3	214.98'	2 cf	**Custom Stage Data (Prismatic)** Listed below
		3,200 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
214.98	0	0	0
219.00	1	2	2

Device	Routing	Invert	Outlet Devices
#1	Discarded	213.41'	**0.170 in/hr Exfiltration over Surface area**
#2	Primary	216.25'	**6.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#3	Primary	214.98'	**2.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Primary	215.15'	**8.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.01 cfs @ 12.06 hrs HW=216.57' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=5.51 cfs @ 12.06 hrs HW=216.58' (Free Discharge)
├**2=Sharp-Crested Rectangular Weir** (Weir Controls 3.62 cfs @ 1.87 fps)
├**3=Orifice/Grate** (Orifice Controls 0.13 cfs @ 5.92 fps)
└**4=Orifice/Grate** (Orifice Controls 1.76 cfs @ 5.03 fps)

Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment EX-1: EX-1 Runoff Area=79,516 sf 45.75% Impervious Runoff Depth=3.38"
Tc=6.0 min CN=88 Runoff=6.95 cfs 22,428 cf

Subcatchment EX-2: EX-2 Runoff Area=11,584 sf 0.00% Impervious Runoff Depth=2.55"
Tc=6.0 min CN=79 Runoff=0.78 cfs 2,457 cf

Subcatchment PR-1: PR-1 Runoff Area=88,675 sf 74.72% Impervious Runoff Depth=3.80"
Tc=6.0 min CN=92 Runoff=8.44 cfs 28,056 cf

Subcatchment PR-2: PR-2 Runoff Area=2,425 sf 0.00% Impervious Runoff Depth=2.55"
Tc=6.0 min CN=79 Runoff=0.16 cfs 514 cf

Reach DP-1E: DP-1E Inflow=7.72 cfs 24,885 cf
Outflow=7.72 cfs 24,885 cf

Reach DP-1P: DP-1P Inflow=8.92 cfs 24,430 cf
Outflow=8.92 cfs 24,430 cf

Reach EPLE: East Parking Lot (Ex) Inflow=6.95 cfs 22,428 cf
Outflow=6.95 cfs 22,428 cf

Reach EPLP: East Parking Lot (Pr) Inflow=8.75 cfs 23,915 cf
Outflow=8.75 cfs 23,915 cf

Reach WPLE: West Parking Lot (Ex) Inflow=0.78 cfs 2,457 cf
Outflow=0.78 cfs 2,457 cf

Reach WPLP: West Parking Lot (Pr) Inflow=0.16 cfs 514 cf
Outflow=0.16 cfs 514 cf

Pond 1P: Subsurface Storage Peak Elev=216.75' Storage=3,199 cf Inflow=8.44 cfs 28,056 cf
Discarded=0.01 cfs 1,229 cf Primary=8.75 cfs 23,915 cf Outflow=8.77 cfs 25,144 cf

Total Runoff Area = 182,200 sf Runoff Volume = 53,456 cf Average Runoff Depth = 3.52"
43.67% Pervious = 79,568 sf 56.33% Impervious = 102,632 sf

Summary for Subcatchment EX-1: EX-1

Runoff = 6.95 cfs @ 12.09 hrs, Volume= 22,428 cf, Depth= 3.38"
Routed to Reach EPLE : East Parking Lot (Ex)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year-Storm Rainfall=4.70"

Area (sf)	CN	Description
43,138	79	50-75% Grass cover, Fair, HSG C
36,378	98	Unconnected pavement, HSG C
79,516	88	Weighted Average
43,138		54.25% Pervious Area
36,378		45.75% Impervious Area
36,378		100.00% Unconnected

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

Summary for Subcatchment EX-2: EX-2

Runoff = 0.78 cfs @ 12.09 hrs, Volume= 2,457 cf, Depth= 2.55"
Routed to Reach WPLE : West Parking Lot (Ex)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year-Storm Rainfall=4.70"

Area (sf)	CN	Description
11,584	79	50-75% Grass cover, Fair, HSG C
11,584		100.00% Pervious Area

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

Summary for Subcatchment PR-1: PR-1

Runoff = 8.44 cfs @ 12.09 hrs, Volume= 28,056 cf, Depth= 3.80"
Routed to Pond 1P : Subsurface Storage

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year-Storm Rainfall=4.70"

Area (sf)	CN	Description
66,254	98	Unconnected pavement, HSG C
22,421	74	>75% Grass cover, Good, HSG C
88,675	92	Weighted Average
22,421		25.28% Pervious Area
66,254		74.72% Impervious Area
66,254		100.00% Unconnected

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

Summary for Subcatchment PR-2: PR-2

Runoff = 0.16 cfs @ 12.09 hrs, Volume= 514 cf, Depth= 2.55"
Routed to Reach WPLP : West Parking Lot (Pr)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year-Storm Rainfall=4.70"

Area (sf)	CN	Description
2,425	79	50-75% Grass cover, Fair, HSG C
2,425		100.00% Pervious Area

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

Summary for Reach DP-1E: DP-1E

Inflow Area = 91,100 sf, 39.93% Impervious, Inflow Depth = 3.28" for 10-Year-Storm event
Inflow = 7.72 cfs @ 12.09 hrs, Volume= 24,885 cf
Outflow = 7.72 cfs @ 12.09 hrs, Volume= 24,885 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Summary for Reach DP-1P: DP-1P

Inflow Area = 91,100 sf, 72.73% Impervious, Inflow Depth = 3.22" for 10-Year-Storm event
Inflow = 8.92 cfs @ 12.09 hrs, Volume= 24,430 cf
Outflow = 8.92 cfs @ 12.09 hrs, Volume= 24,430 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Summary for Reach EPLE: East Parking Lot (Ex)

Inflow Area = 79,516 sf, 45.75% Impervious, Inflow Depth = 3.38" for 10-Year-Storm event
Inflow = 6.95 cfs @ 12.09 hrs, Volume= 22,428 cf
Outflow = 6.95 cfs @ 12.09 hrs, Volume= 22,428 cf, Atten= 0%, Lag= 0.0 min
Routed to Reach DP-1E : DP-1E

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Summary for Reach EPLP: East Parking Lot (Pr)

Inflow Area = 88,675 sf, 74.72% Impervious, Inflow Depth = 3.24" for 10-Year-Storm event
Inflow = 8.75 cfs @ 12.09 hrs, Volume= 23,915 cf
Outflow = 8.75 cfs @ 12.09 hrs, Volume= 23,915 cf, Atten= 0%, Lag= 0.0 min
Routed to Reach DP-1P : DP-1P

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Summary for Reach WPLE: West Parking Lot (Ex)

Inflow Area = 11,584 sf, 0.00% Impervious, Inflow Depth = 2.55" for 10-Year-Storm event
Inflow = 0.78 cfs @ 12.09 hrs, Volume= 2,457 cf
Outflow = 0.78 cfs @ 12.09 hrs, Volume= 2,457 cf, Atten= 0%, Lag= 0.0 min
Routed to Reach DP-1E : DP-1E

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Summary for Reach WPLP: West Parking Lot (Pr)

Inflow Area = 2,425 sf, 0.00% Impervious, Inflow Depth = 2.55" for 10-Year-Storm event
Inflow = 0.16 cfs @ 12.09 hrs, Volume= 514 cf
Outflow = 0.16 cfs @ 12.09 hrs, Volume= 514 cf, Atten= 0%, Lag= 0.0 min
Routed to Reach DP-1P : DP-1P

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Summary for Pond 1P: Subsurface Storage

Inflow Area = 88,675 sf, 74.72% Impervious, Inflow Depth = 3.80" for 10-Year-Storm event
Inflow = 8.44 cfs @ 12.09 hrs, Volume= 28,056 cf
Outflow = 8.77 cfs @ 12.09 hrs, Volume= 25,144 cf, Atten= 0%, Lag= 0.3 min
Discarded = 0.01 cfs @ 12.09 hrs, Volume= 1,229 cf
Primary = 8.75 cfs @ 12.09 hrs, Volume= 23,915 cf
Routed to Reach EPLP : East Parking Lot (Pr)

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 216.75' @ 12.09 hrs Surf.Area= 3,435 sf Storage= 3,199 cf

Plug-Flow detention time= 89.1 min calculated for 25,144 cf (90% of inflow)
Center-of-Mass det. time= 39.1 min (823.8 - 784.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	213.41'	1,053 cf	**33.53'W x 102.43'L x 1.57'H Field A** 5,392 cf Overall - 2,384 cf Embedded = 3,008 cf x 35.0% Voids
#2A	213.66'	2,145 cf	**Ferguson R-Tank XD 5** x 900 Inside #1 Inside= 19.7"W x 9.8"H => 1.21 sf x 1.97'L = 2.4 cf Outside= 19.7"W x 9.8"H => 1.35 sf x 1.97'L = 2.6 cf 900 Chambers in 18 Rows
#3	214.98'	2 cf	**Custom Stage Data (Prismatic)** Listed below
		3,200 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
214.98	0	0	0
219.00	1	2	2

Device	Routing	Invert	Outlet Devices
#1	Discarded	213.41'	**0.170 in/hr Exfiltration over Surface area**
#2	Primary	216.25'	**6.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#3	Primary	214.98'	**2.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Primary	215.15'	**8.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.01 cfs @ 12.09 hrs HW=216.73' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=8.50 cfs @ 12.09 hrs HW=216.73' (Free Discharge)
├**2=Sharp-Crested Rectangular Weir** (Weir Controls 6.49 cfs @ 2.27 fps)
├**3=Orifice/Grate** (Orifice Controls 0.14 cfs @ 6.22 fps)
└**4=Orifice/Grate** (Orifice Controls 1.88 cfs @ 5.38 fps)

Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment EX-1: EX-1 Runoff Area=79,516 sf 45.75% Impervious Runoff Depth=5.30"
Tc=6.0 min CN=88 Runoff=10.64 cfs 35,135 cf

Subcatchment EX-2: EX-2 Runoff Area=11,584 sf 0.00% Impervious Runoff Depth=4.31"
Tc=6.0 min CN=79 Runoff=1.31 cfs 4,161 cf

Subcatchment PR-1: PR-1 Runoff Area=88,675 sf 74.72% Impervious Runoff Depth=5.76"
Tc=6.0 min CN=92 Runoff=12.50 cfs 42,555 cf

Subcatchment PR-2: PR-2 Runoff Area=2,425 sf 0.00% Impervious Runoff Depth=4.31"
Tc=6.0 min CN=79 Runoff=0.27 cfs 871 cf

Reach DP-1E: DP-1E Inflow=11.95 cfs 39,296 cf
Outflow=11.95 cfs 39,296 cf

Reach DP-1P: DP-1P Inflow=12.77 cfs 39,224 cf
Outflow=12.77 cfs 39,224 cf

Reach EPLE: East Parking Lot (Ex) Inflow=10.64 cfs 35,135 cf
Outflow=10.64 cfs 35,135 cf

Reach EPLP: East Parking Lot (Pr) Inflow=12.50 cfs 38,353 cf
Outflow=12.50 cfs 38,353 cf

Reach WPLE: West Parking Lot (Ex) Inflow=1.31 cfs 4,161 cf
Outflow=1.31 cfs 4,161 cf

Reach WPLP: West Parking Lot (Pr) Inflow=0.27 cfs 871 cf
Outflow=0.27 cfs 871 cf

Pond 1P: Subsurface Storage Peak Elev=216.91' Storage=3,199 cf Inflow=12.50 cfs 42,555 cf
Discarded=0.01 cfs 1,288 cf Primary=12.50 cfs 38,353 cf Outflow=12.51 cfs 39,641 cf

Total Runoff Area = 182,200 sf Runoff Volume = 82,722 cf Average Runoff Depth = 5.45"
43.67% Pervious = 79,568 sf 56.33% Impervious = 102,632 sf

Summary for Subcatchment EX-1: EX-1

Runoff = 10.64 cfs @ 12.09 hrs, Volume= 35,135 cf, Depth= 5.30"
Routed to Reach EPLE : East Parking Lot (Ex)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year-Storm Rainfall=6.70"

Area (sf)	CN	Description
43,138	79	50-75% Grass cover, Fair, HSG C
36,378	98	Unconnected pavement, HSG C
79,516	88	Weighted Average
43,138		54.25% Pervious Area
36,378		45.75% Impervious Area
36,378		100.00% Unconnected

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

Summary for Subcatchment EX-2: EX-2

Runoff = 1.31 cfs @ 12.09 hrs, Volume= 4,161 cf, Depth= 4.31"
Routed to Reach WPLE : West Parking Lot (Ex)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year-Storm Rainfall=6.70"

Area (sf)	CN	Description
11,584	79	50-75% Grass cover, Fair, HSG C
11,584		100.00% Pervious Area

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

Summary for Subcatchment PR-1: PR-1

Runoff = 12.50 cfs @ 12.09 hrs, Volume= 42,555 cf, Depth= 5.76"
Routed to Pond 1P : Subsurface Storage

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year-Storm Rainfall=6.70"

Area (sf)	CN	Description
66,254	98	Unconnected pavement, HSG C
22,421	74	>75% Grass cover, Good, HSG C
88,675	92	Weighted Average
22,421		25.28% Pervious Area
66,254		74.72% Impervious Area
66,254		100.00% Unconnected

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

Summary for Subcatchment PR-2: PR-2

Runoff = 0.27 cfs @ 12.09 hrs, Volume= 871 cf, Depth= 4.31"
Routed to Reach WPLP : West Parking Lot (Pr)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year-Storm Rainfall=6.70"

Area (sf)	CN	Description
2,425	79	50-75% Grass cover, Fair, HSG C
2,425		100.00% Pervious Area

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

Summary for Reach DP-1E: DP-1E

Inflow Area = 91,100 sf, 39.93% Impervious, Inflow Depth = 5.18" for 100-Year-Storm event
Inflow = 11.95 cfs @ 12.09 hrs, Volume= 39,296 cf
Outflow = 11.95 cfs @ 12.09 hrs, Volume= 39,296 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Summary for Reach DP-1P: DP-1P

Inflow Area = 91,100 sf, 72.73% Impervious, Inflow Depth = 5.17" for 100-Year-Storm event
Inflow = 12.77 cfs @ 12.09 hrs, Volume= 39,224 cf
Outflow = 12.77 cfs @ 12.09 hrs, Volume= 39,224 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Summary for Reach EPLE: East Parking Lot (Ex)

Inflow Area = 79,516 sf, 45.75% Impervious, Inflow Depth = 5.30" for 100-Year-Storm event
Inflow = 10.64 cfs @ 12.09 hrs, Volume= 35,135 cf
Outflow = 10.64 cfs @ 12.09 hrs, Volume= 35,135 cf, Atten= 0%, Lag= 0.0 min
Routed to Reach DP-1E : DP-1E

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Summary for Reach EPLP: East Parking Lot (Pr)

Inflow Area = 88,675 sf, 74.72% Impervious, Inflow Depth = 5.19" for 100-Year-Storm event
Inflow = 12.50 cfs @ 12.09 hrs, Volume= 38,353 cf
Outflow = 12.50 cfs @ 12.09 hrs, Volume= 38,353 cf, Atten= 0%, Lag= 0.0 min
Routed to Reach DP-1P : DP-1P

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Summary for Reach WPLE: West Parking Lot (Ex)

Inflow Area = 11,584 sf, 0.00% Impervious, Inflow Depth = 4.31" for 100-Year-Storm event
Inflow = 1.31 cfs @ 12.09 hrs, Volume= 4,161 cf
Outflow = 1.31 cfs @ 12.09 hrs, Volume= 4,161 cf, Atten= 0%, Lag= 0.0 min
Routed to Reach DP-1E : DP-1E

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Summary for Reach WPLP: West Parking Lot (Pr)

Inflow Area = 2,425 sf, 0.00% Impervious, Inflow Depth = 4.31" for 100-Year-Storm event
Inflow = 0.27 cfs @ 12.09 hrs, Volume= 871 cf
Outflow = 0.27 cfs @ 12.09 hrs, Volume= 871 cf, Atten= 0%, Lag= 0.0 min
Routed to Reach DP-1P : DP-1P

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Summary for Pond 1P: Subsurface Storage

Inflow Area = 88,675 sf, 74.72% Impervious, Inflow Depth = 5.76" for 100-Year-Storm event
Inflow = 12.50 cfs @ 12.09 hrs, Volume= 42,555 cf
Outflow = 12.51 cfs @ 12.09 hrs, Volume= 39,641 cf, Atten= 0%, Lag= 0.0 min
Discarded = 0.01 cfs @ 12.09 hrs, Volume= 1,288 cf
Primary = 12.50 cfs @ 12.09 hrs, Volume= 38,353 cf
Routed to Reach EPLP : East Parking Lot (Pr)

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 216.91' @ 12.09 hrs Surf.Area= 3,435 sf Storage= 3,199 cf

Plug-Flow detention time= 67.8 min calculated for 39,641 cf (93% of inflow)
Center-of-Mass det. time= 31.0 min (804.9 - 774.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	213.41'	1,053 cf	**33.53'W x 102.43'L x 1.57'H Field A** 5,392 cf Overall - 2,384 cf Embedded = 3,008 cf x 35.0% Voids
#2A	213.66'	2,145 cf	**Ferguson R-Tank XD 5** x 900 Inside #1 Inside= 19.7"W x 9.8"H => 1.21 sf x 1.97'L = 2.4 cf Outside= 19.7"W x 9.8"H => 1.35 sf x 1.97'L = 2.6 cf 900 Chambers in 18 Rows
#3	214.98'	2 cf	**Custom Stage Data (Prismatic)** Listed below
		3,200 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
214.98	0	0	0
219.00	1	2	2

Device	Routing	Invert	Outlet Devices
#1	Discarded	213.41'	**0.170 in/hr Exfiltration over Surface area**
#2	Primary	216.25'	**6.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#3	Primary	214.98'	**2.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Primary	215.15'	**8.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.01 cfs @ 12.09 hrs HW=216.90' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=12.16 cfs @ 12.09 hrs HW=216.90' (Free Discharge)
├**2=Sharp-Crested Rectangular Weir** (Weir Controls 10.02 cfs @ 2.63 fps)
├**3=Orifice/Grate** (Orifice Controls 0.14 cfs @ 6.52 fps)
└**4=Orifice/Grate** (Orifice Controls 2.00 cfs @ 5.73 fps)

ACTIVITAS
landscape architecture | civil engineering

Operations & Maintenance Plan

Operation and Maintenance Plan

Town of Needham

Needham High School Tennis Court Renovation

609 Webster Street

Needham, Massachusetts

2/6/23

Owner:
Town of Needham
1471 Highland Ave
Needham, MA 02492
(781) 455-7500

Submitted To:
Town of Needham
Planning Board
1471 Highland Ave
Needham, MA 02492
(781) 455-7526

Applicant:
Activitas, Inc.
70 Milton Street
Dedham, MA 02026
(781) 355-7040

February 6, 2024

Table of Contents

1.0 Operation and Maintenance Plan

The Town of Needham High School Tennis project site is subject to Standard 9 - Operation and Maintenance Plan of the Massachusetts Stormwater Handbook. This Operation and Maintenance Plan details management recommendations for long-term pollution prevention.

The area to be renovated is the existing Needham High School Tennis Facility located at 609 Webster Street. The project scope is limited to an area of approximately 2.09 acres. The project consists of installation of four (4) new tennis courts, renovations to the existing four (4) tennis courts, ADA accessible walkways leading from the parking lot to tennis court areas, new spectator seating areas, and drainage improvements.

The surfacing types within the limit of work consist of cement concrete, post tension concrete, bituminous asphalt, and grassed areas.

1.1 Area Drains

Area drains should be cleaned twice per year. Area drains should be checked at least four times a year and at the end of the foliage and snow-removal seasons.

- Record all maintenance and repairs. Submit reports every year for compliance.
- Inspect all area drains after every storm (or at least four times a year) and at the end of the foliage and snow-removal seasons.
- If sediment is more than six inches deep and/or there are floatable pollutants, they will be removed from the drain and disposed of.
- During colder periods, area drain grates shall be kept free of ice and snow.
- During warmer periods, area drain grates shall be kept free of leaves, litter, sand, and other debris.

1.2 Subsurface Chamber System

The subsurface chamber system should be inspected monthly within the first year of installation. Inspections should begin with upstream and downstream structures for signs of sediment or other debris and standing water in the upstream manhole. Use of a pipe camera is recommended to inspect the pipes and chambers. The recharge system has been designed with inspection ports at the end of each row of chambers. If warranted, sections of the turf field should be removed, and inspection ports accessed.

- The owner shall keep a maintenance log which shall include details of any events which would have an effect on the system's operational capacity.
- The operation and maintenance procedure shall be reviewed periodically and changed to meet site conditions.
- Maintenance of the stormwater management system shall be performed by qualified workers and shall follow applicable occupational health and safety requirements.

Debris removed from the stormwater management system shall be disposed of in accordance with

1.3 Outlet Control Structure

There will be one outlet control structure on site to control the flow out of the tennis court drainage system. The outlet control structure should be inspected twice each year and cleaned twice per year. The outlet control structure should be checked at least four times a year and at the end of the foliage and snow-removal season.

- Record all maintenance and repairs. Submit reports every year for compliance.
- Inspect the outlet control structure every storm (or at least four times a year) and at the end of the foliage and snow-removal season.
- If sediment is more than six inches deep and/or there are floatable pollutants, they will be removed from the outlet control structure and disposed of.

1.4 Vegetated Areas Maintenance

Although not a structural component of the drainage system, the maintenance of vegetated areas may affect the function of stormwater management practices. This includes the health/density of vegetative cover and activities such as the application and disposal of lawn and garden care products, disposal of leaves and yard trimmings.

- Inspect planted areas on a semi-annual basis and remove any litter.
- Maintain planted areas adjacent to pavement to prevent soil washout.
- Immediately clean any soil deposited on pavement.
- Re-seed bare areas; install appropriate erosion control measures when native soil is exposed or erosion channels are forming.
- Plant alternative mixture of grass species in the event of unsuccessful establishment.

1.5 Spill Prevention and Control Plan

The Property Owner will be responsible for training of people in the proper handling and cleanup of spilled materials. No spilled hazardous materials or hazardous wastes will be allowed to come in contact with stormwater discharges. If such contact occurs, the stormwater discharge will be contained on site until appropriate measures in compliance with state and federal regulations are taken to dispose of such contaminated stormwater.

In order to minimize the potential for a spill of hazardous materials to come into contact with stormwater, the following steps will be implemented:

1. All materials with hazardous properties (such as pesticides, petroleum products, fertilizers, detergents, construction chemicals, acids, paints, paint solvents, cleaning solvents, additives for soil stabilization, concrete curing compounds and additives, etc.) will be stored in a secure location, with their lids on, preferably under cover, when not in use.
2. The minimum practical quantity of all such materials will be kept on the site.
3. A spill control and containment kit (containing, for example, absorbent materials, acid neutralizing powder, brooms, dustpans, mops, rags, gloves, goggles, plastic and metal trash containers, etc.) will be provided at the maintenance area of the site.
4. Manufacturers recommended methods for spill cleanup will be clearly posted and site personnel will be trained regarding these procedures and the location of the information and cleanup supplies.

In the event of a spill, the following procedures should be followed:

1. All spills will be cleaned up immediately after discovery.
2. The spill area will be kept well ventilated and personnel will wear appropriate protective clothing to prevent injury from contact with hazardous substances.
3. The Owner will be notified immediately.
4. Spills of toxic or hazardous materials will be reported to the appropriate federal, state, and/or local government agency, regardless of the size of the spill.

The Property Owner will be the spill prevention and response coordinator. He will designate the individuals who will receive spill prevention and response training. These individuals will each become responsible for a particular phase of prevention and response. The names of these personnel will be posted in the material storage area and other applicable areas onsite.

2.0 Appendices

2.1 Operations and Maintenance Logs

Inspection for Year: _____

NOTE: See Operations and Maintenance Plan for details of inspection requirements.

Structural Best Management Practice	Action	Date Completed	Comments	Completed By	Action	Date Completed	Comments	Completed By
Area Drains	Inspect				Clean (if required—See Plan for details.)			
Outlet Control Structure	Inspect				Clean (if required—See Plan for details.)			
Subsurface Recharge System—Inspect every 5 years, clean as required.	Inspect				Clean (if required—See Plan for details.)			