Wednesday, March 4, 2020

Wayland Conservation Commission
41 Cochituate Road
Wayland, MA 01778

RECEIVED
MAR 04 2020
WAYLAND CONSERVATION COMMISSION

Re: NOI Filing
Loker Conservation and Recreation Area
412 Commonwealth Road
Wayland, MA 01778

The Town of Wayland is hereby enclosing two (2) copies (including original) of the Notice of Intent submittal (including plans) to fulfill the requirements of the Massachusetts Wetlands Protection Act, M.G.L. Chapter 131, Section 40 submittal requirements and the Town of Wayland submittal requirements. This submittal is a formal Notice of Intent for the multi-purpose athletic field proposed at the Loker Conservation and Recreation Area.

As part of the filing, we have attached the following:

Appendix A: Project Description

Appendix B: Alternatives Analysis

Appendix C: Stormwater Report

A. Attachment A - Locus Map
B. Attachment B - NRCS Soils Map, Soils Report, and HSG Classifications
C. Attachment C - Test Pit Summary and Logs
D. Attachment D - Stormwater Modeling
    i. HydroCAD model output
E. Attachment E - Calculations
    i. Required Recharge Calculation
    ii. Water Quality Volume Calculation
    iii. TSS Removal Worksheet
F. Attachment F - Long Term Pollution Prevention Plan
G. Attachment G - Construction Period Pollution and Erosion and Sedimentation Control Plan
H. Attachment H - Operations and Maintenance Plan
I. Attachment I - Illicit Discharge Compliance Statement

Appendix D: Project Maps

Appendix E: Contract Specifications

Appendix F: Abutters List / Notice to Abutters

Appendix G: Wetlands Memorandum

Appendix H: Tree Memorandum

Appendix I: Response to Conservation Commission Questions after first NOI

Appendix J: Bidding Documents / Site Plans (02/28/2019)

Appendix K: PFAS Memo & Infill Chart

Appendix L: LSP Opinions (4)

Appendix M: Vernal Pool Information

Appendix N: Sports Lighting Photometric Plan from Musco Lighting, Inc.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands
WPA Form 3 – Notice of Intent
Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Provided by MassDEP:

MassDEP File Number

Document Transaction Number

City/Town

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

A. General Information

1. Project Location (**Note:** electronic filers will click on button to locate project site):

412 Commonwealth Road
a. Street Address

Wayland
b. City/Town

01778
c. Zip Code

Latitude and Longitude:

42deg 19'34.61"N
d. Latitude

71deg 20'36.25"W
e. Longitude

49
f. Assessors Map/Plat Number

064B
g. Parcel /Lot Number

2. Applicant:

Louise
a. First Name

Miller
b. Last Name

Town of Wayland - Town Administrator
c. Organization

41 Cochituate Road
d. Street Address

Wayland
e. City/Town

MA
f. State

01778
g. Zip Code

h. Phone Number

i. Fax Number

j. Email Address

Note: Before completing this form consult your local Conservation Commission regarding any municipal bylaw or ordinance.

3. Property owner (required if different from applicant): ☐ Check if more than one owner

a. First Name

b. Last Name

c. Organization

d. Street Address

e. City/Town

f. State

g. Zip Code

h. Phone Number

i. Fax Number

j. Email address

4. Representative (if any):

Brandon
a. First Name

Kunkel
b. Last Name

Weston & Sampson
c. Company

85 Devonshire Street, 3rd Floor
d. Street Address

Boston
e. City/Town

MA
f. State

01960
g. Zip Code

(617) 412-440, ext.7705

i. Fax Number

kunkelb@wseinc.com
j. Email address

5. Total WPA Fee Paid (from NOI Wetland Fee Transmittal Form):

exempt
a. Total Fee Paid

b. State Fee Paid

c. City/Town Fee Paid

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

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City/Town

A. General Information (continued)

6. General Project Description:

   Addition of a multi-purpose athletic field at Loker Conservation and Recreation Area (See Appendix A for additional information)

7a. Project Type Checklist: (Limited Project Types see Section A. 7b.)

   1. ☐ Single Family Home
   2. ☐ Residential Subdivision
   3. ☐ Commercial/Industrial
   4. ☐ Dock/Pier
   5. ☐ Utilities
   6. ☐ Coastal engineering Structure
   7. ☐ Agriculture (e.g., cranberries, forestry)
   8. ☐ Transportation
   9. ☒ Other

7b. Is any portion of the proposed activity eligible to be treated as a limited project (including Ecological Restoration Limited Project) subject to 310 CMR 10.24 (coastal) or 310 CMR 10.53 (inland)?

   1. ☐ Yes ☒ No If yes, describe which limited project applies to this project. (See 310 CMR 10.24 and 10.53 for a complete list and description of limited project types)

   2. Limited Project Type

   If the proposed activity is eligible to be treated as an Ecological Restoration Limited Project (310 CMR10.24(8), 310 CMR 10.53(4)), complete and attach Appendix A: Ecological Restoration Limited Project Checklist and Signed Certification.

8. Property recorded at the Registry of Deeds for:

Middlesex	
a. County	b. Certificate # (if registered land)
31387	167
c. Book	d. Page Number

B. Buffer Zone & Resource Area Impacts (temporary & permanent)

1. ☒ Buffer Zone Only – Check if the project is located only in the Buffer Zone of a Bordering Vegetated Wetland, Inland Bank, or Coastal Resource Area.
2. ☐ Inland Resource Areas (see 310 CMR 10.54-10.58; if not applicable, go to Section B.3, Coastal Resource Areas).

   Check all that apply below. Attach narrative and any supporting documentation describing how the project will meet all performance standards for each of the resource areas altered, including standards requiring consideration of alternative project design or location.

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B. Buffer Zone & Resource Area Impacts (temporary & permanent) (cont'd)

For all projects affecting other Resource Areas, please attach a narrative explaining how the resource area was delineated.

Resource Area	Size of Proposed Alteration	Proposed Replacement (if any)
a. ☐ Bank	1. linear feet	2. linear feet
b. ☐ Bordering Vegetated Wetland	1. square feet	2. square feet
c. ☐ Land Under Waterbodies and Waterways	1. square feet	2. square feet
	3. cubic yards dredged	

Resource Area	Size of Proposed Alteration	Proposed Replacement (if any)
d. ☐ Bordering Land Subject to Flooding	1. square feet	2. square feet
	3. cubic feet of flood storage lost	4. cubic feet replaced
e. ☐ Isolated Land Subject to Flooding	1. square feet	
	2. cubic feet of flood storage lost	3. cubic feet replaced
f. ☐ Riverfront Area	1. Name of Waterway (if available) - **specify coastal or inland**	

2. Width of Riverfront Area (check one):

☐ 25 ft. - Designated Densely Developed Areas only

☐ 100 ft. - New agricultural projects only

☐ 200 ft. - All other projects

3. Total area of Riverfront Area on the site of the proposed project: ______ square feet

4. Proposed alteration of the Riverfront Area:

a. total square feet ______ b. square feet within 100 ft. ______ c. square feet between 100 ft. and 200 ft. ______

5. Has an alternatives analysis been done and is it attached to this NOI? ☐ Yes ☐ No

6. Was the lot where the activity is proposed created prior to August 1, 1996? ☐ Yes ☐ No

3. ☐ Coastal Resource Areas: (See 310 CMR 10.25-10.35)

Note: for coastal riverfront areas, please complete **Section B.2.f**. above.

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Provided by MassDEP:

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City/Town

B. Buffer Zone & Resource Area Impacts (temporary & permanent) (cont'd)

Check all that apply below. Attach narrative and supporting documentation describing how the project will meet all performance standards for each of the resource areas altered, including standards requiring consideration of alternative project design or location.

Online Users: Include your document transaction number (provided on your receipt page) with all supplementary information you submit to the Department.

Resource Area	Size of Proposed Alteration	Proposed Replacement (if any)
a. ☐ Designated Port Areas	Indicate size under Land Under the Ocean, below	
b. ☐ Land Under the Ocean	1. square feet 2. cubic yards dredged	
c. ☐ Barrier Beach	Indicate size under Coastal Beaches and/or Coastal Dunes below	
d. ☐ Coastal Beaches	1. square feet	2. cubic yards beach nourishment
e. ☐ Coastal Dunes	1. square feet	2. cubic yards dune nourishment

	Size of Proposed Alteration	Proposed Replacement (if any)
f. ☐ Coastal Banks	1. linear feet	
g. ☐ Rocky Intertidal Shores	1. square feet	
h. ☐ Salt Marshes	1. square feet	2. sq ft restoration, rehab., creation
i. ☐ Land Under Salt Ponds	1. square feet 2. cubic yards dredged	
j. ☐ Land Containing Shellfish	1. square feet	
k. ☐ Fish Runs	Indicate size under Coastal Banks, inland Bank, Land Under the Ocean, and/or inland Land Under Waterbodies and Waterways, above 1. cubic yards dredged	
l. ☐ Land Subject to Coastal Storm Flowage	1. square feet	

4. ☐ Restoration/Enhancement
If the project is for the purpose of restoring or enhancing a wetland resource area in addition to the square footage that has been entered in Section B.2.b or B.3.h above, please enter the additional amount here.

a. square feet of BVW

b. square feet of Salt Marsh

5. ☐ Project Involves Stream Crossings

a. number of new stream crossings

b. number of replacement stream crossings

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C. Other Applicable Standards and Requirements

☐ This is a proposal for an Ecological Restoration Limited Project. Skip Section C and complete Appendix A: Ecological Restoration Limited Project Checklists – Required Actions (310 CMR 10.11).

Streamlined Massachusetts Endangered Species Act/Wetlands Protection Act Review

1. Is any portion of the proposed project located in **Estimated Habitat of Rare Wildlife** as indicated on the most recent Estimated Habitat Map of State-Listed Rare Wetland Wildlife published by the Natural Heritage and Endangered Species Program (NHESP)? To view habitat maps, see the *Massachusetts Natural Heritage Atlas* or go to http://maps.massgis.state.ma.us/PRI_EST_HAB/viewer.htm.

a. ☐ Yes ☒ No

If yes, include proof of mailing or hand delivery of NOI to:

Natural Heritage and Endangered Species Program
Division of Fisheries and Wildlife
1 Rabbit Hill Road
Westborough, MA 01581

2018
b. Date of map

If *yes*, the project is also subject to Massachusetts Endangered Species Act (MESA) review (321 CMR 10.18). To qualify for a streamlined, 30-day, MESA/Wetlands Protection Act review, please complete Section C.1.c, and include requested materials with this Notice of Intent (NOI); *OR* complete Section C.2.f, if applicable. *If MESA supplemental information is not included with the NOI, by completing Section 1 of this form, the NHESP will require a separate MESA filing which may take up to 90 days to review (unless noted exceptions in Section 2 apply, see below).*

c. Submit Supplemental Information for Endangered Species Review*

1. ☐ Percentage/acreage of property to be altered:

(a) within wetland Resource Area ________________ percentage/acreage

(b) outside Resource Area ________________ percentage/acreage

2. ☐ Assessor's Map or right-of-way plan of site

2. ☐ Project plans for entire project site, including wetland resource areas and areas outside of wetlands jurisdiction, showing existing and proposed conditions, existing and proposed tree/vegetation clearing line, and clearly demarcated limits of work **

(a) ☐ Project description (including description of impacts outside of wetland resource area & buffer zone)

(b) ☐ Photographs representative of the site

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* Some projects **not** in Estimated Habitat may be located in Priority Habitat, and require NHESP review (see http://www.mass.gov/eea/agencies/dfg/dfw/natural-heritage/regulatory-review/). Priority Habitat includes habitat for state-listed plants and strictly upland species not protected by the Wetlands Protection Act.

** MESA projects may not be segmented (321 CMR 10.16). The applicant must disclose full development plans even if such plans are not required as part of the Notice of Intent process.

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C. Other Applicable Standards and Requirements (cont'd)

(c) ☐ MESA filing fee (fee information available at http://www.mass.gov/dfwele/dfw/nhesp/regulatory_review/mesa/mesa_fee_schedule.htm). Make check payable to "Commonwealth of Massachusetts - NHESP" and ***mail to NHESP*** at above address

*Projects altering **10 or more acres** of land, also submit:*

(d) ☐ Vegetation cover type map of site

(e) ☐ Project plans showing Priority & Estimated Habitat boundaries

(f) OR Check One of the Following

1. ☐ Project is exempt from MESA review.
Attach applicant letter indicating which MESA exemption applies. (See 321 CMR 10.14, http://www.mass.gov/dfwele/dfw/nhesp/regulatory_review/mesa/mesa_exemptions.htm; the NOI must still be sent to NHESP if the project is within estimated habitat pursuant to 310 CMR 10.37 and 10.59.)

2. ☐ Separate MESA review ongoing. ______ a. NHESP Tracking # ______ b. Date submitted to NHESP

3. ☐ Separate MESA review completed.
Include copy of NHESP "no Take" determination or valid Conservation & Management Permit with approved plan.

3. For coastal projects only, is any portion of the proposed project located below the mean high water line or in a fish run?

a. ☒ Not applicable – project is in inland resource area only b. ☐ Yes ☐ No

If yes, include proof of mailing, hand delivery, or electronic delivery of NOI to either:

South Shore - Cohasset to Rhode Island border, and the Cape & Islands:

Division of Marine Fisheries -
Southeast Marine Fisheries Station
Attn: Environmental Reviewer
836 South Rodney French Blvd.
New Bedford, MA 02744
Email: DMF.EnvReview-South@state.ma.us

North Shore - Hull to New Hampshire border:

Division of Marine Fisheries -
North Shore Office
Attn: Environmental Reviewer
30 Emerson Avenue
Gloucester, MA 01930
Email: DMF.EnvReview-North@state.ma.us

Also if yes, the project may require a Chapter 91 license. For coastal towns in the Northeast Region, please contact MassDEP's Boston Office. For coastal towns in the Southeast Region, please contact MassDEP's Southeast Regional Office.

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Provided by MassDEP:

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City/Town

C. Other Applicable Standards and Requirements (cont'd)

Online Users: Include your document transaction number (provided on your receipt page) with all supplementary information you submit to the Department.

4. Is any portion of the proposed project within an Area of Critical Environmental Concern (ACEC)?

   a. ☐ Yes ☒ No   If yes, provide name of ACEC (see instructions to WPA Form 3 or MassDEP Website for ACEC locations). **Note:** electronic filers click on Website.

   b. ACEC

5. Is any portion of the proposed project within an area designated as an Outstanding Resource Water (ORW) as designated in the Massachusetts Surface Water Quality Standards, 314 CMR 4.00?

   a. ☐ Yes ☒ No

6. Is any portion of the site subject to a Wetlands Restriction Order under the Inland Wetlands Restriction Act (M.G.L. c. 131, § 40A) or the Coastal Wetlands Restriction Act (M.G.L. c. 130, § 105)?

   a. ☐ Yes ☒ No

7. Is this project subject to provisions of the MassDEP Stormwater Management Standards?

   a. ☒ Yes. Attach a copy of the Stormwater Report as required by the Stormwater Management Standards per 310 CMR 10.05(6)(k)-(q) and check if:

      1. ☐ Applying for Low Impact Development (LID) site design credits (as described in Stormwater Management Handbook Vol. 2, Chapter 3)

      2. ☐ A portion of the site constitutes redevelopment

      3. ☐ Proprietary BMPs are included in the Stormwater Management System.

   b. ☐ No. Check why the project is exempt:

      1. ☐ Single-family house

      2. ☐ Emergency road repair

      3. ☐ Small Residential Subdivision (less than or equal to 4 single-family houses or less than or equal to 4 units in multi-family housing project) with no discharge to Critical Areas.

D. Additional Information

☐ This is a proposal for an Ecological Restoration Limited Project. Skip Section D and complete Appendix A: Ecological Restoration Notice of Intent – Minimum Required Documents (310 CMR 10.12).

Applicants must include the following with this Notice of Intent (NOI). See instructions for details.

Online Users: Attach the document transaction number (provided on your receipt page) for any of the following information you submit to the Department.

1. ☒ USGS or other map of the area (along with a narrative description, if necessary) containing sufficient information for the Conservation Commission and the Department to locate the site. (Electronic filers may omit this item.)

2. ☒ Plans identifying the location of proposed activities (including activities proposed to serve as a Bordering Vegetated Wetland [BVW] replication area or other mitigating measure) relative to the boundaries of each affected resource area.

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City/Town

D. Additional Information (cont'd)

3. ☒ Identify the method for BVW and other resource area boundary delineations (MassDEP BVW Field Data Form(s), Determination of Applicability, Order of Resource Area Delineation, etc.), and attach documentation of the methodology.

4. ☒ List the titles and dates for all plans and other materials submitted with this NOI.

a. Plan Title

b. Prepared By

c. Signed and Stamped by

d. Final Revision Date

e. Scale

f. Additional Plan or Document Title

g. Date

5. ☐ If there is more than one property owner, please attach a list of these property owners not listed on this form.

6. ☐ Attach proof of mailing for Natural Heritage and Endangered Species Program, if needed.

7. ☐ Attach proof of mailing for Massachusetts Division of Marine Fisheries, if needed.

8. ☐ Attach NOI Wetland Fee Transmittal Form

9. ☐ Attach Stormwater Report, if needed.

E. Fees

1. ☒ Fee Exempt: No filing fee shall be assessed for projects of any city, town, county, or district of the Commonwealth, federally recognized Indian tribe housing authority, municipal housing authority, or the Massachusetts Bay Transportation Authority.

Applicants must submit the following information (in addition to pages 1 and 2 of the NOI Wetland Fee Transmittal Form) to confirm fee payment:

2. Municipal Check Number

3. Check date

4. State Check Number

5. Check date

6. Payor name on check: First Name

7. Payor name on check: Last Name

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Provided by MassDEP:

MassDEP File Number

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City/Town

F. Signatures and Submittal Requirements

I hereby certify under the penalties of perjury that the foregoing Notice of Intent and accompanying plans, documents, and supporting data are true and complete to the best of my knowledge. I understand that the Conservation Commission will place notification of this Notice in a local newspaper at the expense of the applicant in accordance with the wetlands regulations, 310 CMR 10.05(5)(a).

I further certify under penalties of perjury that all abutters were notified of this application, pursuant to the requirements of M.G.L. c. 131, § 40. Notice must be made by Certificate of Mailing or in writing by hand delivery or certified mail (return receipt requested) to all abutters within 100 feet of the property line of the project location.

Louis Miller
1. Signature of Applicant

3/4/2020
2. Date

TOWN OF WAYLAND
3. Signature of Property Owner (if different)

4. Date

5. Signature of Representative (if any)

6. Date

For Conservation Commission:
Two copies of the completed Notice of Intent (Form 3), including supporting plans and documents, two copies of the NOI Wetland Fee Transmittal Form, and the city/town fee payment, to the Conservation Commission by certified mail or hand delivery.

For MassDEP:
One copy of the completed Notice of Intent (Form 3), including supporting plans and documents, one copy of the NOI Wetland Fee Transmittal Form, and a **copy** of the state fee payment to the MassDEP Regional Office (see Instructions) by certified mail or hand delivery.

Other:
If the applicant has checked the "yes" box in any part of Section C, Item 3, above, refer to that section and the Instructions for additional submittal requirements.

The original and copies must be sent simultaneously. Failure by the applicant to send copies in a timely manner may result in dismissal of the Notice of Intent.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

NOI Wetland Fee Transmittal Form

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

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

A. Applicant Information

1. Location of Project:

a. Street Address ____________ b. City/Town ____________

c. Check number ____________ d. Fee amount ____________

2. Applicant Mailing Address:

a. First Name ____________ b. Last Name ____________

c. Organization ____________

d. Mailing Address ____________

e. City/Town ____________ f. State ____________ g. Zip Code ____________

h. Phone Number ____________ i. Fax Number ____________ j. Email Address ____________

3. Property Owner (if different):

a. First Name ____________ b. Last Name ____________

c. Organization ____________

d. Mailing Address ____________

e. City/Town ____________ f. State ____________ g. Zip Code ____________

h. Phone Number ____________ i. Fax Number ____________ j. Email Address ____________

B. Fees

To calculate filing fees, refer to the category fee list and examples in the instructions for filling out WPA Form 3 (Notice of Intent).

Fee should be calculated using the following process & worksheet. ***Please see Instructions before filling out worksheet.***

Step 1/Type of Activity: Describe each type of activity that will occur in wetland resource area and buffer zone.

Step 2/Number of Activities: Identify the number of each type of activity.

Step 3/Individual Activity Fee: Identify each activity fee from the six project categories listed in the instructions.

Step 4/Subtotal Activity Fee: Multiply the number of activities (identified in Step 2) times the fee per category (identified in Step 3) to reach a subtotal fee amount. Note: If any of these activities are in a Riverfront Area in addition to another Resource Area or the Buffer Zone, the fee per activity should be multiplied by 1.5 and then added to the subtotal amount.

Step 5/Total Project Fee: Determine the total project fee by adding the subtotal amounts from Step 4.

Step 6/Fee Payments: To calculate the state share of the fee, divide the total fee in half and subtract $12.50. To calculate the city/town share of the fee, divide the total fee in half and add $12.50.

B. Fees (continued)

Step 1/Type of Activity	Step 2/Number of Activities	Step 3/Individual Activity Fee	Step 4/Subtotal Activity Fee

Step 5/Total Project Fee: ____________

Step 6/Fee Payments:

Total Project Fee: ____________ a. Total Fee from Step 5

State share of filing Fee: ____________ b. 1/2 Total Fee **less** $12.50

City/Town share of filling Fee: ____________ c. 1/2 Total Fee **plus** $12.50

C. Submittal Requirements

a.) Complete pages 1 and 2 and send with a check or money order for the state share of the fee, payable to the Commonwealth of Massachusetts.

Department of Environmental Protection
Box 4062
Boston, MA 02211

b.) **To the Conservation Commission:** Send the Notice of Intent or Abbreviated Notice of Intent; a **copy** of this form; and the city/town fee payment.

To MassDEP Regional Office (see Instructions): Send a copy of the Notice of Intent or Abbreviated Notice of Intent; a **copy** of this form; and a **copy** of the state fee payment. (E-filers of Notices of Intent may submit these electronically.)

TOWN OF WAYLAND
MASSACHUSETTS
01778

CONSERVATION COMMISSION

TOWN BUILDING
41 COCHITUATE ROAD
TELEPHONE: (508) 358-3669
FAX: (508) 358-3606

CHAPTER 193 APPLICATION
Stormwater Management and Land Disturbance Bylaw

A. General Information

1. Project Location

412 Commonwealth Road
a. Street Address

Wayland
b. City/Town

01778
c. Zip code

49-064B
d. Parcel/ Lot Number

2. Applicant:

Louise
a. First Name

Miller
b. Last Name

41 Cochituate Road
c. Street Address

Wayland
d.City

MA
e. State

01778
f. Zip Code

(508) 358-3786
g. Work/ Cell Phone #

lmiller@wayland.ma.us
h. Email Address

3. Property Owner (required if different from applicant):

Town of Wayland
a. First Name

b. Last Name

41 Cochituate Road
c. Street Address

Wayland
d.City

MA
e. State

01778
f. Zip Code

(508) 358-3786
g. Work/ Cell Phone #

lmiller@wayland.ma.us
h. Email Address

4. Representative (if any):

Brandon — a. First Name

Kunkel — b. Last Name

Weston & Sampson — c. Company

85 Devonshire Street, 3rd Floor — c. Street Address

Boston — d.City

MA — e. State

02109 — f. Zip Code

(617) 412-4480, ext. 7705 — g. Work/ Cell Phone #

kunkelb@wseinc.com — h. Email Address

5a. Project Type Checklist (check all that applies):

1. ☒ Creation of new or increasing existing impervious surface of 500 sq. ft. or more.

   Impervious Surface: Is any material or structure on or above the ground that prevents water infiltration to the underlying soils. Impervious surface includes without limitation roads, paved parking lots, sidewalks, stone patios, decking, and rooftops.

2. ☒ Alteration and/or land disturbance of at least 5,000 sq. ft. or 10% of the parcel; whichever is less.

   Alteration and/or land disturbance as defined in Chapter 193 Bylaw.

5b. General Project Description:

Improvements to the recreation parcel of Loker Conservation and Recreation Area including but not limited to: new synthetic turf field and sport field lighting, parking lot, stormwater drainage system, parking lot and pedestrian lighting and emergency vehicle access drive and pedestrian walkways

B. Additional Information

By submitting an application for coverage under the Stormwater Management and Land Disturbance Permit, the Applicant agrees to the following:

1. At a minimum, the proposed project complies with the performance standards of the most recent version of the Massachusetts Stormwater Management Handbook including but not limited to:

   a. Employing environmentally sensitive site design
   b. Evaluation of Low Impact Development practices
   c. Incorporation of source controls of contaminants and employing BMPs to minimize stormwater pollution
   d. Sizing of water quality volume of BMPs are based on 1-inch of runoff
   e. Methodology for hydrologic analyses (if necessary) is based on TR-55/TR-20 methodology
   f. Designing redevelopment of existing sites must provide a net improvement to stormwater conditions at the site.

2. The activity shall not increase either the rate or volume of stormwater runoff leaving the site, nor shall it alter stormwater flow to any adjoining properties, public ways, or any wetland resource areas, unless otherwise permitted based on improvements over existing conditions.

Please check all that apply to this project:

- ☐ Roof drains emptying into dry wells/recharge basins
- ☒ Grassed swales constructed
- ☐ Porous pavement installed; ______ sq. ft.
- ☐ Water quality swale
- ☐ Rain barrels/cisterns for irrigation
- ☒ Other methods (please list/describe): Detention and infiltration at synthetic turf field and subsurface stormwater chambers

3. The Applicant shall provide and maintain Erosion and Sedimentation controls as necessary until the site is permanently stabilized. BMP's selected for erosion controls shall be chosen to minimize site disturbance from erosion control installation. As soon as the site is stabilized, such measures shall be removed.

   Please check all that apply to this project:

   - ☒ Sediment filter fence with either hay bales or straw wattles
   - ☒ Mulch filled fabric sock
   - ☒ Construction entrance
   - ☐ Temporary vegetative cover – mulch, netting
   - ☒ Permanent vegetative cover – hydro seeding, seeding, sodding
   - ☐ Slope stabilization
   - ☒ Retaining Walls
   - ☐ Slope drains
   - ☐ Other methods (please list/describe): ______________________

4. The Applicant shall ensure that the site and stormwater management systems are perpetually inspected and maintained to function as designed.

   Please check all that apply to this project:

   - ☒ Visual inspections by contractor
   - ☒ Visual inspections by homeowner
   - ☒ Operation and Maintenance Plan
   - ☐ Maintenance contract for stormwater components
   - ☒ Other methods (please list/describe): Continued maintenance by DPW

5. Other Jurisdiction

- ☒ Massachusetts Wetlands Protection Act (310 CMR 10.00) and it's implementing Regulations
- ☒ Wayland's Wetlands and Water Resource Protection Bylaw – Chapter 194
- ☐ Subdivision Approval

☐ Board of Health Permit

☒ Special Permit or Site Plan Review

☐ Building Permit

C. Fees

Applicants must submit a $100 application fee.

D. Signatures and Submittal Requirements

I certify that I have reviewed the design standards above and the information contained herein, including all attachments, is true, accurate, and complete to the best of my knowledge. Further, I grant the Wayland Conservation Commission and its authorized Agents permission to enter the property to review this application and make inspections before, during and after construction. **I have included a check for the application fee of $100.**

[signature] for TOWN OF WAYLAND | 3/4/2020
Signature of Applicant | Date

Signature of Property Owner (if different) | Date

Signature of Representative (if any) | Date

For Conservation Commission:
Eight copies of the completed Stormwater Management and Land Disturbance Bylaw (Chapter 193), including plans and documents, and the bylaw fee payment, to the Conservation Commission by mail or hand delivery.

Wayland Wetlands and Water Resources Bylaw, Chapter 194 Application

1. Applicant:

Louise Miller — Name (PLEASE PRINT)
lmiller@wayland.ma.us — Email Address (if applicable)
41 Cochituate Road — Mailing Address
Wayland — City/Town
MA — State
01778 — Zip Code
Phone Number:
Fax Number (if applicable):

2. Representative:

Weston & Sampson — Firm/Business Name
Brandon Kunkel — Contact Name
85 Devonshire Street, 3rd Floor — Mailing Address
Boston — City/Town
MA — State
02109 — Zip Code
(617) 412-4480, ext. 7705 — Phone Number
Fax Number (if applicable):

3. Property Owner(s)

Town of Wayland — Property Owner (PLEASE PRINT)
Email Address (if applicable):
41 Cochituate Road — Address
Wayland — City/Town
MA — State
01778 — Zip Code
Phone Number:
Fax Number (if applicable):

4. Type of Application

[ ] Request for a Determination of Applicability (RDA)
[ ] Abbreviated NOI
[ ] Notice of Resource Area Delineation
[ ] After the Fact Amendment (AFA)
[ ] Amendment to Order of Conditions
[x] Notice of Intent (NOI)
[ ] Extension of O.O.C.
[ ] Certificate of Compliance
[ ] After the Fact Filing (AFF)

5. Project

412 Commonwealth Road — Location Address
49 — Assessors Map(s)
064B — Parcel(s)

Project Description (PLEASE PRINT):
Construction of a multi-purpose athletic field and parking lot within the designated recreation parcel of the Loker Conservation and Recreation area.

6. Title/Date of Plan(s) Improvements to Loker Conservation and Recreation Area
February 28, 2019

7. Bylaw Application Fee: $ exempt

8. Application filed pursuant to MGL Chapter 131, Section 40 [ ] Yes [ ] No

9. Signature of Applicant Louise Miller Date 3/4/2020

Signature of Property Owner Town of Wayland Date 3/28/2019

(NOTE: This application shall be signed by the property owner as well as the applicant. Signature of the property owner on this application shall be deemed permission granted to the Conservation Commission and their agents to go upon the subject property.)

TOWN OF WAYLAND
Conservation Commission
41 COCHITUATE ROAD
WAYLAND, MASSACHUSETTS 01778

CHAPTER 194 Submittal Requirements

Upon submittal of any Bylaw application the applicant(s), property owner (if different), and their representative(s) must sign this checklist.

- [X] Original and one copy of the MA Wetlands Protection Act ("WPA") application and Chapter 194 Bylaw application, including owner(s) signature, the applicant(s) signature, site plan(s), narrative, etc. *

  NOTE: If a WPA Application is not filed, a copy of either a statement as to not applicable (limited generally to buffer zone or bordering land subject to flooding) or a valid Order of Resource Area Determination (ORAD) must be provided with copies.

- [ ] A separate check for all applicable Wetlands Act fees.

- [ ] A separate check for all applicable Chapter 194 Bylaw fees.

- [X] A list of the 100' Abutters, certified by the Assessors Office.

- [ ] Evidence of Board of Health receipt of application or approval for all applications with septic work or home renovations.

*A copy of all documents submitted should be provided electronically to Nicole Thomson (nthomson@wayland.ma.us) and Linda Hansen (lhansen@wayland.ma.us)

Project Summary

- [X] A narrative statement describing all of the activities proposed. If work is omitted from the narrative it may not be permitted.

- [X] A narrative summary description of the types of resource areas on or near the site. Omission of resource areas is a basis for denial of the project as being incomplete.

- [X] A narrative discussion how the project has been designed to minimize impacts to resource areas and how any mitigation has been proposed to better protect or enhance the resource areas during and after construction.

  The Conservation Commission will evaluate the application based on the scope of the project and the potential impacts on the resource area (e.g. a wetland, pond, vernal pool, riverfront area, etc.) The Commission's priorities for project assessment are avoidance, minimization, and mitigation of impacts to resource area/s in that order. If mitigation is proposed, the Commission will require a 1:1.5 ratio of replication for impacts to wetlands and for buffer zones. The narrative should clearly address these priorities.

- [X] A narrative discussion that presents justification, based on factors of technical or economic feasibility, why alternatives that might minimize or completely avoid adverse impact to the Riverfront Area, Floodplain, the Buffer Zone, and/or any other resource area are not being proposed. At a minimum there must be discussion of the alternative for no alteration.

The following items are required for Site Plans submitted with a Bylaw application; however, if the Applicant considers that the information is not relevant to the scope or scale of the proposed project, a Waiver(s) of requirements must be requested at the time of filing the application with the Conservation Commission.

TOWN OF WAYLAND
Conservation Commission
41 COCHITUATE ROAD
WAYLAND, MASSACHUSETTS 01778

Site Plan Minimum Requirements

The following shall be included on the Site Plan:

- [X] Stamp of a Professional Engineer (P.E.) and/or a Professional Land Surveyor (P.L.S.) depending upon proximity to lot lines or project complexity.

  OR

- [ ] Stamp of a Registered Sanitarian (R.S.) is acceptable for designs of septic systems handling less than 2,000 gallons per day, with incidental site work.

- [X] Grade elevations based on National Geodetic Vertical Datum (NGVD). Grade contours in the area of work shall be provided with at least 1-foot intervals.

- [X] Plan Scale: 1 inch = 10 feet or 1 inch = 20 feet.

- [X] Wetlands flagging with letters and/or numbers as defined in the field.

- [X] Date that wetlands flagging was done and name of the wetland delineator (if GIS was used to wetlands, then include the GIS source.)

- [X] Site Plans must clearly show existing conditions and proposed conditions, utilities, impervious surfaces, limit of lawn, trees greater than 6 inches in diameter proposed for removal, significant land features such as rock outcroppings, all Resource Areas (differentiate each) including Buffer Zone. *Note: It may be more comprehensible to submit two plans: an existing conditions plan and a proposed conditions plan.*

- [X] Site plans must detail the permanent demarcation of the limit of lawn with minimum 30' offset from resource area for new construction, and minimum average 15' offset for existing dwellings.

- [X] Locations and identifiers for <u>all</u> test pit locations.

- [ ] A cross-section of grading and profile for proposed septic systems.

- [X] Locations for temporary stockpiles or storage of soils or demolition debris during construction.

- [X] Access route for construction equipment and construction entrance location details.

- [X] Location of erosion control barrier(s).

- [X] Detail for installation of erosion control barrier(s).

- [X] Location for refueling of equipment. (Outside buffer zone strongly preferred)

- [X] Locations designated for snow storage, if necessary.

- [X] Pre/Post-Construction Lot Coverage Summary for areas within by-law jurisdiction: a) Total lot area; b) total impervious area **(Note: impervious areas shall include, but are not limited to, roofs, decks, walks, and driveways)**; c) total landscaped/lawn area; and d) total area altered during construction (including temporary impacts).

Drainage Requirements

The Commission seeks to protect water quality of surface waters and groundwater, and to limit any increase in the rate or quantity of runoff of storm water from the property.

☐ For projects adding less than or equal to 500 square feet of impervious area, a narrative description of specific measures used to provide for infiltration of runoff equivalent to runoff this additional impervious area. Those measures must be clearly depicted on the Site Plan as a specification.

OR

☒ For projects adding more than 500 square feet of impervious area,

- ☒ A narrative discussion of the methods and all assumptions used in the drainage calculations
- ☒ A plan showing drainage catchment areas
- ☒ Supporting calculations (i.e. HydroCAD) stamped by a P.E.
- ☒ Summary tables presenting Pre/Post Construction Storm Water Runoff Rates and Volumes for a 1-inch storm event, a 10-year, and a 100-year storm events. Note: Rainfall of at least 8 inches in 24 hours must be used for 100-year storm event.
- ☒ Compliance with DEP's Stormwater Management Standards.

☒ Narrative description of structural and non-structural best management practice (BMP) (See "Definitions), controls for storm water management for the project **during construction phases and for long term site management**:

- ☒ Evaluation of BMP selection and factors of site suitability including: soils, drainage area, depth to water table, depth to bedrock, slopes and proximity to wells and foundations
- ☒ Discussion of construction phasing
- ☒ Relevant site characterization data for design
- ☒ Water quality calculations for total suspended solids (TSS) removal
- ☒ Calculated storm water recharge rate
- ☒ Calculated peak discharge rate

☒ Maintenance requirements and site inspections templates for BMPs must be specified. Operation and Maintenance (O&M) plans for Stormwater shall be submitted with the application describing short-term BMPs (during construction) and long-term BMPs (post-construction) for management of the drainage structures, roadway and/or parking lot (as applicable) including but not limited to sweeping; catch basin cleaning; snow storage and erosion controls, such as hay bales or sediment fences. The drainage components (Best Management Practice – BMP) shall be as described using terminology in the most recent version of the DEP Storm water Technical Handbook, March 1997. A Plan for protecting the post-construction BMPs during construction shall be include in the O&M Plan.

☐ Aquifer Protection District – If the project is within this area, a narrative description of how the project complies with aquifer protection requirements.

Soils Information

☐ Septic Systems or Drainage BMPs (where applicable) - Clear statement of how many test pits or borings were conducted for the project planning and engineering evaluations and what number and types of analytical methods may have been applied for soils characterization including visual evaluation, percolation tests, field screening, and laboratory analyses.

☐ Septic Systems and/or applicable drainage BMP - Copies of all soil data including boring and/or test pit logs.

☐ Wetland field data forms that document observations made during the wetland delineation including soil or test pit logs.

Waivers

In the event that Applicant considers certain required information to be, in their opinion, not relevant to the scope or scale of the proposed project Applicant may request a Waiver of the requirements with this application to the Conservation Commission. Indicate all provisions requested for Waiver below designating the specific paragraph number/letter designation.

Site Plan Minimum Requirement Waiver(s) ☐ None ☐ List________________

Drainage Requirement Waiver(s) ☐ None ☐ List________________

Soils Information Waiver(s) ☐ None ☐ List________________

If applicable, attach a statement for justification of the requested waivers.

In the event that any requested Waiver is not granted by the Commission or the application is otherwise found to be deficient in providing required information the hearing may at the discretion of the Commission either be closed and denied for the lack of information or continued for a specific timeframe approved by the Commission for the Applicant to submit the required information.

The Commission has authorized its Administrator to review projects and to not accept project applications under the Bylaw that have apparent deficiencies to meeting the above requirements. Notwithstanding that authority, acceptance of an application by the Administrator does not represent a decision that the application is fully complete. Deficiencies identified by the Administrator will be report to the applicant and the Commission during the hearing.

The property owner, as well as the applicant and/or representative (if different from owner) must sign this checklist and all other applicable applications. The property owner, by signing this checklist and the applications, acknowledges that the Commission and Staff may enter the property to inspect the premises as part of the assessment of the application.

Town of Wayland
Property Owner's Name (Print)

Town of Wayland
Property Owner's Signature Date

I certify under penalty of law that this document and all its attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete.

LOUISE MILLER
Applicant's Name (Print)

Louise Miller 3/4/2020
Applicant's Signature Date

APPENDIX A:
Project Description

PROJECT DESCRIPTION

Background

The Town of Wayland Recreation Department is currently faced with a deficit of rectangular athletic fields and striving to meet the current demands and needs of the Town's recreational programs. As such, the proposed installation of a new synthetic turf multi-purpose rectangular field within the limits of recreation area of the Loker Conservation and Recreation would tremendously benefit demand for recreational programs. The project includes, but not limited to earthwork, tree removal, field installation, lighting, parking, and the a stormwater management system. Refer to Appendix D for proposed conditions plans and details.

Project Location

Loker Conservation and Recreation Area is located at the corner of Commonwealth Road and Rice Road. There is currently a paved access drive at Commonwealth Road that is remnant of the sites previous use as a Dow company facility. The designated recreation area itself consists of a steeply sloped open field surrounded by wooded areas on all sides. North Pond is located north of the existing designated parking area and West and East Pond are located to the south, on either side of the access drive, north of Commonwealth Road.

Project Description

The proposed improvements to the delineated recreation parcel of the Loker Conservation and Recreation property is to provide the Town of Wayland Recreation Department with a new 195 x 300-ft. synthetic turf multi-purpose athletic field and parking lot.

The site currently consists of a steep sloped open lawn area encompassed by thickly vegetated forest and abandoned asphalt pavement drive. In addition, there is a non-ADA compliant parking area that will also be renovated, improved and expanded to allow for 62 total parking spaces including accessible parking spaces and additional parking for both the new athletic field and the conservation area. In addition, both the new field and parking lot, new lighting will be added to allow for expanded field use hours and safety. The existing asphalt drive will be replaced with a new emergency access drive to the field. To account for the new athletic field and parking lot being added to the site, a stormwater management system will be installed. Refer C for additional stormwater information.

Prior to the commencement of any work, erosion control barriers must be installed around the limit of work to prevent any sediment migration from the work area into nearby resource areas. With best efforts to minimize the extent of both the earthwork disturbance and the total number of trees to be removed within the project area, a tree assessment was conducted in conjunction the Town of Wayland Chapter 193 Stormwater Management and Land Disturbance Bylaw. Approximately 56 trees will be removed within the 100-ft. wetland buffer zone and 335 trees outside the wetland resource area as part of the clearing process. Refer to Appendix H for the Tree Assessment Report.

Water Quality

The effects of turf fields (artificial or natural) on water quality include both:

1) the ability of the turf system to remove pollutants associated with rainwater or incoming stormwater and
2) the potential for pollutants to be generated by turf systems through processes such as erosion or leaching.

Many studies have been conducted on the potential water quality impacts associated with both artificial and natural turf fields. The focus of the artificial turf studies centers on the potential for heavy metals such as lead and/or zinc to leach from the crumb rubber infill material. Several studies were reviewed for this project to address the public's concerns regarding the potential for heavy metals such as lead or zinc to be leached from the crumb rubber into the stormwater and discharged either as surface water into a local wetland or directly into the groundwater system. The studies reviewed were performed by:

- New York State Department of Environmental Conservation and New York State Department of Health (2009)
- Connecticut Department of Environmental Protection (2010)
- Maryland – Montgomery County Staff Work Group (2011)
- California Department of Resources Recycling and Recovery (2010)

The conclusions of all the studies reviewed suggest that artificial turf fields are unlikely to generate pollutant at concentrations above water quality limits. The perception is that zinc can be a potential issue for aquatic life since the water quality standard for aquatic life in surface water (120 μg/L) is significantly lower than the GW-1 groundwater standard (5,000 μg/L). A review of the leachate sampling for the existing crumb rubber artificial turf field at the Wayland High School was also conducted in an effort to understand if any potential concerns were raised in the existing field that has been in place for 11 years. The results of the water quality sampling also revealed that the four stormwater samples collected and analyzed for zinc were well below the EPA Freshwater Chronic Criterion Concentration for fresh surface water of 120 μg/L. Based on previous studies in the northeast, Atlantic coast, western states, and the Town of Wayland, Weston & Sampson believes there will be no water quality impact to either surface water or groundwater from the construction of an artificial turf field at the Loker Conservation and Recreation Area.

Environmental Considerations

There will be no impacts to wetland resource area protected under the wetlands protection act. There will be certain areas that will be within the 100-foot wetlands buffer zone. This work includes tree removal and earthwork including the northeast corner of the athletic field, northern portion of the proposed parking lot and access drive improvements

APPENDIX B:
Alternative Analysis

ALTERNATIVES ANALYSIS

Basis for Alternatives Analysis

The following is a presentation of alternatives that were evaluated for addressing the improvements at Loker Conservation and Recreation Area. The primary objective is to provide a design strategy that minimizes the amount of disturbance and environmental impact to the site while also providing sufficient facilities and amenities that meet the town's recreation needs. This includes evaluating the number of athletic facilities proposed, the size of the field footprints, as well as alternative layouts and orientations for the field and parking lot.

Alternative Analysis

During the design process for improvements to the Loker Conservation and Recreation Area, the number of field footprints were investigated to evaluate the amount of disturbance and environmental impact on site in relation to the town's recreation facility needs. The town also investigated different field footprint sizes and parking lot layouts to determine the configuration with the least amount of disturbance and impact. It is important to note the property has an interior area designated for recreation use. This is one of the significant constraints on potential footprint locations, sizes, and orientation.

Alternatives Investigation 1 – Quantity and Size of Field Footprints

The number of recreation field footprints were evaluated that maximize the quantity of facilities within the property limits designated for recreation use. This resulted in an additional 180' x 300' field footprint to the southeast of North Pond. The area beyond these extents would be disturbed in order to meet existing grades. As part of this exercise, the size of field(s) were also evaluated.

<u>Advantages:</u>
The additional 180' x 300' field footprint maximizes the area within the property designated for recreation use. A second field helps alleviate the town-wide deficit in multi-purpose rectangular fields that has been identified in several independent studies performed by the town. Smaller field footprints resulted smaller disturbed areas and lessened the environmental impact to the site.

<u>Disadvantages:</u>
The second field footprint increases the area of disturbance in the 100' wetland buffers of North Pond and East Pond. This would also increase the total number of trees needing removed to accommodate the additional field footprint and increase the volume of stormwater captured and treated. The smaller footprints did not provide enough play area to satisfy the Recreation Department's programming needs.

<u>Conclusion:</u>
It was determined that limiting the proposed design to one field footprint significantly reduces the amount of disturbance and environmental impact to the Loker Conservation and Recreation Area while also positively impacting the town-wide recreation field shortage. One field footprint also reduces the amount of stormwater captured on site.

Alternatives Investigation 2 – Layout and Orientation of Field Footprint and Parking Lot

Alternative layouts of the multi-purpose rectangular field footprint were tested. It is important to note that the limit within the property designated for recreational use severely constrains the number of viable configurations.

Advantages:
One alternative layout provided a field and parking lot that were parallel and at the same approximate finish grade. This drastically improved the pedestrian access between the parking area and the athletic field.

Disadvantages:
The alternative layout resulted in larger areas of disturbance and environmental impact, particularly within wetland buffer areas. This was primarily due to the amount of cutting and filling required to tie in the field and parking lot finish grades to existing grades.

Conclusion:
The proposed layout and configuration of the field and parking lot works with existing grades and takes advantage of areas disturbed by the site's former use as a Dow Chemical research facility. This includes locating proposed improvements where the former Dow building was located, the old parking areas still visible on site, and the existing access/maintenance drives. The proposed design also incorporates retaining walls to further minimize the area of disturbance with the 100' wetland buffer.

APPENDIX C:
Stormwater Report
with attachments A. to I.

Stormwater Report

Conservation Commission
Wayland, Massachusetts

Loker Field Improvements

Notice of Intent
Massachusetts Wetland Protection Act
M.G.L. c. 131 § 40

July 11, 2018
Revised September 10, 2018

JOB NO: 2180076

Weston & Sampson
5 Centennial Drive
Peabody, MA 01960

www.westonandsampson.com
Tel: 978-532-1900 Fax: 978-977-0100

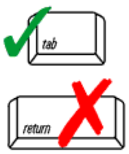
Table of Contents

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.

B. Stormwater Checklist and Certification

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

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

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

Registered Professional Engineer's Certification

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

Registered Professional Engineer Block and Signature

COMMONWEALTH OF MASSACHUSETTS
JAMES
I.
PEARSON
CIVIL
No. 50675
REGISTERED
PROFESSIONAL ENGINEER

9/10/2018

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 (continued)

Standard 2: Peak Rate Attenuation

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

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

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

Standard 3: Recharge

☐ Soil Analysis provided.

☒ Required Recharge Volume calculation provided.

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

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

☐ Static ☒ Simple Dynamic ☐ Dynamic Field[1]

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

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

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

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

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

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

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

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

Checklist (continued)

Standard 3: Recharge (continued)

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

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

Standard 4: Water Quality

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

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

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

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

  ☐ is within the Zone II or Interim Wellhead Protection Area

  ☐ is near or to other critical areas

  ☒ is within soils with a rapid infiltration rate (greater than 2.4 inches per hour)

  ☐ involves runoff from land uses with higher potential pollutant loads.

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

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

Checklist (continued)

Standard 4: Water Quality (continued)

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

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

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

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

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

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

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

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

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

☐ All exposure has been eliminated.

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

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

Standard 6: Critical Areas

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

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

Checklist (continued)

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

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

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

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

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

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

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

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

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

Checklist 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.

Stormwater Report

To Be Submitted with the Notice of Intent

Revised 9/10/2018

Applicant/Project Name: Town of Wayland – Loker Field Improvements

Project Address: Commonwealth Road, Wayland MA

Application Prepared by:

Firm: Weston & Sampson, Inc.

Registered PE: James Pearson

Below is an explanation concerning Standards 1-10 as they apply to the Town of Wayland Loker Field Imprvement project, located on Commonwealth Road:

General:

Due to the increased need for town athletic facilities, the Town of Wayland is proposing the installation of a multi-purpose athletic field within the Loker Conservation and Recreation Area. The project includes field installation, field lighting, parking, trail improvements, and the addition of a stormwater management system. There would also be improvements to the existing emergency access road and parking area. The goal of this project is to utilize the Loker Conservation and Recreation Area to provide the Town of Wayland with a multi-purpose athletic field. Currently there is existing open field space on the property. By expanding this open space there will be room for the new athletic field. There is also an existing parking lot that will also be expanded on to allow for additional parking. In addition to the field and parking lot, new lighting will be added to allow for field use after daylight hours. The existing emergency access road will also be improved upon to allow for easier use, and miscellaneous paved areas in various locations of the site will be removed and converted to grassed space.

Standard 1: No New Untreated Discharges

The proposed project will create no new untreated discharges. Total impervious area post-development will increase by approximately 6% within the proposed limit of work.

Standard 2: Peak Rate Attenuation

Both existing and proposed conditions were modeled using HydroCAD computer software. The results of this analysis are presented in Table 1.

Table 1: Total Peak Runoff Rate

Point of Interest	Storm Frequency	Storm Depth (in)	Peak Flow (cfs) Pre-Development	Post-Development
P1	0.5-Inch	0.50	0.04	0.02
	1-Inch	1.00	0.09	0.04
	2 Year	3.31	0.32	0.16
	10 Year	5.19	0.51	0.25
	25 Year	6.36	0.65	0.35
	100 Year	8.17	1.03	0.75
P2	0.5-Inch	0.50	0.40	0.24
	1-Inch	1.00	0.96	0.58
	2 Year	3.31	3.48	2.09
	10 Year	5.19	5.50	3.30
	25 Year	6.36	6.84	4.37
	100 Year	8.17	10.02	9.89

The proposed design is such that peak runoff rates do not exceed rates of runoff under existing conditions even in the 100-year storm scenario. For regulatory purposes the existing site condition serves as the benchmark for peak discharges that must not be exceeded under the re-developed condition. Peak discharges are mitigated by using the proposed underground chambers to provide stormwater detention benefit. Please refer to existing and proposed conditions in HydroCAD model printouts included in Attachment D for additional details.

To ensure that the work incorporates the performance standards recommended in the DEP's Stormwater Management Policy, necessary erosion and sedimentation control measures will be utilized during construction. These measures will include compost filter tubes, catch basin protection, and a stabilized construction entrance, as depicted on the site plans.

Standard 3: Recharge

Overall, the site is being redeveloped such that the increase in impervious area under proposed conditions will be minimal in comparison with existing conditions as the site is redeveloped. As such, stormwater recharge has been provided to the maximum extent practicable. Recharge Volume (Appendix E) has been calculated based on the amount of impervious area contributing runoff to the underground chambers. The recharge rate for the site was determined based on the soil type at the site as determined by test pits and borings (Appendix C). Logs B-5-L, TP-5 and TP-6 indicate the consistent presence of a "sand and gravel" in the area where the underground infiltration chambers are proposed.

Using data from the MA Stormwater Handbook (Table 2.3.3 1982 Rawls Rates), an infiltration rate of 2.41 inches/hour was conservatively used, which corresponds with a soil type of Loamy Sand.

Standard 4: Water Quality

As discussed under Standard 3, this is a redevelopment project. Stormwater from impervious areas on the site will undergo treatment to bring TSS levels within regulated limits (>80% removal) to the maximum extent practicable. Treatment will be provided for the improved parking lot area, which is where the increased impervious area occurs. Runoff from the existing parking lot area does not presently undergo treatment, but under proposed conditions runoff from this area will be directed through deep sump hooded catch basins and into the underground stormwater chambers. Runoff from the existing access drives will be directed to existing catch basins. During construction of the project, appropriate temporary stormwater BMPs will be used to minimize sedimentation and soil erosion.

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

This project will not create a land use with higher potential pollutant load.

Standard 6: Critical Areas

There will be no new discharge to critical areas.

Standard 7: Redevelopments and Other Projects Subject to the Standards Only to the Maximum Extent Practicable

The project is a mix of new development and redevelopment. Certain standards for redeveloped areas have been met to the maximum extent practicable as described herein.

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

A detailed Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan is included in Attachment G. To ensure that the work incorporates the performance standards recommended in the DEP's Stormwater Management Policy, necessary erosion and sedimentation control measures will be utilized during construction. These measures will include compost filter tubes, silt fence, catch basin protection, and a stabilized construction entrance.

Standard 9: Operation and Maintenance Plan

An operations and maintenance plan is included in Attachment H.

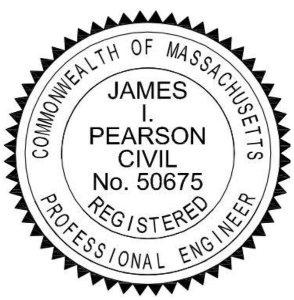
Standard 10: Prohibition of Illicit Discharges

An illicit discharge compliance statement has been included in Attachment I.

Registered Professional Engineer's Certification

I have reviewed the Stormwater Report, including any relevant soil evaluations, computations, Long-term Pollution Prevention Plan, the Construction Period Erosion and Sedimentation Control Plan, the Long-term Post-Construction Operation and Maintenance Plan, the Illicit Discharge Compliance Statement 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.

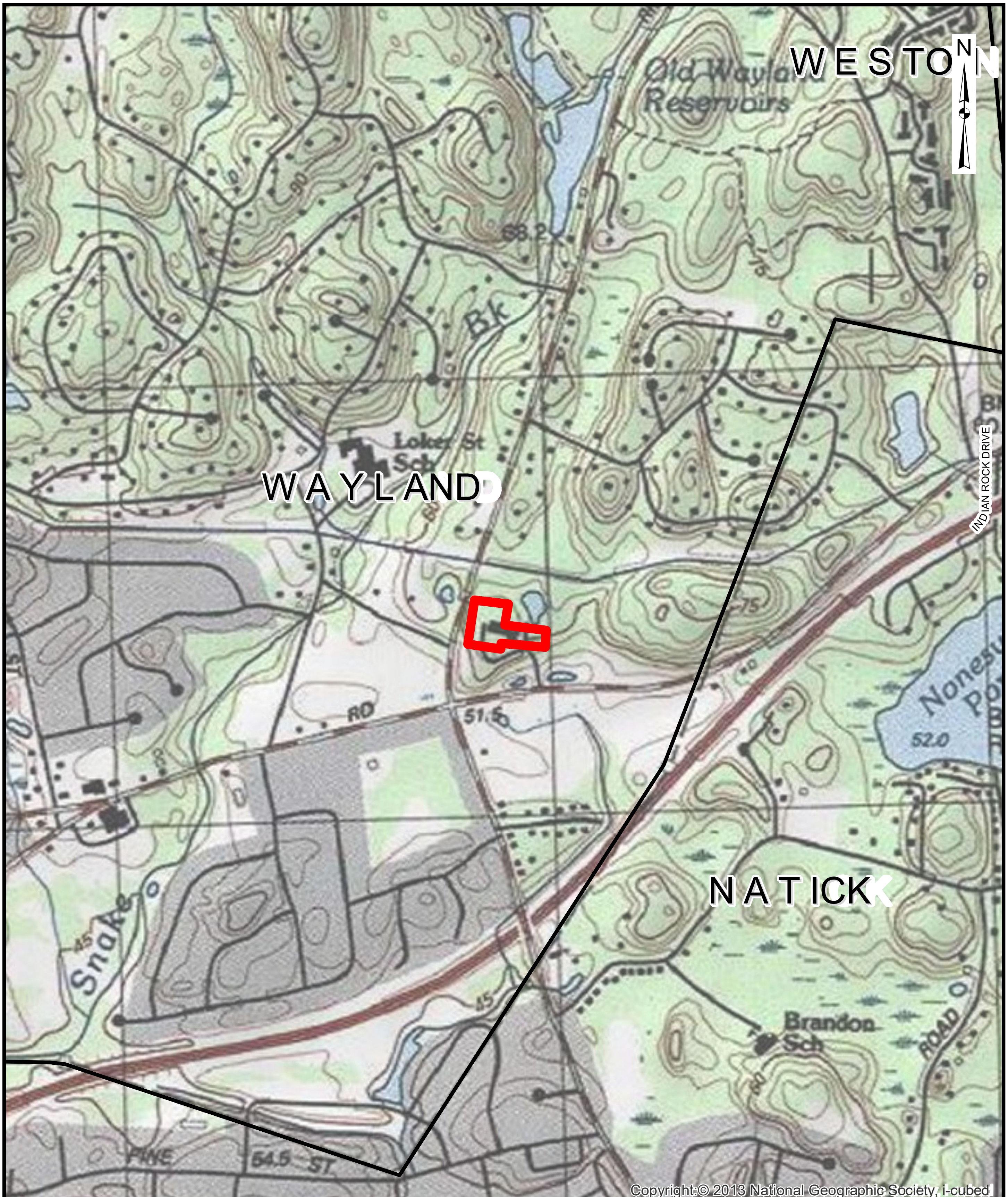
Registered Professional Engineer Block and Signature



9/10/2018

Signature and Date

Attachment A - Locus Map



Attachment A
Loker Conservation & Recreation Area
Wayland, Massachusetts

Locus Map

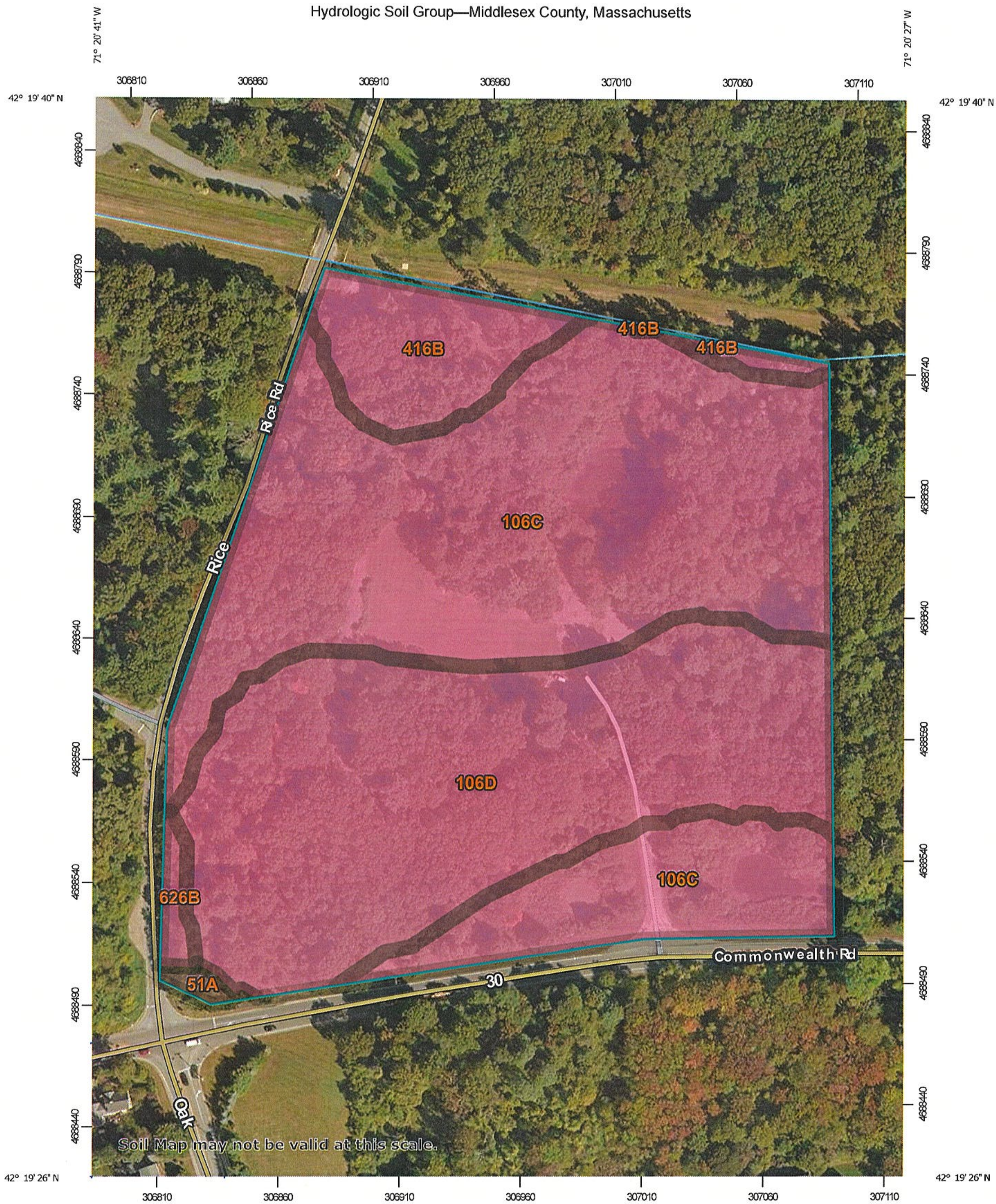
Work Area

600 0 600
Scale In Feet

Weston & Sampson

Attachment B - NRCS Soils Map, Soils Report, and HSG Classifications

Hydrologic Soil Group—Middlesex County, Massachusetts



Map Scale: 1:2,160 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0, 30, 60, 120, 180

Feet: 0, 100, 200, 400, 600

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

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:25,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Middlesex County, Massachusetts
Survey Area Data: Version 17, Oct 6, 2017

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

Date(s) aerial images were photographed: Sep 12, 2014—Sep 28, 2014

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

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
51A	Swansea muck, 0 to 1 percent slopes	B/D	0.1	0.5%
106C	Narragansett-Hollis-Rock outcrop complex, 3 to 15 percent slopes	A	8.9	52.4%
106D	Narragansett-Hollis-Rock outcrop complex, 15 to 25 percent slopes	A	6.5	38.5%
416B	Narragansett silt loam, 3 to 8 percent slopes, very stony	A	1.3	7.6%
626B	Merrimac-Urban land complex, 0 to 8 percent slopes	A	0.2	0.9%
Totals for Area of Interest			**16.9**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

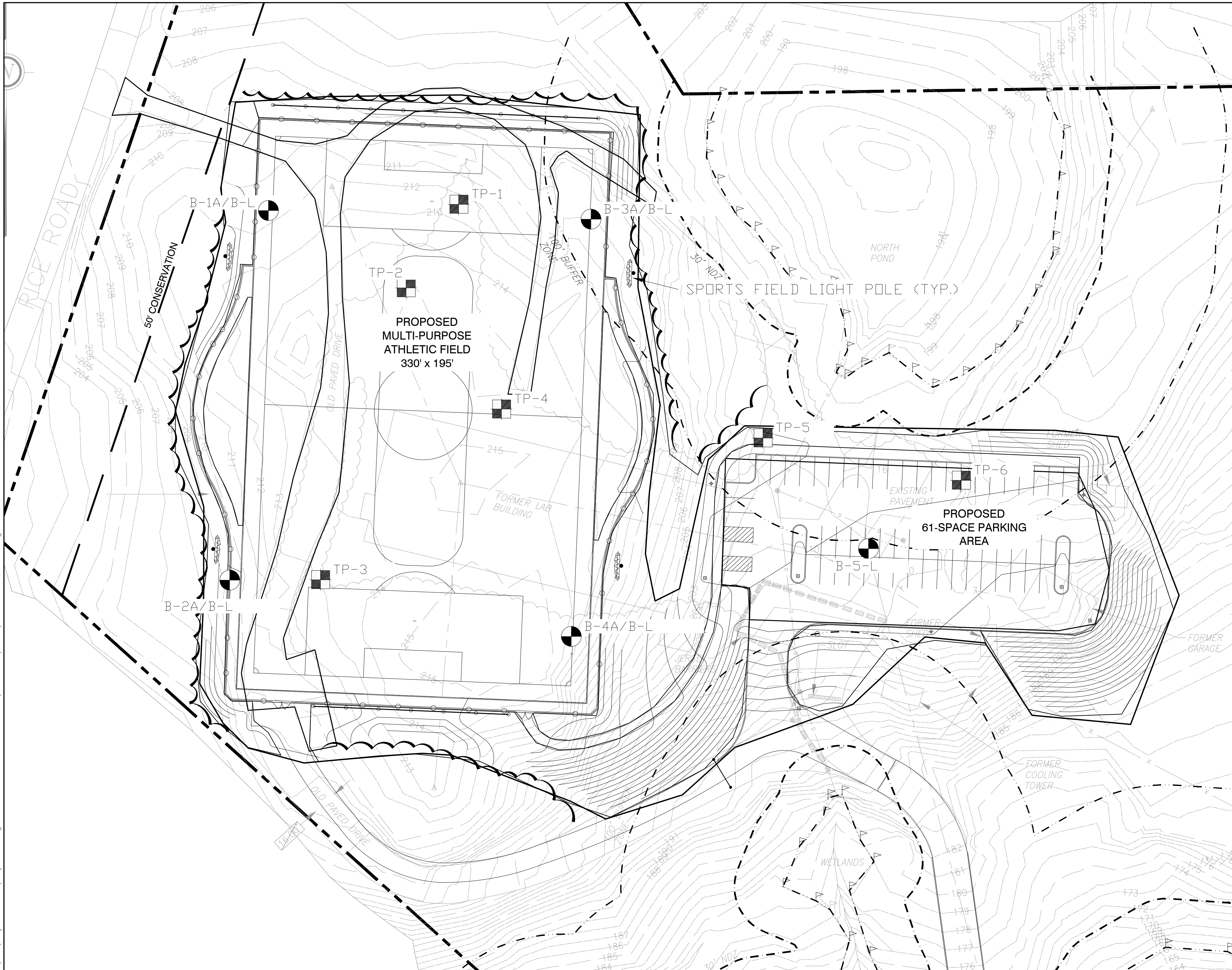
Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Attachment C - Test Pit Summary and Logs



NOTES:

1. THIS FIGURE IS BASED ON AN EXISTING AND PROPOSED CONDITIONS SURVEY PLAN PREPARED BY WESTON & SAMPSON ENGINEERS, INC. DATED MARCH 2018.
2. ELEVATIONS REFERENCE THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88).
3. BORINGS WERE COMPLETED BY TECHNICAL DRILLING SERVICES, INC. OF STERLING, MA AND OBSERVED BY WESTON & SAMPSON ENGINEERS, INC. ON MARCH 12, 2018.
4. TEST PITS WERE COMPLETED BY THE TOWN OF WAYLAND AND OBSERVED BY WESTON & SAMPSON ENGINEERS, INC. ON MARCH 21, 2018.
5. BORING LOCATIONS SHOWN ARE APPROXIMATE AND WERE LOCATED IN THE FIELD BY WESTON & SAMPSON ENGINEERS, INC. USING A HANDHELD GPS DEVICE.
6. LOCATIONS OF UNDERGROUND UTILITIES AND STRUCTURES SHOWN HAVE BEEN COMPILED, IN PART, FROM RECORD MAPPING AND OTHER DATA SUPPLIED BY THE RESPECTIVE UTILITY COMPANIES AND/OR OTHER SOURCES. THESE LOCATIONS MUST BE CONSIDERED APPROXIMATE.

LEGEND:

B-1-L BORING DESIGNATION AND APPROXIMATE LOCATION.

TP-1 TEST PIT DESIGNATION AND APPROXIMATE LOCATION.

60 30 0 60 120

SCALE: 1"=60'

FIGURE 1
LOKER SITE PLAN

WAYLAND HIGH SCHOOL ATHLETIC FACILITIES
WAYLAND, MA

DESIGNED BY: MJZ	CHECKED BY:	DATE: APRIL 2018

Weston & Sampson℠

P:\MA\Wayland MA\Wayland High School Athletic Facilities\Geotech\Plan\Loker Site Plan.dwg

Weston & Sampson

CLIENT: Town of Wayland
PROJECT NUMBER: 2180076
PROJECT NAME: Wayland High School Athletic Facilities
PROJECT LOCATION: Wayland, Massachusetts

DRILLER: Brett Balyk - Technical Drilling Services
LOGGED / CHECKED BY: M. Zanchi, EIT /
RIG TYPE / DRILLING METHODS: ATV / hollow-stem auger (HSA)
CASING DIAMETER: 4-1/4" ID
SAMPLING METHODS: Standard penetration test (SPT)
SAMPLER TYPE: Standard 24" long x 2" OD (1-3/8" ID) split-spoon
SAMPLER HAMMER: 140-lb. automatic hammer
OTHER:

BORING LOCATION: See attached plan.
GROUND ELEVATION: Not available **DATUM:** Unknown
DRILLING START DATE: 3/12/2018 **END DATE:** 3/12/2018

GROUNDWATER OBSERVATIONS

DATE	DEPTH	COMMENTS
3/12/2018	Not observed	

MATERIAL DESCRIPTION
(see guide below for soil classification based on constituent percentage)

Mineral Soil
GRAVEL, SAND, SILT, CLAY: >50%
gravelly, sandy, silty, clayey: 35-50%
some: 20-35%
little: 10-20%
trace: 0-10%

Organic Soil
PEAT: 50-100%
organic (soil): 15-50%
with some organics: 5-15%

DEPTH (ft.) *Elevation*	TYPE - NO.	DEPTH (ft.)	REC./PEN. (in.)	SPT BLOWS/6"	SPT N-VALUE	% MOISTURE	% FINES (P200)	GRAPHIC LOG	STRATA NAME	MATERIAL DESCRIPTION	COMMENTS
0	S-1	0.0	11/24	2 4 4 11	8					6" Organics (Wood, leaves, pine needles, roots); moist.	
									FILL	Loose, light brown, fine to coarse SAND, some fine to coarse gravel, little silt; moist. [FILL]	P.I.D. - 0.8 ppm
	S-2	2.0	13/14	14 36 120/2"					SAND & GRAVEL	Very dense, tan, gravelly fine to coarse SAND, little silt; moist.	P.I.D. - 0.1 ppm - Auger grinding at approximately 2 ft.
5	S-3	4.0	6/11	27 120/5"					SAND & GRAVEL	Very dense, gray, fine to coarse GRAVEL, some fine to coarse sand, little silt; moist.	P.I.D. - 0.4 ppm - Heavy auger grinding and rig chatter at approximately 5 - 7 ft.

Auger refusal at 7 ft. End of boring at 7 ft. Offset boring approximately 5 ft. west to B-1B-L and re-attempt.

SAMPLE		GRANULAR SOILS		COHESIVE SOILS	
SYMBOL	TYPE	N-Value	Density	N-VALUE	CONSISTENCY
S	Split spoon	0-4	Very Loose	< 2	Very Soft
ST	Shelby tube	4-10	Loose	2-4	Soft
AG	Auger grab	10-30	Med. Dense	4-8	Med. Stiff
NX	Rock core	30-50	Dense	8-15	Stiff
GP	Direct push	> 50	Very Dense	15-30	Very Stiff
				> 30	Hard

GENERAL NOTES:
1. The stratification lines represent the approximate boundary between soil types; actual transitions may be gradual.

2. Water level readings have been made in the drill holes at the times and conditions stated on the boring log. Fluctuations in the level of groundwater may occur due to other factors than those presented at the time measurements are made.

BORING NUMBER: **B-1B-L**

CLIENT: Town of Wayland
PROJECT NUMBER: 2180076
PROJECT NAME: Wayland High School Athletic Facilities
PROJECT LOCATION: Wayland, Massachusetts

DRILLER: Brett Balyk - Technical Drilling Services
LOGGED / CHECKED BY: M. Zanchi, EIT /
RIG TYPE / DRILLING METHODS: ATV / hollow-stem auger (HSA)
CASING DIAMETER: 4-1/4" ID
SAMPLING METHODS: Standard penetration test (SPT)
SAMPLER TYPE: Standard 24" long x 2" OD (1-3/8" ID) split-spoon
SAMPLER HAMMER: 140-lb. automatic hammer
OTHER:

BORING LOCATION: See attached plan.
GROUND ELEVATION: Not available **DATUM:** Unknown
DRILLING START DATE: 3/12/2018 **END DATE:** 3/12/2018

GROUNDWATER OBSERVATIONS

DATE	DEPTH	COMMENTS
3/12/2018	Not observed	

DEPTH (ft.) *Elevation*	TYPE - NO.	DEPTH (ft.)	REC./PEN. (in.)	SPT BLOWS/6"	SPT N-VALUE	% MOISTURE	% FINES (P200)	GRAPHIC LOG	STRATA NAME	MATERIAL DESCRIPTION	COMMENTS
0										See log for B-1A-L for soil descriptions.	B-1B is offset approximately 5 ft. west of B-1A-L.
5											
										Auger refusal at 7 ft. End of boring at 7 ft.	

MATERIAL DESCRIPTION guide (see guide below for soil classification based on constituent percentage):

Mineral Soil: GRAVEL, SAND, SILT, CLAY: >50%; gravelly, sandy, silty, clayey: 35-50%; some: 20-35%; little: 10-20%; trace: 0-10%

Organic Soil: PEAT: 50-100%; organic (soil): 15-50%; with some organics: 5-15%

SAMPLE SYMBOL	SAMPLE TYPE	GRANULAR SOILS N-Value	GRANULAR SOILS Density	COHESIVE SOILS N-VALUE	COHESIVE SOILS CONSISTENCY
S	Split spoon	0-4	Very Loose	< 2	Very Soft
ST	Shelby tube	4-10	Loose	2-4	Soft
AG	Auger grab	10-30	Med. Dense	4-8	Med. Stiff
NX	Rock core	30-50	Dense	8-15	Stiff
GP	Direct push	> 50	Very Dense	15-30	Very Stiff
				> 30	Hard

GENERAL NOTES:

1. The stratification lines represent the approximate boundary between soil types; actual transitions may be gradual.

2. Water level readings have been made in the drill holes at the times and conditions stated on the boring log. Fluctuations in the level of groundwater may occur due to other factors than those presented at the time measurements are made.

BORING NUMBER: **B-1B-L**

Weston & Sampson

BORING NUMBER: B-2A-L

CLIENT: Town of Wayland
PROJECT NUMBER: 2180076
PROJECT NAME: Wayland High School Athletic Facilities
PROJECT LOCATION: Wayland, Massachusetts

DRILLER: Brett Balyk - Technical Drilling Services
LOGGED / CHECKED BY: M. Zanchi, EIT /
RIG TYPE / DRILLING METHODS: ATV / hollow-stem auger (HSA)
CASING DIAMETER: 4-1/4" ID
SAMPLING METHODS: Standard penetration test (SPT)
SAMPLER TYPE: Standard 24" long x 2" OD (1-3/8" ID) split-spoon
SAMPLER HAMMER: 140-lb. automatic hammer
OTHER:

BORING LOCATION: See attached plan.
GROUND ELEVATION: Not available **DATUM:** Unknown
DRILLING START DATE: 3/12/2018 **END DATE:** 3/12/2018

GROUNDWATER OBSERVATIONS

DATE	DEPTH	COMMENTS
3/12/2018	Not observed	

MATERIAL DESCRIPTION
(see guide below for soil classification based on constituent percentage)

Mineral Soil
GRAVEL, SAND, SILT, CLAY: >50%
gravelly, sandy, silty, clayey: 35-50%
some: 20-35%
little: 10-20%
trace: 0-10%

Organic Soil
PEAT: 50-100%
organic (soil): 15-50%
with some organics: 5-15%

DEPTH (ft.) *Elevation*	TYPE - NO.	DEPTH (ft.)	REC./PEN. (in.)	SPT BLOWS/6"	SPT N-VALUE	% MOISTURE	% FINES (P200)	GRAPHIC LOG	STRATA NAME	MATERIAL DESCRIPTION	COMMENTS
0	S-1	0.0	3/24	2 3 4 8	7				FILL	Loose, brown, coarse GRAVEL, little silt, little fine to coarse sand, little organics (roots, leaves); moist. [FILL]	- Coarse gravel fragment in tip of spoon.
	S-2	2.0	12/14	28 35 120/2"					SAND & GRAVEL	Very dense, light brown, gravelly fine to coarse SAND, trace silt; moist.	P.I.D. - 0.1 ppm
5	S-3	4.0	12/12	55 33 120/0"						Very dense, gray-brown, fine to coarse GRAVEL, little fine to medium sand, trace silt; moist.	P.I.D. - 0.9 ppm
										Auger refusal at 5 ft. End of boring at 5 ft. Offset boring approximately 2 ft. northwest to B-2B-L and re-attempt.	

SAMPLE SYMBOL	SAMPLE TYPE	GRANULAR SOILS N-Value	GRANULAR SOILS Density	COHESIVE SOILS N-VALUE	COHESIVE SOILS CONSISTENCY
S	Split spoon	0-4	Very Loose	< 2	Very Soft
ST	Shelby tube	4-10	Loose	2-4	Soft
AG	Auger grab	10-30	Med. Dense	4-8	Med. Stiff
NX	Rock core	30-50	Dense	8-15	Stiff
GP	Direct push	> 50	Very Dense	15-30	Very Stiff
				> 30	Hard

GENERAL NOTES:
1. The stratification lines represent the approximate boundary between soil types; actual transitions may be gradual.

2. Water level readings have been made in the drill holes at the times and conditions stated on the boring log. Fluctuations in the level of groundwater may occur due to other factors than those presented at the time measurements are made.

BORING NUMBER: B-2A-L

BORING NUMBER: **B-2B-L**

CLIENT: Town of Wayland
PROJECT NUMBER: 2180076
PROJECT NAME: Wayland High School Athletic Facilities
PROJECT LOCATION: Wayland, Massachusetts

DRILLER: Brett Balyk - Technical Drilling Services
LOGGED / CHECKED BY: M. Zanchi, EIT /
RIG TYPE / DRILLING METHODS: ATV / hollow-stem auger (HSA)
CASING DIAMETER: 4-1/4" ID
SAMPLING METHODS: Standard penetration test (SPT)
SAMPLER TYPE: Standard 24" long x 2" OD (1-3/8" ID) split-spoon
SAMPLER HAMMER: 140-lb. automatic hammer
OTHER:

BORING LOCATION: See attached plan.
GROUND ELEVATION: Not available **DATUM:** Unknown
DRILLING START DATE: 3/12/2018 **END DATE:** 3/12/2018

GROUNDWATER OBSERVATIONS

DATE	DEPTH	COMMENTS
3/12/2018	Not observed	

DEPTH (ft.) *Elevation*	TYPE - NO.	DEPTH (ft.)	REC./PEN. (in.)	SPT BLOWS/6"	SPT N-VALUE	% MOISTURE	% FINES (P200)	GRAPHIC LOG	STRATA NAME	MATERIAL DESCRIPTION	COMMENTS
0										See log for B-2A-L for soil descriptions.	B-2B-L is offset approximately 5 ft. northwest of B-2A-L.
5										Auger refusal at 5 ft. End of boring at 5 ft.	

MATERIAL DESCRIPTION (see guide below for soil classification based on constituent percentage)

Mineral Soil
GRAVEL, SAND, SILT, CLAY: >50%
gravelly, sandy, silty, clayey: 35-50%
some: 20-35%
little: 10-20%
trace: 0-10%

Organic Soil
PEAT: 50-100%
organic (soil): 15-50%
with some organics: 5-15%

SAMPLE SYMBOL	SAMPLE TYPE	GRANULAR N-Value	GRANULAR Density	COHESIVE N-VALUE	COHESIVE CONSISTENCY
S	Split spoon	0-4	Very Loose	< 2	Very Soft
ST	Shelby tube	4-10	Loose	2-4	Soft
AG	Auger grab	10-30	Med. Dense	4-8	Med. Stiff
NX	Rock core	30-50	Dense	8-15	Stiff
GP	Direct push	> 50	Very Dense	15-30	Very Stiff
				> 30	Hard

GENERAL NOTES:

1. The stratification lines represent the approximate boundary between soil types; actual transitions may be gradual.

2. Water level readings have been made in the drill holes at the times and conditions stated on the boring log. Fluctuations in the level of groundwater may occur due to other factors than those presented at the time measurements are made.

BORING NUMBER: **B-2B-L**

Weston & Sampson

BORING NUMBER: **B-3A-L**

CLIENT: Town of Wayland
PROJECT NUMBER: 2180076
PROJECT NAME: Wayland High School Athletic Facilities
PROJECT LOCATION: Wayland, Massachusetts

DRILLER: Brett Balyk - Technical Drilling Services
LOGGED / CHECKED BY: M. Zanchi, EIT /
RIG TYPE / DRILLING METHODS: ATV / hollow-stem auger (HSA)
CASING DIAMETER: 4-1/4" ID
SAMPLING METHODS: Standard penetration test (SPT)
SAMPLER TYPE: Standard 24" long x 2" OD (1-3/8" ID) split-spoon
SAMPLER HAMMER: 140-lb. automatic hammer
OTHER:

BORING LOCATION: See attached plan.
GROUND ELEVATION: Not available **DATUM:** Unknown
DRILLING START DATE: 3/12/2018 **END DATE:** 3/12/2018

GROUNDWATER OBSERVATIONS

DATE	DEPTH	COMMENTS
3/12/2018	Not observed	

MATERIAL DESCRIPTION (see guide below for soil classification based on constituent percentage)

Mineral Soil
GRAVEL, SAND, SILT, CLAY: >50%
gravelly, sandy, silty, clayey: 35-50%
some: 20-35%
little: 10-20%
trace: 0-10%

Organic Soil
PEAT: 50-100%
organic (soil): 15-50%
with some organics: 5-15%

DEPTH (ft.) *Elevation*	TYPE - NO.	DEPTH (ft.)	REC./PEN. (in.)	SPT BLOWS/6"	SPT N-VALUE	% MOISTURE	% FINES (P200)	GRAPHIC LOG	STRATA NAME	MATERIAL DESCRIPTION	COMMENTS
0	S-1	0.0	18/24	1 5 11 12	16					5" Topsoil	
									FILL	Very stiff, orange-brown, sandy SILT, little fine to coarse gravel, trace roots; moist. [FILL]	P.I.D. - 6.2 ppm
	S-2	2.0	7/8	25 120/2"					SAND & GRAVEL	Very dense, gray-brown, gravelly fine to coarse SAND, little silt; moist.	P.I.D. - 4.3 ppm - Auger grinding approximately 2 - 4 ft.
5	S-3	4.0	8/9	25 120/3"						Very dense, gray, fine to coarse GRAVEL, some fine to coarse sand, little silt; moist.	- Heavy auger grinding and rig chatter at approximately 4 - 7 ft. Auger cuttings are primarily gray gravel from approximately 4 - 7 ft.

Auger refusal at 7 ft. End of boring at 7 ft. Offset boring approximately 2.7 ft. east to B-3B-L and re-attempt.

SAMPLE		GRANULAR SOILS		COHESIVE SOILS	
SYMBOL	TYPE	N-Value	Density	N-VALUE	CONSISTENCY
S	Split spoon	0-4	Very Loose	< 2	Very Soft
ST	Shelby tube	4-10	Loose	2-4	Soft
AG	Auger grab	10-30	Med. Dense	4-8	Med. Stiff
NX	Rock core	30-50	Dense	8-15	Stiff
GP	Direct push	> 50	Very Dense	15-30	Very Stiff
				> 30	Hard

GENERAL NOTES:

1. The stratification lines represent the approximate boundary between soil types; actual transitions may be gradual.

2. Water level readings have been made in the drill holes at the times and conditions stated on the boring log. Fluctuations in the level of groundwater may occur due to other factors than those presented at the time measurements are made.

BORING NUMBER: **B-3A-L**

BORING NUMBER: **B-3A-L**

CLIENT: Town of Wayland
PROJECT NUMBER: 2180076
PROJECT NAME: Wayland High School Athletic Facilities
PROJECT LOCATION: Wayland, Massachusetts

DRILLER: Brett Balyk - Technical Drilling Services
LOGGED / CHECKED BY: M. Zanchi, EIT /
RIG TYPE / DRILLING METHODS: ATV / hollow-stem auger (HSA)
CASING DIAMETER: 4-1/4" ID
SAMPLING METHODS: Standard penetration test (SPT)
SAMPLER TYPE: Standard 24" long x 2" OD (1-3/8" ID) split-spoon
SAMPLER HAMMER: 140-lb. automatic hammer
OTHER:

BORING LOCATION: See attached plan.
GROUND ELEVATION: Not available **DATUM:** Unknown
DRILLING START DATE: 3/12/2018 **END DATE:** 3/12/2018

GROUNDWATER OBSERVATIONS

DATE	DEPTH	COMMENTS
3/12/2018	Not observed	

MATERIAL DESCRIPTION
(see guide below for soil classification based on constituent percentage)

Mineral Soil
GRAVEL, SAND, SILT, CLAY: >50%
gravelly, sandy, silty, clayey: 35-50%
some: 20-35%
little: 10-20%
trace: 0-10%

Organic Soil
PEAT: 50-100%
organic (soil): 15-50%
with some organics: 5-15%

DEPTH (ft.) *Elevation*	TYPE - NO.	DEPTH (ft.)	REC./PEN. (in.)	SPT BLOWS/6"	SPT N-VALUE	% MOISTURE	% FINES (P200)	GRAPHIC LOG	STRATA NAME	MATERIAL DESCRIPTION	COMMENTS
0	S-1	0.0	18/24	1 5 11 12	16					5" Topsoil	
									FILL	Very stiff, orange-brown, sandy SILT, little fine to coarse gravel, trace roots; moist. [FILL]	P.I.D. - 6.2 ppm
	S-2	2.0	7/8	25 120/2"					SAND & GRAVEL	Very dense, gray-brown, gravelly fine to coarse SAND, little silt; moist.	P.I.D. - 4.3 ppm - Auger grinding approximately 2 - 4 ft.
5	S-3	4.0	8/9	25 120/3"						Very dense, gray, fine to coarse GRAVEL, some fine to coarse sand, little silt; moist.	- Heavy auger grinding and rig chatter at approximately 4 - 7 ft. Auger cuttings are primarily gray gravel from approximately 4 - 7 ft.

Auger refusal at 7 ft. End of boring at 7 ft. Offset boring approximately 2.7 ft. east to B-3B-L and re-attempt.

SAMPLE		GRANULAR SOILS		COHESIVE SOILS	
SYMBOL	TYPE	N-Value	Density	N-VALUE	CONSISTENCY
S	Split spoon	0-4	Very Loose	< 2	Very Soft
ST	Shelby tube	4-10	Loose	2-4	Soft
AG	Auger grab	10-30	Med. Dense	4-8	Med. Stiff
NX	Rock core	30-50	Dense	8-15	Stiff
GP	Direct push	> 50	Very Dense	15-30	Very Stiff
				> 30	Hard

GENERAL NOTES:
1. The stratification lines represent the approximate boundary between soil types; actual transitions may be gradual.

2. Water level readings have been made in the drill holes at the times and conditions stated on the boring log. Fluctuations in the level of groundwater may occur due to other factors than those presented at the time measurements are made.

BORING NUMBER: **B-3A-L**

Weston & Sampson

BORING NUMBER: **B-3B-L**

CLIENT: Town of Wayland
PROJECT NUMBER: 2180076
PROJECT NAME: Wayland High School Athletic Facilities
PROJECT LOCATION: Wayland, Massachusetts

DRILLER: Brett Balyk - Technical Drilling Services
LOGGED / CHECKED BY: M. Zanchi, EIT /
RIG TYPE / DRILLING METHODS: ATV / hollow-stem auger (HSA)
CASING DIAMETER: 4-1/4" ID
SAMPLING METHODS: Standard penetration test (SPT)
SAMPLER TYPE: Standard 24" long x 2" OD (1-3/8" ID) split-spoon
SAMPLER HAMMER: 140-lb. automatic hammer
OTHER:

BORING LOCATION: See attached plan.
GROUND ELEVATION: Not available **DATUM:** Unknown
DRILLING START DATE: 3/12/2018 **END DATE:** 3/12/2018

GROUNDWATER OBSERVATIONS

DATE	DEPTH	COMMENTS
3/12/2018	Not observed	

DEPTH (ft.) *Elevation*	SAMPLE INFORMATION: TYPE - NO.	DEPTH (ft.)	REC./PEN. (in.)	SPT BLOWS/6"	SPT N-VALUE	% MOISTURE	% FINES (P200)	GRAPHIC LOG	STRATA NAME	MATERIAL DESCRIPTION	COMMENTS
0										(see guide below for soil classification based on constituent percentage) Mineral Soil: GRAVEL, SAND, SILT, CLAY: >50%; gravelly, sandy, silty, clayey: 35-50%; some: 20-35%; little: 10-20%; trace: 0-10% Organic Soil: PEAT: 50-100%; organic (soil): 15-50%; with some organics: 5-15%	
5											B-3B-L is offset approximately 2.7 ft. east of B-3A-L. See log for B-3A-L for soil descriptions. - Auger grinding and rig chatter at approximately 2 - 6.5 ft. - Auger cuttings are primarily gray gravel from approximately 4 - 7 ft.

Auger refusal at 6.5 ft. End of boring at 6.5 ft.

SAMPLE

SYMBOL	TYPE
S	Split spoon
ST	Shelby tube
AG	Auger grab
NX	Rock core
GP	Direct push

GRANULAR SOILS

N-Value	Density
0-4	Very Loose
4-10	Loose
10-30	Med. Dense
30-50	Dense
> 50	Very Dense

COHESIVE SOILS

N-VALUE	CONSISTENCY
< 2	Very Soft
2-4	Soft
4-8	Med. Stiff
8-15	Stiff
15-30	Very Stiff
> 30	Hard

GENERAL NOTES:

1. The stratification lines represent the approximate boundary between soil types; actual transitions may be gradual.

2. Water level readings have been made in the drill holes at the times and conditions stated on the boring log. Fluctuations in the level of groundwater may occur due to other factors than those presented at the time measurements are made.

BORING NUMBER: **B-3B-L**

Weston & Sampson

BORING NUMBER: B-4A-L

CLIENT: Town of Wayland
PROJECT NUMBER: 2180076
PROJECT NAME: Wayland High School Athletic Facilities
PROJECT LOCATION: Wayland, Massachusetts

DRILLER: Brett Balyk - Technical Drilling Services
LOGGED / CHECKED BY: M. Zanchi, EIT /
RIG TYPE / DRILLING METHODS: ATV / hollow-stem auger (HSA)
CASING DIAMETER: 4-1/4" ID
SAMPLING METHODS: Standard penetration test (SPT)
SAMPLER TYPE: Standard 24" long x 2" OD (1-3/8" ID) split-spoon
SAMPLER HAMMER: 140-lb. automatic hammer
OTHER:

BORING LOCATION: See attached plan.
GROUND ELEVATION: Not available **DATUM:** Unknown
DRILLING START DATE: 3/12/2018 **END DATE:** 3/12/2018

GROUNDWATER OBSERVATIONS

DATE	DEPTH	COMMENTS
3/12/2018	Not observed	

MATERIAL DESCRIPTION
(see guide below for soil classification based on constituent percentage)

Mineral Soil
GRAVEL, SAND, SILT, CLAY: >50%
gravelly, sandy, silty, clayey: 35-50%
some: 20-35%
little: 10-20%
trace: 0-10%

Organic Soil
PEAT: 50-100%
organic (soil): 15-50%
with some organics: 5-15%

DEPTH (ft.) *Elevation*	TYPE - NO.	DEPTH (ft.)	REC./PEN. (in.)	SPT BLOWS/6"	SPT N-VALUE	% MOISTURE	% FINES (P200)	GRAPHIC LOG	STRATA NAME	MATERIAL DESCRIPTION	COMMENTS
0	S-1	0.0	12/24	5 4 4 5	8					3" Topsoil	
									FILL	Loose, light brown, fine to medium SAND, little fine to coarse gravel, trace silt; moist. [FILL]	
	S-2	2.0	7/24	6 5 6 6	11				FILL	Medium dense, light brown, fine to medium SAND, little fine gravel, little silt; moist. [FILL]	
5	S-3	4.0	6/7	9 120/1"					SAND & GRAVEL	Very dense, gray-brown, fine to coarse SAND, some fine to coarse gravel, little silt; moist.	

Auger refusal at 7 ft. End of boring at 7 ft. Offset boring approximately 5 ft. northeast to B-4B-L and re-attempt.

SAMPLE		GRANULAR SOILS		COHESIVE SOILS	
SYMBOL	TYPE	N-Value	Density	N-VALUE	CONSISTENCY
S	Split spoon	0-4	Very Loose	< 2	Very Soft
ST	Shelby tube	4-10	Loose	2-4	Soft
AG	Auger grab	10-30	Med. Dense	4-8	Med. Stiff
NX	Rock core	30-50	Dense	8-15	Stiff
GP	Direct push	> 50	Very Dense	15-30	Very Stiff
				> 30	Hard

GENERAL NOTES:
1. The stratification lines represent the approximate boundary between soil types; actual transitions may be gradual.

2. Water level readings have been made in the drill holes at the times and conditions stated on the boring log. Fluctuations in the level of groundwater may occur due to other factors than those presented at the time measurements are made.

BORING NUMBER: B-4A-L

BORING NUMBER: **B-4B-L**

CLIENT: Town of Wayland
PROJECT NUMBER: 2180076
PROJECT NAME: Wayland High School Athletic Facilities
PROJECT LOCATION: Wayland, Massachusetts

DRILLER: Brett Balyk - Technical Drilling Services
LOGGED / CHECKED BY: M. Zanchi, EIT /
RIG TYPE / DRILLING METHODS: ATV / hollow-stem auger (HSA)
CASING DIAMETER: 4-1/4" ID
SAMPLING METHODS: Standard penetration test (SPT)
SAMPLER TYPE: Standard 24" long x 2" OD (1-3/8" ID) split-spoon
SAMPLER HAMMER: 140-lb. automatic hammer
OTHER:

BORING LOCATION: See attached plan.
GROUND ELEVATION: Not available **DATUM:** Unknown
DRILLING START DATE: 3/12/2018 **END DATE:** 3/12/2018

GROUNDWATER OBSERVATIONS

DATE	DEPTH	COMMENTS
3/12/2018	Not observed	

DEPTH (ft.) *Elevation*	TYPE - NO.	DEPTH (ft.)	REC./PEN. (in.)	SPT BLOWS/6"	SPT N-VALUE	% MOISTURE	% FINES (P200)	GRAPHIC LOG	STRATA NAME	MATERIAL DESCRIPTION	COMMENTS
0											B-4B-L is offset approximately 5 ft. northeast of B-4A-L. See log for B-4A-L for soil descriptions.
5											

SAMPLE INFORMATION

MATERIAL DESCRIPTION
(see guide below for soil classification based on constituent percentage)

Mineral Soil
GRAVEL, SAND, SILT, CLAY: >50%
gravelly, sandy, silty, clayey: 35-50%
some: 20-35%
little: 10-20%
trace: 0-10%

Organic Soil
PEAT: 50-100%
organic (soil): 15-50%
with some organics: 5-15%

Auger refusal at 8 ft. End of boring at 8 ft.

SAMPLE

SYMBOL	TYPE
S	Split spoon
ST	Shelby tube
AG	Auger grab
NX	Rock core
GP	Direct push

GRANULAR SOILS

N-Value	Density
0-4	Very Loose
4-10	Loose
10-30	Med. Dense
30-50	Dense
> 50	Very Dense

COHESIVE SOILS

N-VALUE	CONSISTENCY
< 2	Very Soft
2-4	Soft
4-8	Med. Stiff
8-15	Stiff
15-30	Very Stiff
> 30	Hard

GENERAL NOTES:
1. The stratification lines represent the approximate boundary between soil types; actual transitions may be gradual.

2. Water level readings have been made in the drill holes at the times and conditions stated on the boring log. Fluctuations in the level of groundwater may occur due to other factors than those presented at the time measurements are made.

BORING NUMBER: **B-4B-L**

Weston & Sampson

BORING NUMBER: **B-5-L**

CLIENT: Town of Wayland
PROJECT NUMBER: 2180076
PROJECT NAME: Wayland High School Athletic Facilities
PROJECT LOCATION: Wayland, Massachusetts

DRILLER: Brett Balyk - Technical Drilling Services
LOGGED / CHECKED BY: M. Zanchi, EIT /
RIG TYPE / DRILLING METHODS: ATV / hollow-stem auger (HSA)
CASING DIAMETER: 4-1/4" ID
SAMPLING METHODS: Standard penetration test (SPT)
SAMPLER TYPE: Standard 24" long x 2" OD (1-3/8" ID) split-spoon
SAMPLER HAMMER: 140-lb. automatic hammer
OTHER:

BORING LOCATION: See attached plan.
GROUND ELEVATION: Not available **DATUM:** Unknown
DRILLING START DATE: 3/12/2018 **END DATE:** 3/12/2018

GROUNDWATER OBSERVATIONS

DATE	DEPTH	COMMENTS
3/12/2018	Not observed	

MATERIAL DESCRIPTION
(see guide below for soil classification based on constituent percentage)

Mineral Soil	Organic Soil
GRAVEL, SAND, SILT, CLAY: >50%	PEAT: 50-100%
gravelly, sandy, silty, clayey: 35-50%	organic (soil): 15-50%
some: 20-35%	with some organics: 5-15%
little: 10-20%	
trace: 0-10%	

DEPTH (ft.) *Elevation*	TYPE - NO.	DEPTH (ft.)	REC./PEN. (in.)	SPT BLOWS/6"	SPT N-VALUE	% MOISTURE	% FINES (P200)	GRAPHIC LOG	STRATA NAME	MATERIAL DESCRIPTION	COMMENTS
0	S-1	0.0	9/24	4 7 13 12	20				FILL	1" Topsoil Medium dense, brown, fine to coarse SAND, little fine gravel, trace silt; moist. [FILL]	
	S-2	2.0	15/24	13 12 9 11	21				FILL	Top 4" - Brown, fine to coarse SAND, little fine gravel, trace silt; moist. [FILL] Bottom 11" - Medium dense, orange-brown, silty fine SAND, little fine to coarse gravel; moist. [FILL]	
5	S-3	4.0	10/24	9 17 18 30	35				SAND & GRAVEL	Dense, brown, sandy fine to coarse GRAVEL, trace silt; moist.	

End of boring at 6 ft.

SAMPLE		GRANULAR SOILS		COHESIVE SOILS	
SYMBOL	TYPE	N-Value	Density	N-VALUE	CONSISTENCY
S	Split spoon	0-4	Very Loose	< 2	Very Soft
ST	Shelby tube	4-10	Loose	2-4	Soft
AG	Auger grab	10-30	Med. Dense	4-8	Med. Stiff
NX	Rock core	30-50	Dense	8-15	Stiff
GP	Direct push	> 50	Very Dense	15-30	Very Stiff
				> 30	Hard

GENERAL NOTES:

1. The stratification lines represent the approximate boundary between soil types; actual transitions may be gradual.

2. Water level readings have been made in the drill holes at the times and conditions stated on the boring log. Fluctuations in the level of groundwater may occur due to other factors than those presented at the time measurements are made.

BORING NUMBER: **B-5-L**

TEST PIT LOG

PROJECT NAME/NO.	Wayland High School Athletic Facilities		**TEST PIT NUMBER**
LOCATION	Wayland, Massachusetts		TP-1
CLIENT	Town of Wayland		GROUND SURFACE
CONTRACTOR	Town of Wayland	FOREMAN: Todd	ELEVATION --
OBSERVED BY	Sarah Rocklin	DATE 3/21/18	DEPTH TO GROUNDWATER
CHECKED BY		DATE	Not observed

DEPTH BELOW GROUND SURFACE (ft.)	SOIL DESCRIPTION	STRATUM DESCRIPTION
Surface	Grass at surface	
1	0 - 1.3' - Dark brown, fine SAND, trace fine to coarse gravel, trace silt, trace organics; moist. [TOPSOIL]	**TOPSOIL**
2	1.3' - 2.7' - Yellow-brown, fine to coarse SAND, some fine to coarse gravel, trace silt; moist. [FILL]	**FILL**
3	2.7' - 5.0' - Coarse GRAVEL, sub-rounded; moist. [SEPTIC FIELD] - 6" diameter broken clay pipe observed at approximately 3.0'	**SEPTIC FIELD [FILL]**
4		
5		
6	5.0' - 6.7' - Gray-brown, gravelly fine to coarse SAND, trace silt; moist.	**SAND & GRAVEL**
7	Possible bedrock (GRANITE) encountered at 6.7'. End of test pit at 6.7'.	**BEDROCK**
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		

NOTES: Coordinates: 42.3265 Lat., -71.3433 Long.

TEST PIT NUMBER
TP-1

Weston & Sampson

TEST PIT LOG

PROJECT NAME/NO.	Wayland High School Athletic Facilities			TEST PIT NUMBER	
LOCATION	Wayland, Massachusetts			TP-2	
CLIENT	Town of Wayland			GROUND SURFACE	
CONTRACTOR	Town of Wayland	FOREMAN:	Todd	ELEVATION	--
OBSERVED BY	Sarah Rocklin	DATE	3/21/18	DEPTH TO GROUNDWATER	
CHECKED BY		DATE			Not observed

DEPTH BELOW GROUND SURFACE (ft.)	SOIL DESCRIPTION	STRATUM DESCRIPTION
Surface	Grass at surface	
1	0 - 1.3' - Dark brown, fine to medium SAND, trace fine to coarse gravel, trace silt, trace organics; moist. [TOPSOIL]	**TOPSOIL**
2	1.3' - 2.7' - Brown, gravelly fine to coarse SAND, trace silt; moist. [FILL] - Concrete wall at west corner of test pit at approximately 2.5'	**FILL**
3	2.7' - 5.0' - Coarse GRAVEL, sub-rounded; moist. [SEPTIC FIELD] - 6" diameter broken clay pipe observed at approximately 2.7'	**SEPTIC FIELD [FILL]**
4		
5		
6	5.0' - 6.0' - Yellow-brown, fine to coarse SAND, some fine to coarse gravel, trace silt; moist.	**SAND & GRAVEL**
7	6.0' - 7.6' - Gray-brown, fine to coarse SAND, some fine to coarse gravel, trace silt; moist.	
8	Possible bedrock (GRANITE) encountered at 7.6'. End of test pit at 7.6'.	**BEDROCK**
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		

NOTES: Coordinates: 42.3264 Lat., -71.3434 Long.

TEST PIT NUMBER
TP-2

Weston & Sampson

TEST PIT LOG

PROJECT NAME/NO.	Wayland High School Athletic Facilities		**TEST PIT NUMBER** TP-3
LOCATION	Wayland, Massachusetts		
CLIENT	Town of Wayland		GROUND SURFACE
CONTRACTOR	Town of Wayland	FOREMAN: Todd	ELEVATION --
OBSERVED BY	Sarah Rocklin	DATE 3/21/18	DEPTH TO GROUNDWATER
CHECKED BY		DATE	Not observed

DEPTH BELOW GROUND SURFACE (ft.)	SOIL DESCRIPTION	STRATUM DESCRIPTION
Surface	Grass at surface	
1	0 - 0.7' - Dark brown, fine SAND, trace fine to coarse gravel, trace silt, trace organics; moist. [TOPSOIL]	**TOPSOIL**
2	0.7' - 1.3' - Brown, fine to medium SAND, trace fine to coarse gravel, trace silt, trace organics; moist. [FILL] - 1" diameter electrical conduit at 1.0'.	**FILL**
3	1.3' - 2.7' - Brown, fine to coarse SAND, some fine to coarse gravel, trace silt; moist. [FILL]	
4	2.7' - 5.7' - Gray-brown, gravelly fine to coarse SAND, trace silt; moist.	**SAND & GRAVEL**
5		
6	Possible bedrock (GRANITE) encountered at 5.7'. End of test pit at 5.7'.	**BEDROCK**
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		

NOTES: Coordinates: 42.3259 Lat., -71.3437 Long.

TEST PIT NUMBER
TP-3

Weston & Sampson[SM]

TEST PIT LOG

PROJECT NAME/NO.	Wayland High School Athletic Facilities		
LOCATION	Wayland, Massachusetts		
CLIENT	Town of Wayland		
CONTRACTOR	Town of Wayland	FOREMAN:	Todd
OBSERVED BY	Sarah Rocklin	DATE	3/21/18
CHECKED BY		DATE	

TEST PIT NUMBER

TP-4

GROUND SURFACE ELEVATION: --

DEPTH TO GROUNDWATER: Not observed

DEPTH BELOW GROUND SURFACE (ft.)	SOIL DESCRIPTION	STRATUM DESCRIPTION
Surface	Grass at surface on pavement	
	4" Asphalt Pavement	**PAVEMENT**
1	0.3' - 1.3' - Dark brown, fine SAND, trace fine to coarse gravel, trace silt, trace organics (roots, grass); moist. [BURIED TOPSOIL]	**BURIED TOPSOIL**
2	1.3' - 2.0' - Light brown, fine to coarse SAND, some fine to coarse gravel, trace silt; moist. [FILL]	**FILL**
3	2.0' - 4.8' - Light brown, gravelly fine to coarse SAND, trace silt; moist.	**SAND & GRAVEL**
4		
5		
6	Possible bedrock (GRANITE) encountered at 4.8'. End of test pit at 4.8'.	**BEDROCK**
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		

NOTES: Coordinates: 42.3262 Lat., -71.3432 Long.

TEST PIT NUMBER

TP-4

Weston & Sampson

P:\MA\Wayland MA\Wayland High School Athletic Facilities\Geotech\Field\Boring & Test Pit Logs\[Loker Site Test Pit Logs 2018.03.26.xls]TP-3

TEST PIT LOG

PROJECT NAME/NO.	Wayland High School Athletic Facilities		TEST PIT NUMBER
LOCATION	Wayland, Massachusetts		TP-5
CLIENT	Town of Wayland		GROUND SURFACE
CONTRACTOR	Town of Wayland	FOREMAN: Todd	ELEVATION --
OBSERVED BY	Sarah Rocklin	DATE 3/21/18	DEPTH TO GROUNDWATER
CHECKED BY		DATE	5.0'

DEPTH BELOW GROUND SURFACE (ft.)	SOIL DESCRIPTION	STRATUM DESCRIPTION
Surface	Asphalt Pavement	
	4" Asphalt Pavement	**PAVEMENT**
1	0.3' - 1.3' - Brown, gravelly fine to coarse SAND, trace silt, trace organics; moist. [FILL]	**FILL**
2	1.3' - 4.0' - Gray-brown, fine to coarse SAND, some gravel, trace silt; moist.	**SAND & GRAVEL**
3		
4		
5	4.0' - 5.0' - Brown, gravelly fine to coarse SAND, some silt; moist to wet.	
6	End of test pit at 5.6'.	
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		

NOTES: Coordinates: 42.3262 Lat., -71.3427 Long.

TEST PIT NUMBER
TP-5

Weston & Sampson

TEST PIT LOG

PROJECT NAME/NO.	Wayland High School Athletic Facilities			TEST PIT NUMBER	
LOCATION	Wayland, Massachusetts			TP-6	
CLIENT	Town of Wayland			GROUND SURFACE	
CONTRACTOR	Town of Wayland	FOREMAN:	Todd	ELEVATION	--
OBSERVED BY	Sarah Rocklin	DATE	3/21/18	DEPTH TO GROUNDWATER	
CHECKED BY		DATE			Not observed

DEPTH BELOW GROUND SURFACE (ft.)	SOIL DESCRIPTION	STRATUM DESCRIPTION
Surface	Asphalt Pavement	
	4" Asphalt Pavement	**PAVEMENT**
1	0.3' - 1.3' - Brown, fine to medium SAND, trace silt; moist. [FILL]	**FILL**
2	1.3' - 7.3' - Gray-brown, gravelly fine to coarse SAND, trace silt; moist.	**SAND & GRAVEL**
3		
4		
5		
6		
7		
8	End of test pit at 7.3'.	
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		

NOTES: Coordinates: 42.3260 Lat., -71.3422 Long.

TEST PIT NUMBER
TP-6

Weston & Sampson

P:\MA\Wayland MA\Wayland High School Athletic Facilities\Geotech\Field\Boring & Test Pit Logs\[Loker Site Test Pit Logs 2018.03.26.xls]TP-3

Attachment D - Stormwater Modeling

PLAN

SCALE: 1" = 100'

FIGURE 1		
TOWN OF WAYLAND MA LOKER RECREATION AREA		
HYDROLOGY MAP EXISTING CONDITIONS		
DESIGNED BY: JIP	CHECKED BY: JIP	DATE: DECEMBER 21, 2017
Weston & Sampson		

\\wse03.local\WSE\Projects\MA\Wayland MA\Wayland High School Athletic Facilities\CAD\0_Current_LOKER\FIGURES\HydroCAD-EX.dwg

FIGURE 2

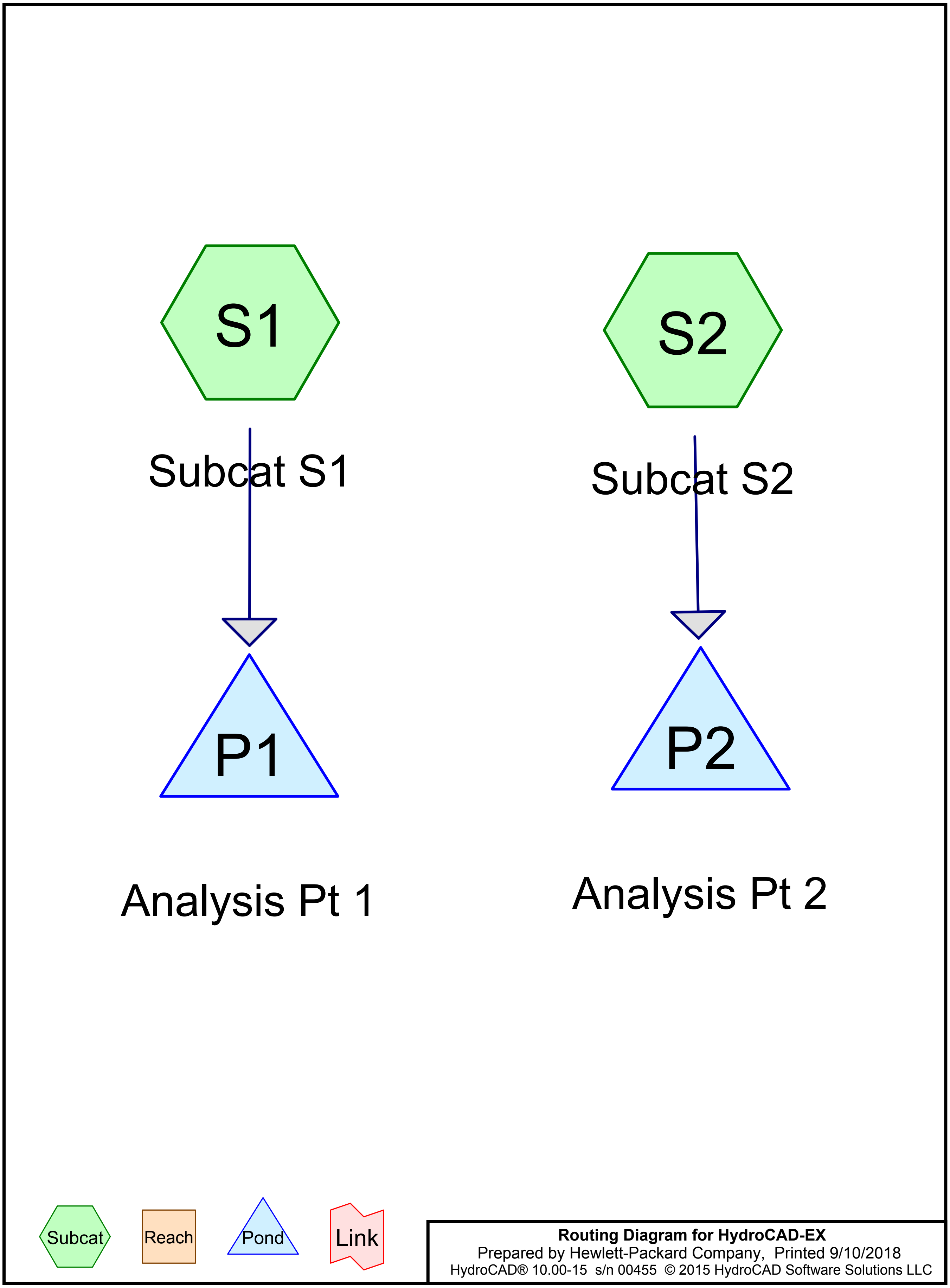
TOWN OF WAYLAND
LOKER RECREATION AREA

HYDROLOGY MAP
PROPOSED CONDITIONS

DESIGNED BY: JIP	CHECKED BY: JIP	DATE: JULY 11, 2018

Weston & Sampson

\\wse03.local\WSE\Projects\MA\Wayland MA\Wayland High School Athletic Facilities\CAD\0_Current_LOKER\FIGURES\HydroCAD-PR.dwg



Routing Diagram for HydroCAD-EX
Prepared by Hewlett-Packard Company, Printed 9/10/2018

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
67,140	39	Pasture/grassland/range, Good, HSG A (S1, S2)
45,517	98	Paved parking, HSG A (S1, S2)
101,413	30	Woods, Good, HSG A (S1, S2)
214,069	**47**	**TOTAL AREA**

Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
214,069	HSG A	S1, S2
0	HSG B	
0	HSG C	
0	HSG D	
0	Other	
214,069		**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
67,140	0	0	0	0	67,140	Pasture/grassland/range, Good
45,517	0	0	0	0	45,517	Paved parking
101,413	0	0	0	0	101,413	Woods, Good
214,069	**0**	**0**	**0**	**0**	**214,069**	**TOTAL AREA**

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

SubcatchmentS1: Subcat S1 Runoff Area=42,037 sf 10.31% Impervious Runoff Depth=0.03"
Tc=5.0 min CN=WQ Runoff=0.04 cfs 115 cf

SubcatchmentS2: Subcat S2 Runoff Area=172,032 sf 23.94% Impervious Runoff Depth=0.08"
Tc=0.0 min CN=WQ Runoff=0.40 cfs 1,091 cf

Pond P1: Analysis Pt 1 Inflow=0.04 cfs 115 cf
Primary=0.04 cfs 115 cf

Pond P2: Analysis Pt 2 Inflow=0.40 cfs 1,091 cf
Primary=0.40 cfs 1,091 cf

Total Runoff Area = 214,069 sf Runoff Volume = 1,206 cf Average Runoff Depth = 0.07"
78.74% Pervious = 168,553 sf 21.26% Impervious = 45,517 sf

Summary for Subcatchment S1: Subcat S1

[49] Hint: Tc<2dt may require smaller dt

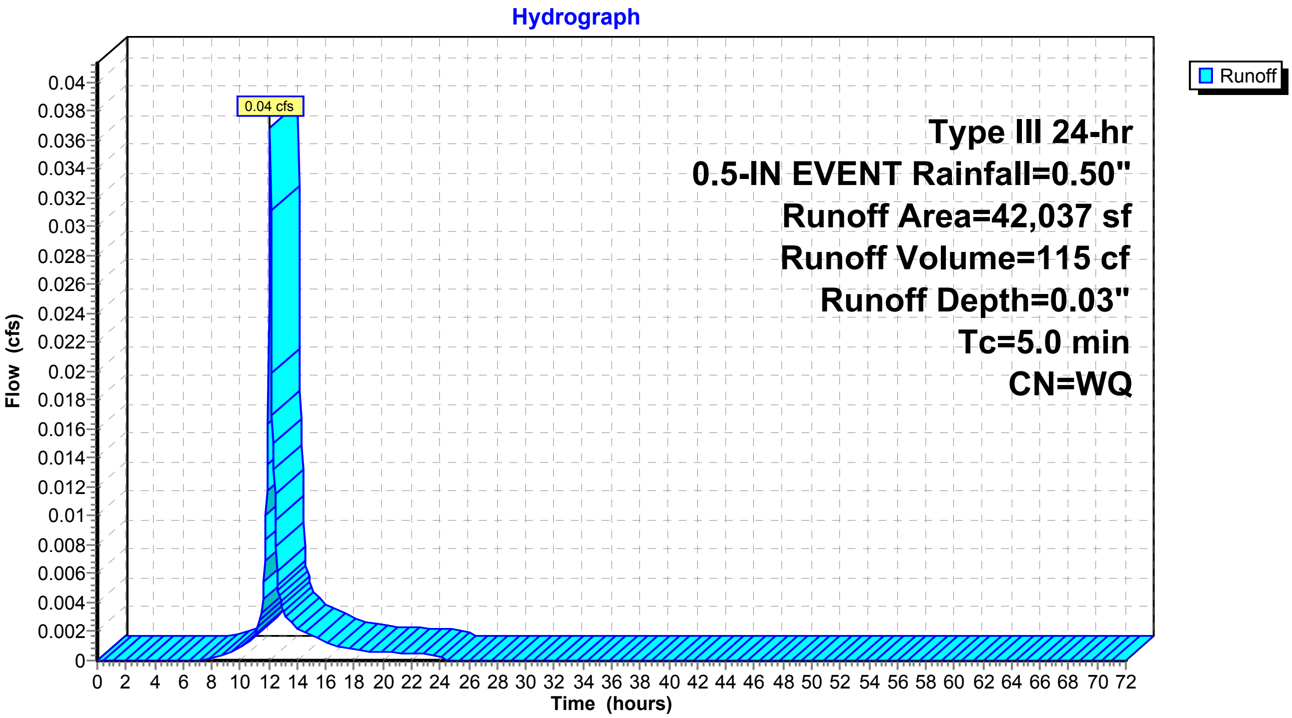
Runoff = 0.04 cfs @ 12.08 hrs, Volume= 115 cf, Depth= 0.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 0.5-IN EVENT Rainfall=0.50"

Area (sf)	CN	Description
3,126	39	Pasture/grassland/range, Good, HSG A
7,885	39	Pasture/grassland/range, Good, HSG A
3,872	30	Woods, Good, HSG A
3,391	30	Woods, Good, HSG A
19,431	30	Woods, Good, HSG A
4,333	98	Paved parking, HSG A
42,037		Weighted Average
37,704	33	89.69% Pervious Area
4,333	98	10.31% Impervious Area

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

Subcatchment S1: Subcat S1



Summary for Subcatchment S2: Subcat S2

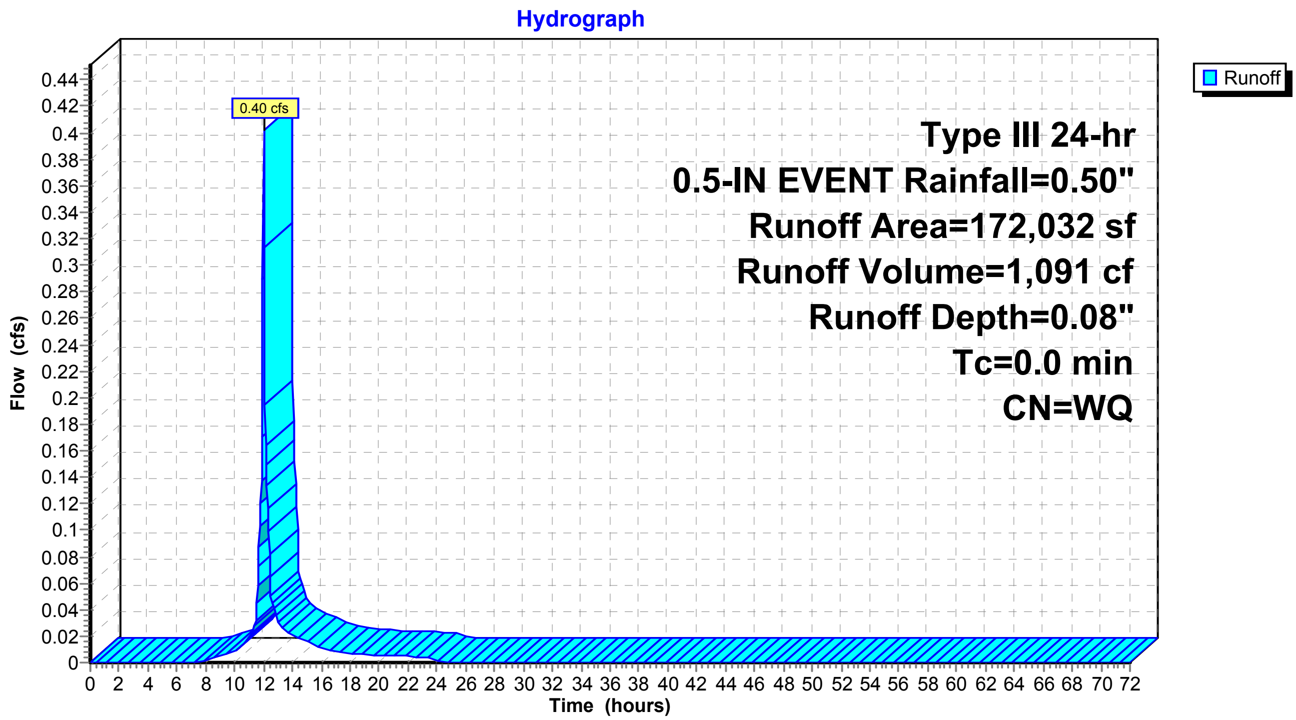
[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 0.40 cfs @ 12.00 hrs, Volume= 1,091 cf, Depth= 0.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 0.5-IN EVENT Rainfall=0.50"

Area (sf)	CN	Description
9	39	Pasture/grassland/range, Good, HSG A
4,136	39	Pasture/grassland/range, Good, HSG A
51,984	39	Pasture/grassland/range, Good, HSG A
19,333	30	Woods, Good, HSG A
2,869	30	Woods, Good, HSG A
16,428	30	Woods, Good, HSG A
2,840	30	Woods, Good, HSG A
360	30	Woods, Good, HSG A
32,889	30	Woods, Good, HSG A
52	98	Paved parking, HSG A
7,859	98	Paved parking, HSG A
33,272	98	Paved parking, HSG A
172,032		Weighted Average
130,848	34	76.06% Pervious Area
41,184	98	23.94% Impervious Area

Subcatchment S2: Subcat S2



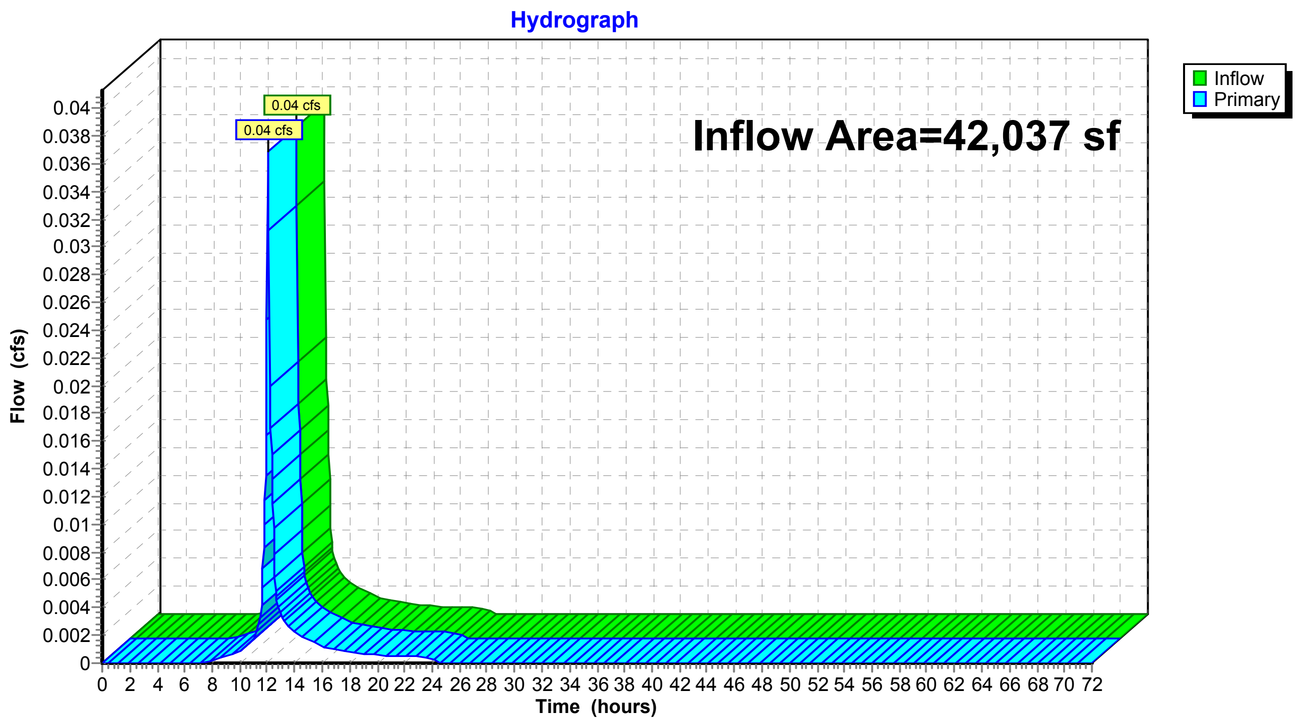
Summary for Pond P1: Analysis Pt 1

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

Inflow Area = 42,037 sf, 10.31% Impervious, Inflow Depth = 0.03" for 0.5-IN EVENT event
Inflow = 0.04 cfs @ 12.08 hrs, Volume= 115 cf
Primary = 0.04 cfs @ 12.08 hrs, Volume= 115 cf, Atten= 0%, Lag= 0.0 min

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

Pond P1: Analysis Pt 1



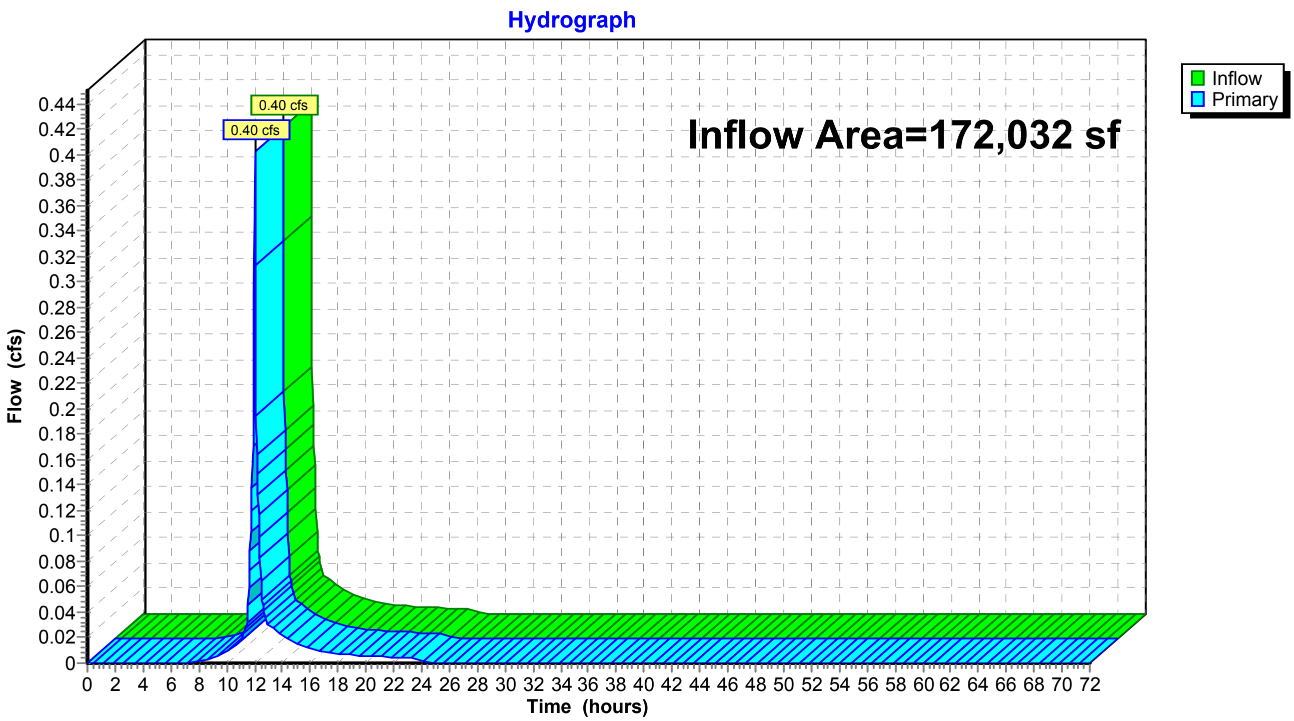
Summary for Pond P2: Analysis Pt 2

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

Inflow Area = 172,032 sf, 23.94% Impervious, Inflow Depth = 0.08" for 0.5-IN EVENT event
Inflow = 0.40 cfs @ 12.00 hrs, Volume= 1,091 cf
Primary = 0.40 cfs @ 12.00 hrs, Volume= 1,091 cf, Atten= 0%, Lag= 0.0 min

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

Pond P2: Analysis Pt 2



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

SubcatchmentS1: Subcat S1 Runoff Area=42,037 sf 10.31% Impervious Runoff Depth=0.08"
Tc=5.0 min CN=WQ Runoff=0.09 cfs 286 cf

SubcatchmentS2: Subcat S2 Runoff Area=172,032 sf 23.94% Impervious Runoff Depth=0.19"
Tc=0.0 min CN=WQ Runoff=0.96 cfs 2,714 cf

Pond P1: Analysis Pt 1 Inflow=0.09 cfs 286 cf
Primary=0.09 cfs 286 cf

Pond P2: Analysis Pt 2 Inflow=0.96 cfs 2,714 cf
Primary=0.96 cfs 2,714 cf

Total Runoff Area = 214,069 sf Runoff Volume = 3,000 cf Average Runoff Depth = 0.17"
78.74% Pervious = 168,553 sf 21.26% Impervious = 45,517 sf

Summary for Subcatchment S1: Subcat S1

[49] Hint: Tc<2dt may require smaller dt

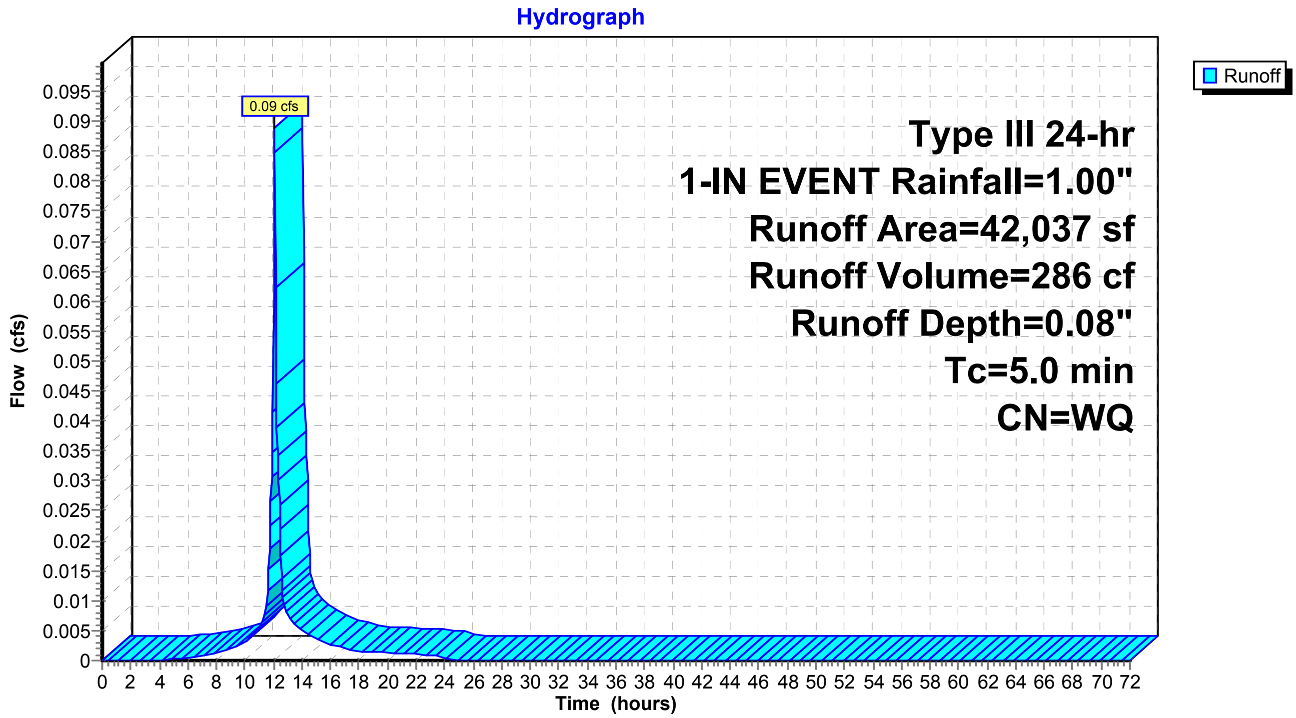
Runoff = 0.09 cfs @ 12.07 hrs, Volume= 286 cf, Depth= 0.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-IN EVENT Rainfall=1.00"

Area (sf)	CN	Description
3,126	39	Pasture/grassland/range, Good, HSG A
7,885	39	Pasture/grassland/range, Good, HSG A
3,872	30	Woods, Good, HSG A
3,391	30	Woods, Good, HSG A
19,431	30	Woods, Good, HSG A
4,333	98	Paved parking, HSG A
42,037		Weighted Average
37,704	33	89.69% Pervious Area
4,333	98	10.31% Impervious Area

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

Subcatchment S1: Subcat S1



Summary for Subcatchment S2: Subcat S2

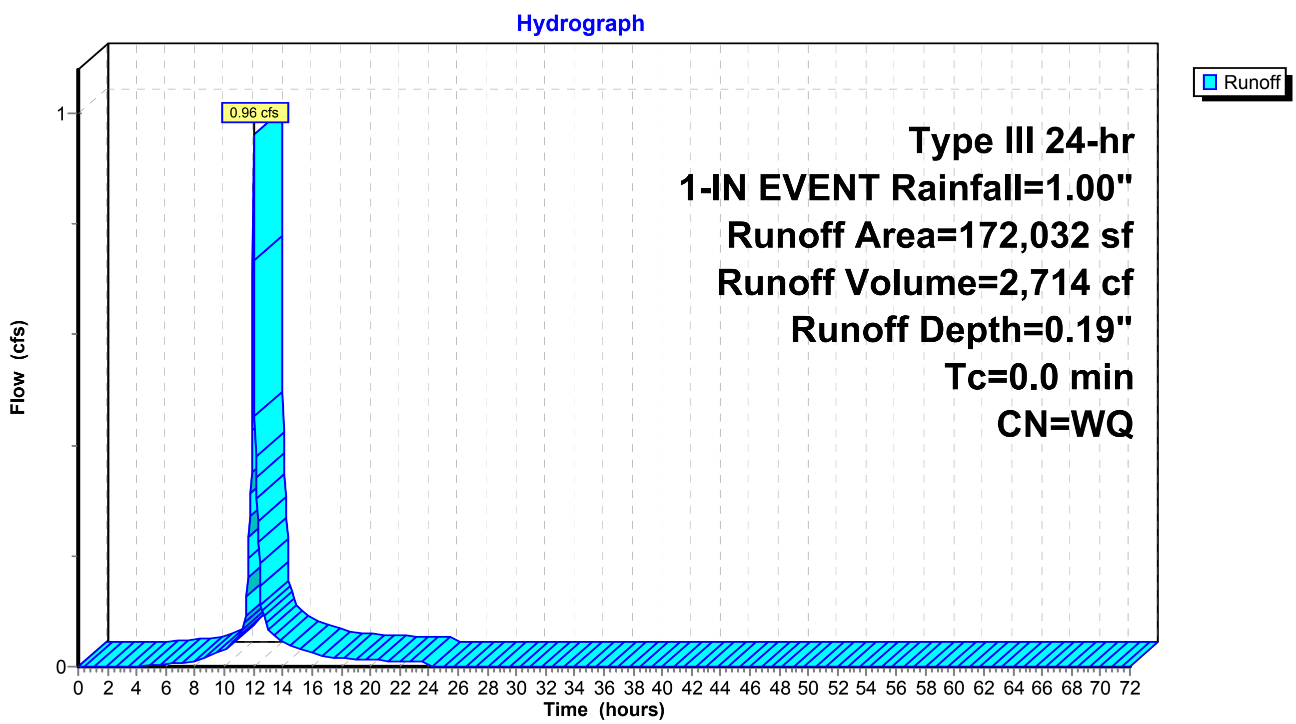
[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 0.96 cfs @ 12.00 hrs, Volume= 2,714 cf, Depth= 0.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-IN EVENT Rainfall=1.00"

Area (sf)	CN	Description
9	39	Pasture/grassland/range, Good, HSG A
4,136	39	Pasture/grassland/range, Good, HSG A
51,984	39	Pasture/grassland/range, Good, HSG A
19,333	30	Woods, Good, HSG A
2,869	30	Woods, Good, HSG A
16,428	30	Woods, Good, HSG A
2,840	30	Woods, Good, HSG A
360	30	Woods, Good, HSG A
32,889	30	Woods, Good, HSG A
52	98	Paved parking, HSG A
7,859	98	Paved parking, HSG A
33,272	98	Paved parking, HSG A
172,032		Weighted Average
130,848	34	76.06% Pervious Area
41,184	98	23.94% Impervious Area

Subcatchment S2: Subcat S2



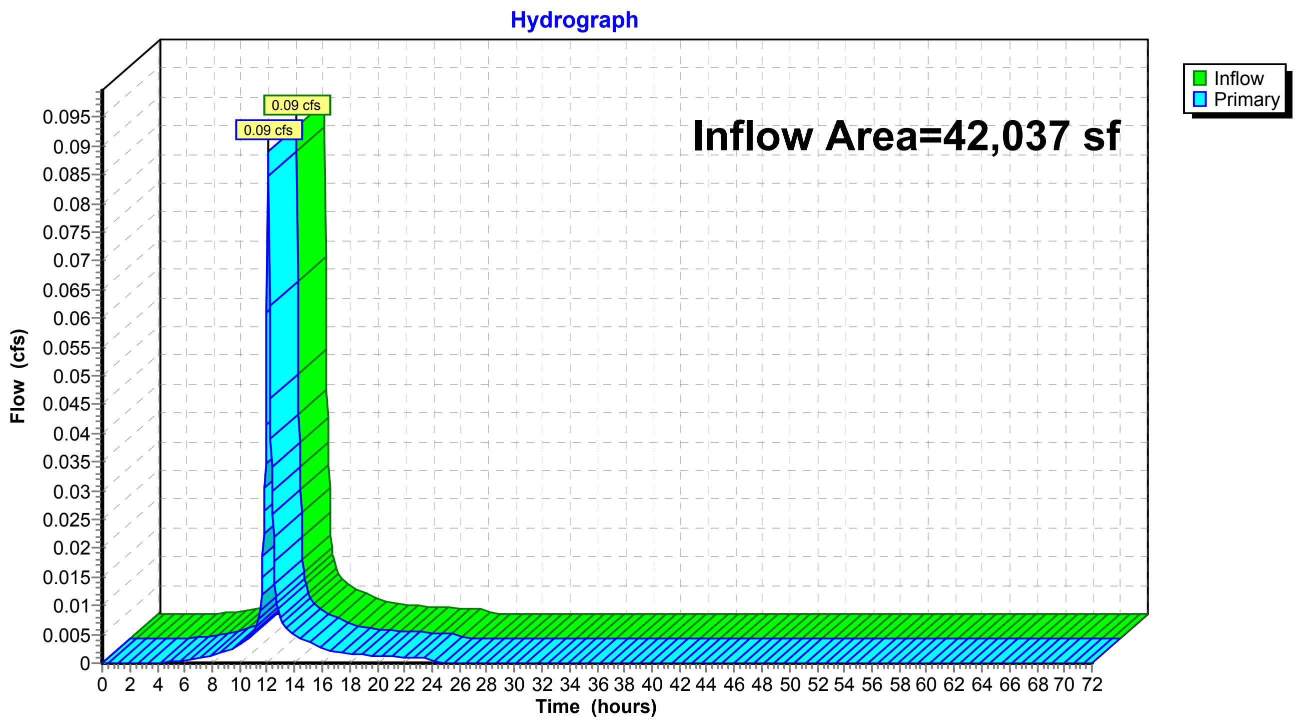
Summary for Pond P1: Analysis Pt 1

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

Inflow Area =	42,037 sf,	10.31% Impervious,	Inflow Depth = 0.08"	for 1-IN EVENT event
Inflow =	0.09 cfs @	12.07 hrs, Volume=	286 cf	
Primary =	0.09 cfs @	12.07 hrs, Volume=	286 cf,	Atten= 0%, Lag= 0.0 min

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

Pond P1: Analysis Pt 1



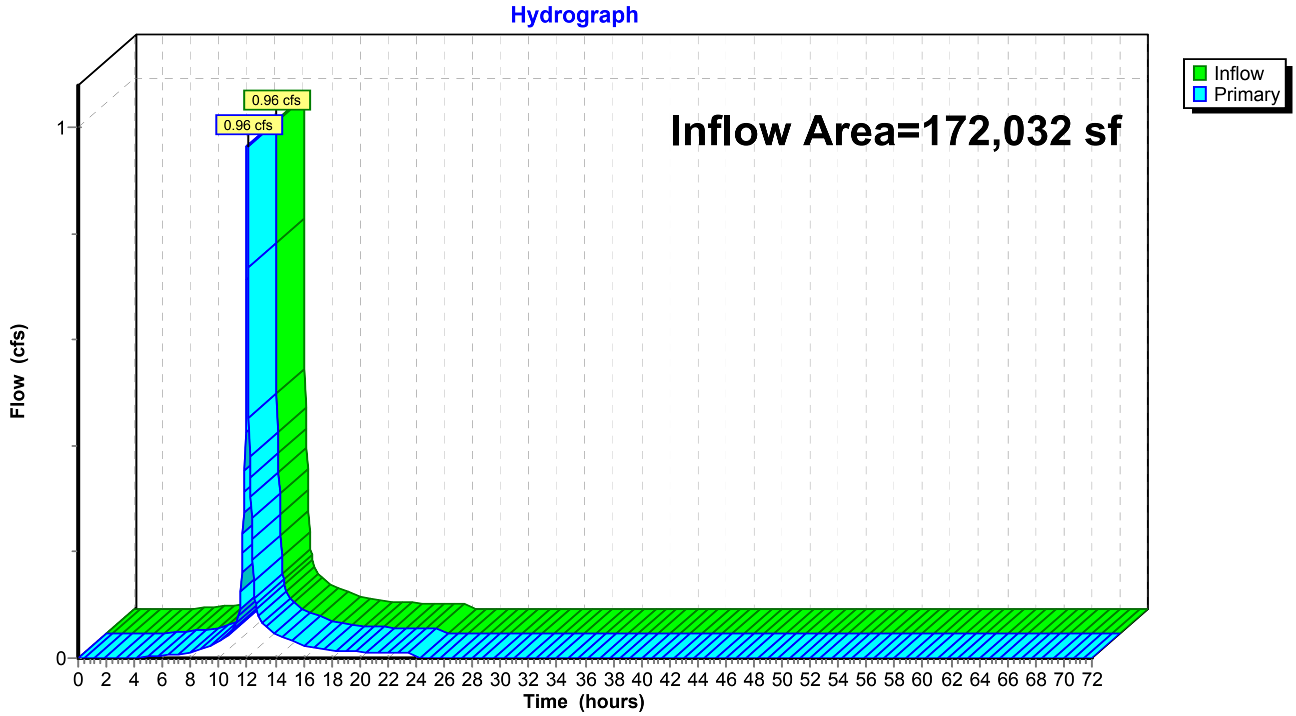
Summary for Pond P2: Analysis Pt 2

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

Inflow Area =	172,032 sf,	23.94% Impervious,	Inflow Depth = 0.19"	for 1-IN EVENT event
Inflow =	0.96 cfs @	12.00 hrs, Volume=	2,714 cf	
Primary =	0.96 cfs @	12.00 hrs, Volume=	2,714 cf,	Atten= 0%, Lag= 0.0 min

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

Pond P2: Analysis Pt 2



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

SubcatchmentS1: Subcat S1 Runoff Area=42,037 sf 10.31% Impervious Runoff Depth=0.32"
Tc=5.0 min CN=WQ Runoff=0.32 cfs 1,113 cf

SubcatchmentS2: Subcat S2 Runoff Area=172,032 sf 23.94% Impervious Runoff Depth=0.74"
Tc=0.0 min CN=WQ Runoff=3.48 cfs 10,570 cf

Pond P1: Analysis Pt 1 Inflow=0.32 cfs 1,113 cf
Primary=0.32 cfs 1,113 cf

Pond P2: Analysis Pt 2 Inflow=3.48 cfs 10,570 cf
Primary=3.48 cfs 10,570 cf

Total Runoff Area = 214,069 sf Runoff Volume = 11,683 cf Average Runoff Depth = 0.65"
78.74% Pervious = 168,553 sf 21.26% Impervious = 45,517 sf

Summary for Subcatchment S1: Subcat S1

[49] Hint: Tc<2dt may require smaller dt

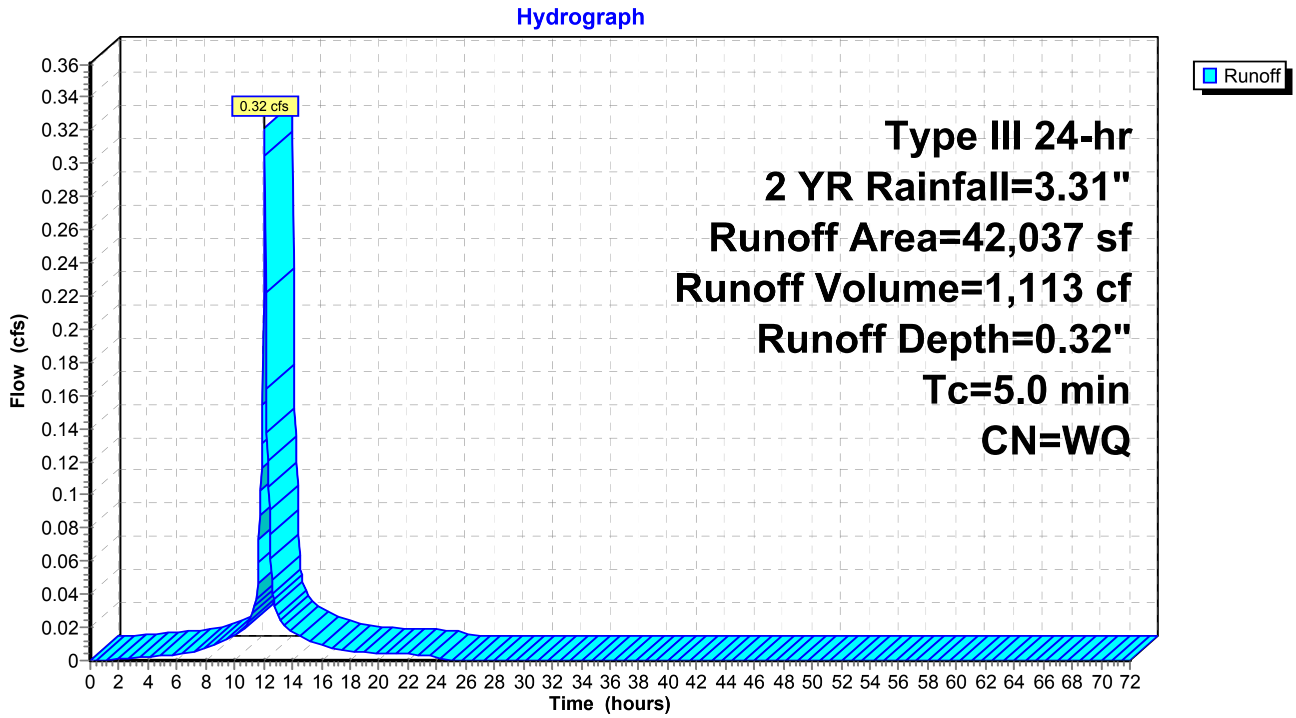
Runoff = 0.32 cfs @ 12.07 hrs, Volume= 1,113 cf, Depth= 0.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 YR Rainfall=3.31"

Area (sf)	CN	Description
3,126	39	Pasture/grassland/range, Good, HSG A
7,885	39	Pasture/grassland/range, Good, HSG A
3,872	30	Woods, Good, HSG A
3,391	30	Woods, Good, HSG A
19,431	30	Woods, Good, HSG A
4,333	98	Paved parking, HSG A
42,037		Weighted Average
37,704	33	89.69% Pervious Area
4,333	98	10.31% Impervious Area

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

Subcatchment S1: Subcat S1



Summary for Subcatchment S2: Subcat S2

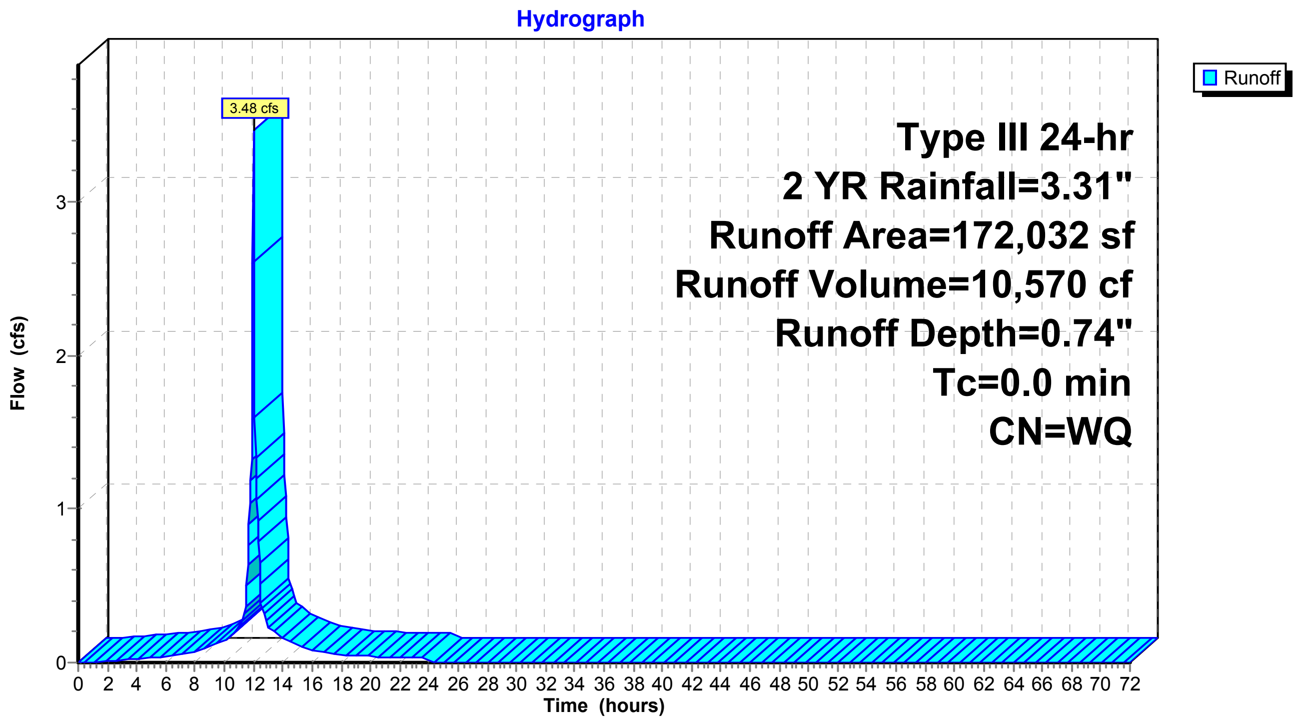
[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 3.48 cfs @ 12.00 hrs, Volume= 10,570 cf, Depth= 0.74"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 YR Rainfall=3.31"

Area (sf)	CN	Description
9	39	Pasture/grassland/range, Good, HSG A
4,136	39	Pasture/grassland/range, Good, HSG A
51,984	39	Pasture/grassland/range, Good, HSG A
19,333	30	Woods, Good, HSG A
2,869	30	Woods, Good, HSG A
16,428	30	Woods, Good, HSG A
2,840	30	Woods, Good, HSG A
360	30	Woods, Good, HSG A
32,889	30	Woods, Good, HSG A
52	98	Paved parking, HSG A
7,859	98	Paved parking, HSG A
33,272	98	Paved parking, HSG A
172,032		Weighted Average
130,848	34	76.06% Pervious Area
41,184	98	23.94% Impervious Area

Subcatchment S2: Subcat S2

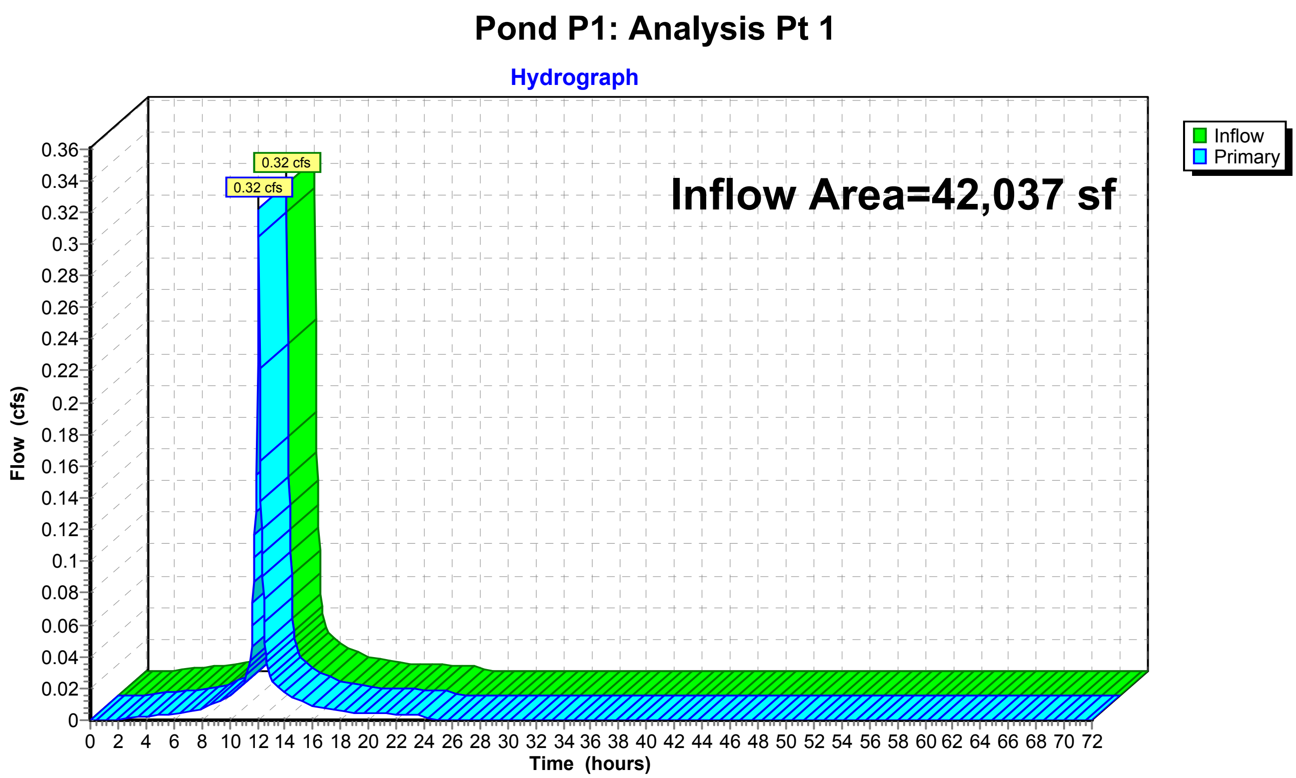


Summary for Pond P1: Analysis Pt 1

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

Inflow Area = 42,037 sf, 10.31% Impervious, Inflow Depth = 0.32" for 2 YR event
Inflow = 0.32 cfs @ 12.07 hrs, Volume= 1,113 cf
Primary = 0.32 cfs @ 12.07 hrs, Volume= 1,113 cf, Atten= 0%, Lag= 0.0 min

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



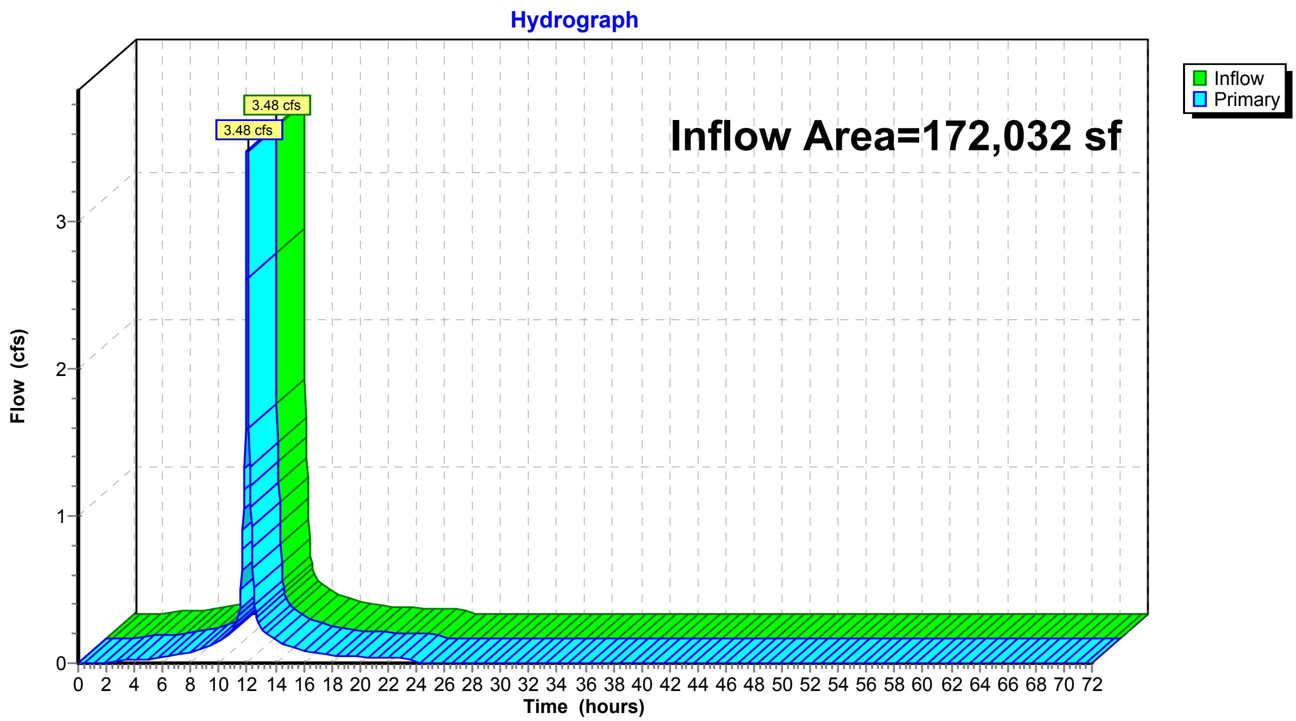
Summary for Pond P2: Analysis Pt 2

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

Inflow Area = 172,032 sf, 23.94% Impervious, Inflow Depth = 0.74" for 2 YR event
Inflow = 3.48 cfs @ 12.00 hrs, Volume= 10,570 cf
Primary = 3.48 cfs @ 12.00 hrs, Volume= 10,570 cf, Atten= 0%, Lag= 0.0 min

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

Pond P2: Analysis Pt 2



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

SubcatchmentS1: Subcat S1 Runoff Area=42,037 sf 10.31% Impervious Runoff Depth=0.58"
Tc=5.0 min CN=WQ Runoff=0.51 cfs 2,034 cf

SubcatchmentS2: Subcat S2 Runoff Area=172,032 sf 23.94% Impervious Runoff Depth=1.27"
Tc=0.0 min CN=WQ Runoff=5.50 cfs 18,193 cf

Pond P1: Analysis Pt 1 Inflow=0.51 cfs 2,034 cf
Primary=0.51 cfs 2,034 cf

Pond P2: Analysis Pt 2 Inflow=5.50 cfs 18,193 cf
Primary=5.50 cfs 18,193 cf

Total Runoff Area = 214,069 sf Runoff Volume = 20,227 cf Average Runoff Depth = 1.13"
78.74% Pervious = 168,553 sf 21.26% Impervious = 45,517 sf

Summary for Subcatchment S1: Subcat S1

[49] Hint: Tc<2dt may require smaller dt

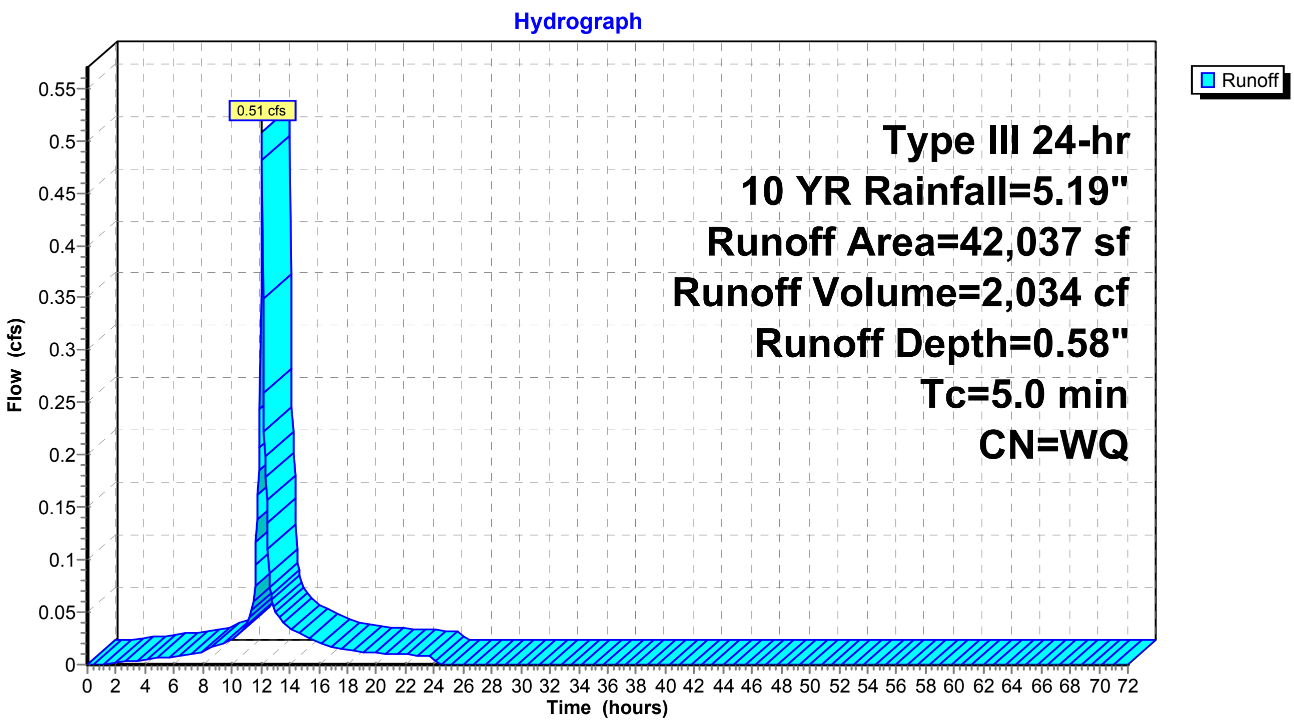
Runoff = 0.51 cfs @ 12.07 hrs, Volume= 2,034 cf, Depth= 0.58"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 YR Rainfall=5.19"

Area (sf)	CN	Description
3,126	39	Pasture/grassland/range, Good, HSG A
7,885	39	Pasture/grassland/range, Good, HSG A
3,872	30	Woods, Good, HSG A
3,391	30	Woods, Good, HSG A
19,431	30	Woods, Good, HSG A
4,333	98	Paved parking, HSG A
42,037		Weighted Average
37,704	33	89.69% Pervious Area
4,333	98	10.31% Impervious Area

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

Subcatchment S1: Subcat S1



Summary for Subcatchment S2: Subcat S2

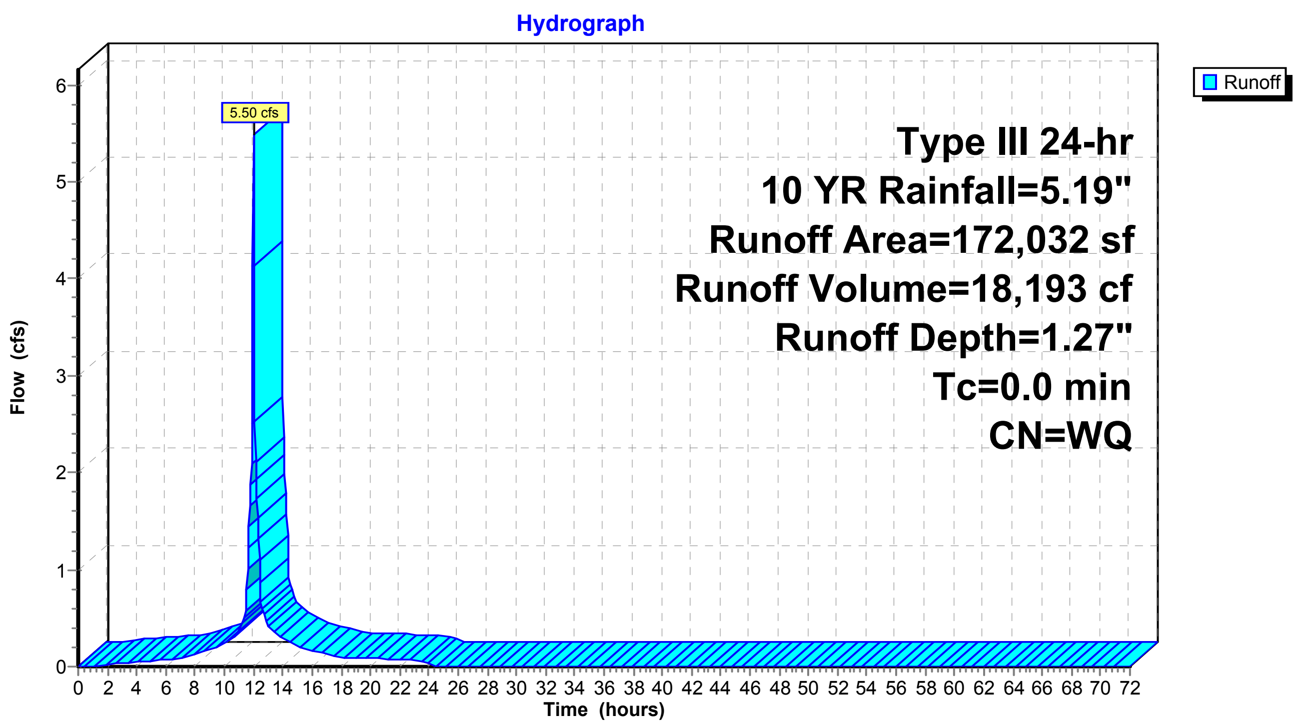
[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 5.50 cfs @ 12.00 hrs, Volume= 18,193 cf, Depth= 1.27"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 YR Rainfall=5.19"

Area (sf)	CN	Description
9	39	Pasture/grassland/range, Good, HSG A
4,136	39	Pasture/grassland/range, Good, HSG A
51,984	39	Pasture/grassland/range, Good, HSG A
19,333	30	Woods, Good, HSG A
2,869	30	Woods, Good, HSG A
16,428	30	Woods, Good, HSG A
2,840	30	Woods, Good, HSG A
360	30	Woods, Good, HSG A
32,889	30	Woods, Good, HSG A
52	98	Paved parking, HSG A
7,859	98	Paved parking, HSG A
33,272	98	Paved parking, HSG A
172,032		Weighted Average
130,848	34	76.06% Pervious Area
41,184	98	23.94% Impervious Area

Subcatchment S2: Subcat S2



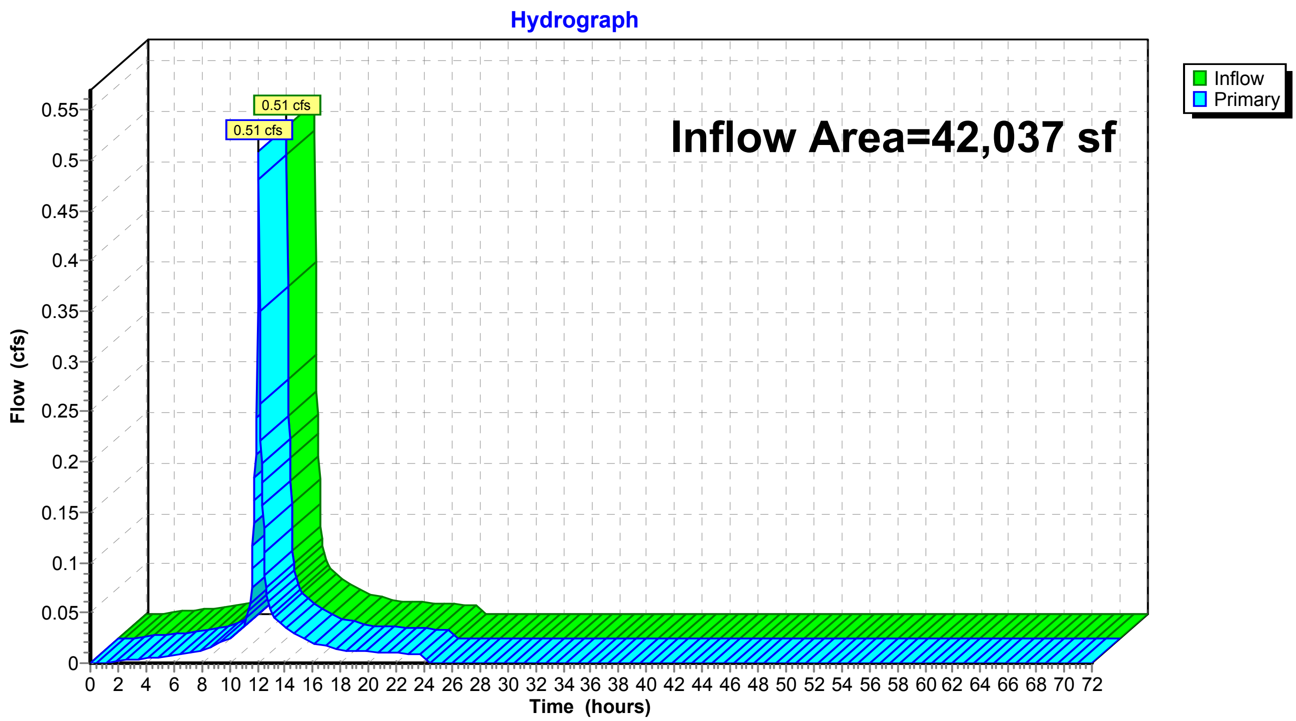
Summary for Pond P1: Analysis Pt 1

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

Inflow Area = 42,037 sf, 10.31% Impervious, Inflow Depth = 0.58" for 10 YR event
Inflow = 0.51 cfs @ 12.07 hrs, Volume= 2,034 cf
Primary = 0.51 cfs @ 12.07 hrs, Volume= 2,034 cf, Atten= 0%, Lag= 0.0 min

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

Pond P1: Analysis Pt 1



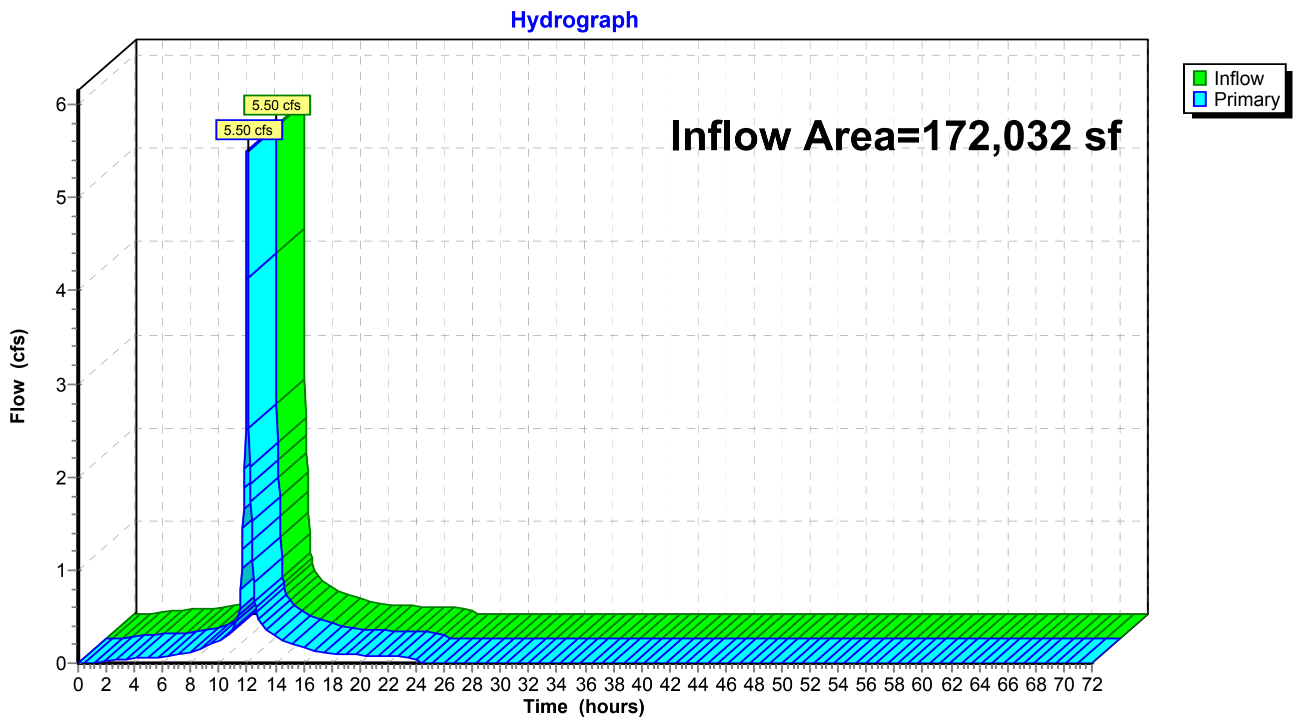
Summary for Pond P2: Analysis Pt 2

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

Inflow Area = 172,032 sf, 23.94% Impervious, Inflow Depth = 1.27" for 10 YR event
Inflow = 5.50 cfs @ 12.00 hrs, Volume= 18,193 cf
Primary = 5.50 cfs @ 12.00 hrs, Volume= 18,193 cf, Atten= 0%, Lag= 0.0 min

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

Pond P2: Analysis Pt 2



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

SubcatchmentS1: Subcat S1 Runoff Area=42,037 sf 10.31% Impervious Runoff Depth=0.85"
Tc=5.0 min CN=WQ Runoff=0.65 cfs 2,973 cf

SubcatchmentS2: Subcat S2 Runoff Area=172,032 sf 23.94% Impervious Runoff Depth=1.70"
Tc=0.0 min CN=WQ Runoff=6.84 cfs 24,311 cf

Pond P1: Analysis Pt 1 Inflow=0.65 cfs 2,973 cf
Primary=0.65 cfs 2,973 cf

Pond P2: Analysis Pt 2 Inflow=6.84 cfs 24,311 cf
Primary=6.84 cfs 24,311 cf

Total Runoff Area = 214,069 sf Runoff Volume = 27,284 cf Average Runoff Depth = 1.53"
78.74% Pervious = 168,553 sf 21.26% Impervious = 45,517 sf

Summary for Subcatchment S1: Subcat S1

[49] Hint: Tc<2dt may require smaller dt

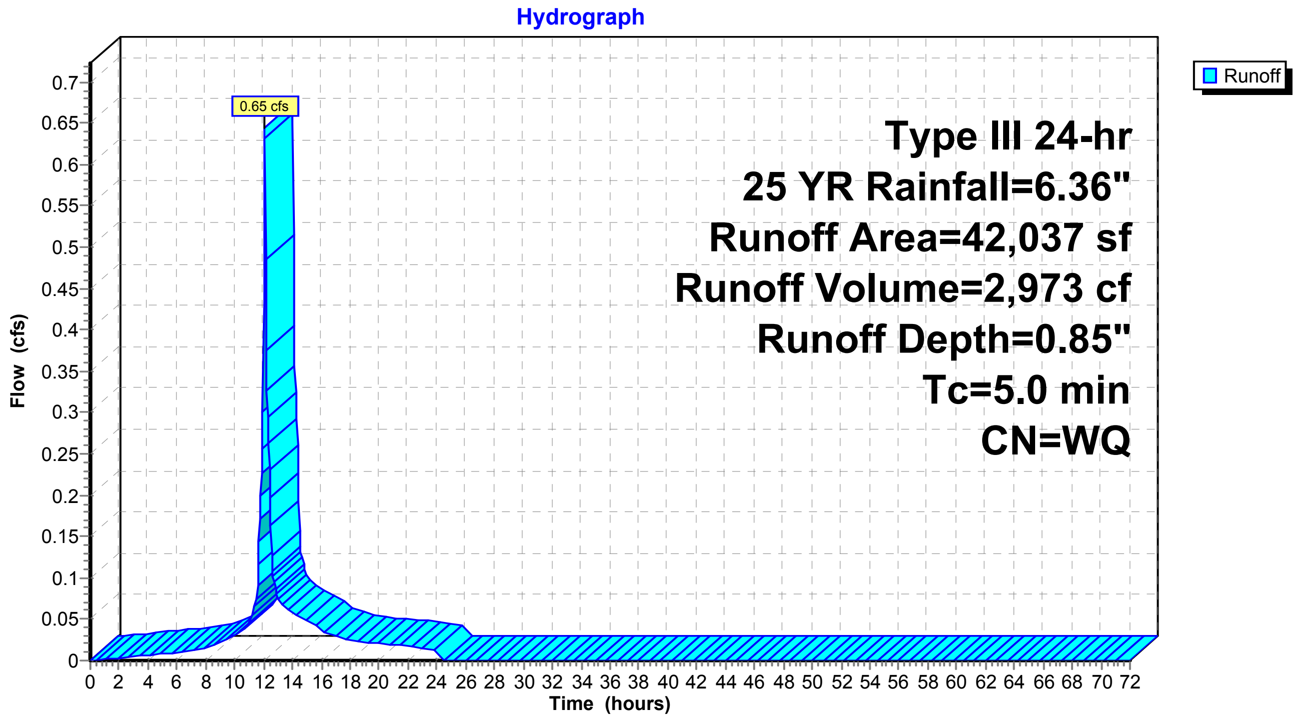
Runoff = 0.65 cfs @ 12.08 hrs, Volume= 2,973 cf, Depth= 0.85"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 YR Rainfall=6.36"

Area (sf)	CN	Description
3,126	39	Pasture/grassland/range, Good, HSG A
7,885	39	Pasture/grassland/range, Good, HSG A
3,872	30	Woods, Good, HSG A
3,391	30	Woods, Good, HSG A
19,431	30	Woods, Good, HSG A
4,333	98	Paved parking, HSG A
42,037		Weighted Average
37,704	33	89.69% Pervious Area
4,333	98	10.31% Impervious Area

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

Subcatchment S1: Subcat S1



Summary for Subcatchment S2: Subcat S2

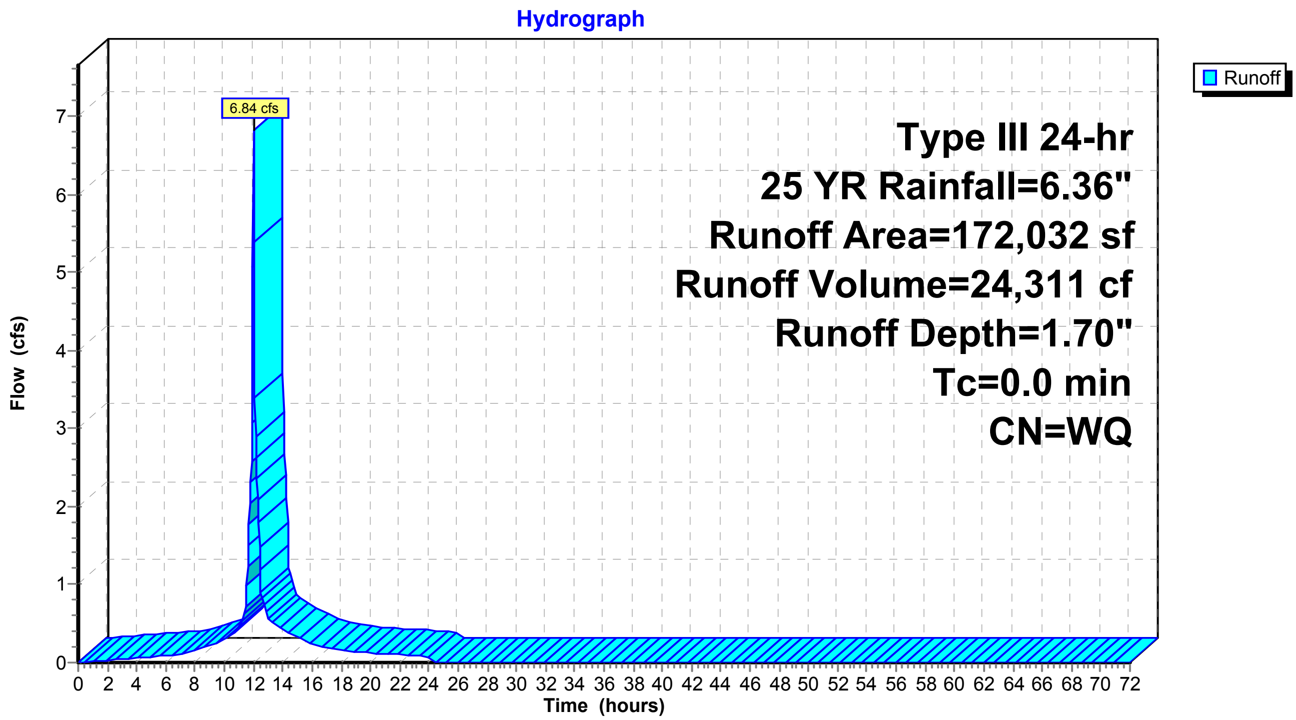
[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 6.84 cfs @ 12.00 hrs, Volume= 24,311 cf, Depth= 1.70"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 YR Rainfall=6.36"

Area (sf)	CN	Description
9	39	Pasture/grassland/range, Good, HSG A
4,136	39	Pasture/grassland/range, Good, HSG A
51,984	39	Pasture/grassland/range, Good, HSG A
19,333	30	Woods, Good, HSG A
2,869	30	Woods, Good, HSG A
16,428	30	Woods, Good, HSG A
2,840	30	Woods, Good, HSG A
360	30	Woods, Good, HSG A
32,889	30	Woods, Good, HSG A
52	98	Paved parking, HSG A
7,859	98	Paved parking, HSG A
33,272	98	Paved parking, HSG A
172,032		Weighted Average
130,848	34	76.06% Pervious Area
41,184	98	23.94% Impervious Area

Subcatchment S2: Subcat S2

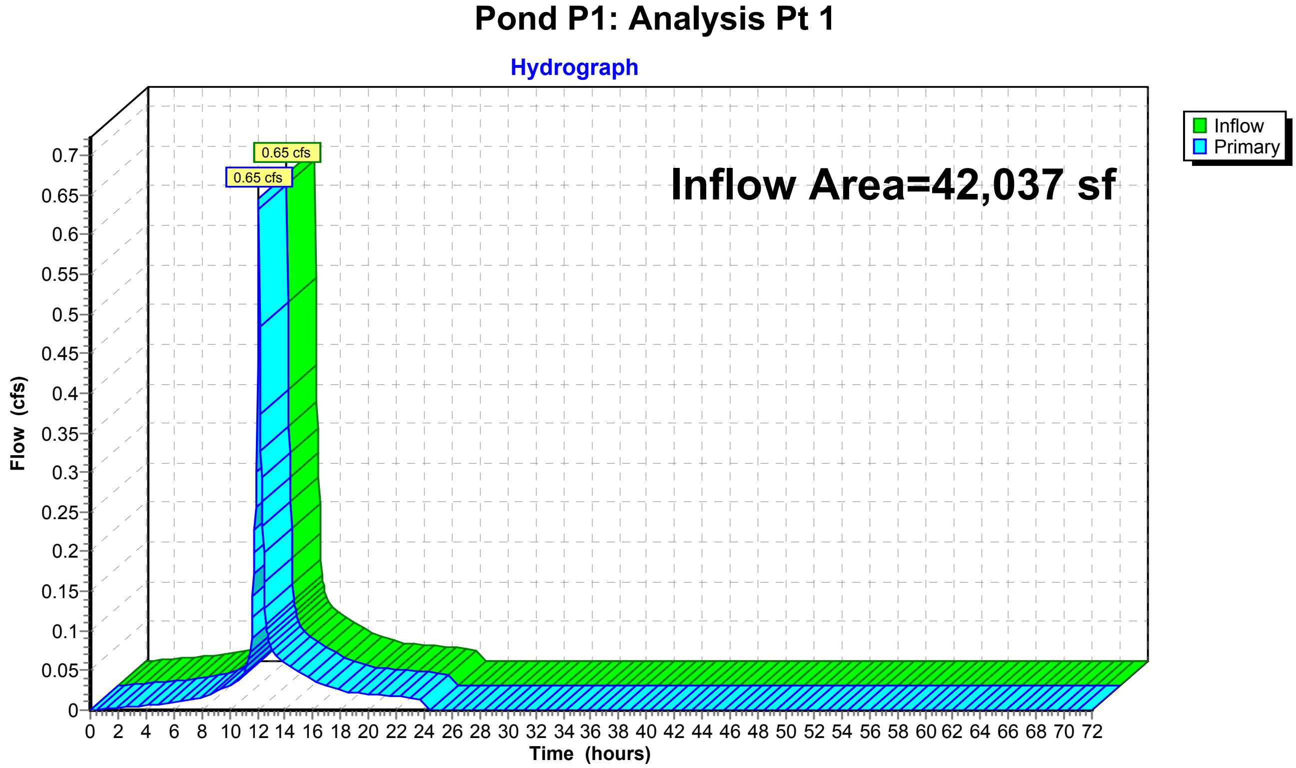


Summary for Pond P1: Analysis Pt 1

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

Inflow Area =	42,037 sf,	10.31% Impervious,	Inflow Depth = 0.85"	for 25 YR event	
Inflow =	0.65 cfs @	12.08 hrs, Volume=	2,973 cf		
Primary =	0.65 cfs @	12.08 hrs, Volume=	2,973 cf,	Atten= 0%,	Lag= 0.0 min

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

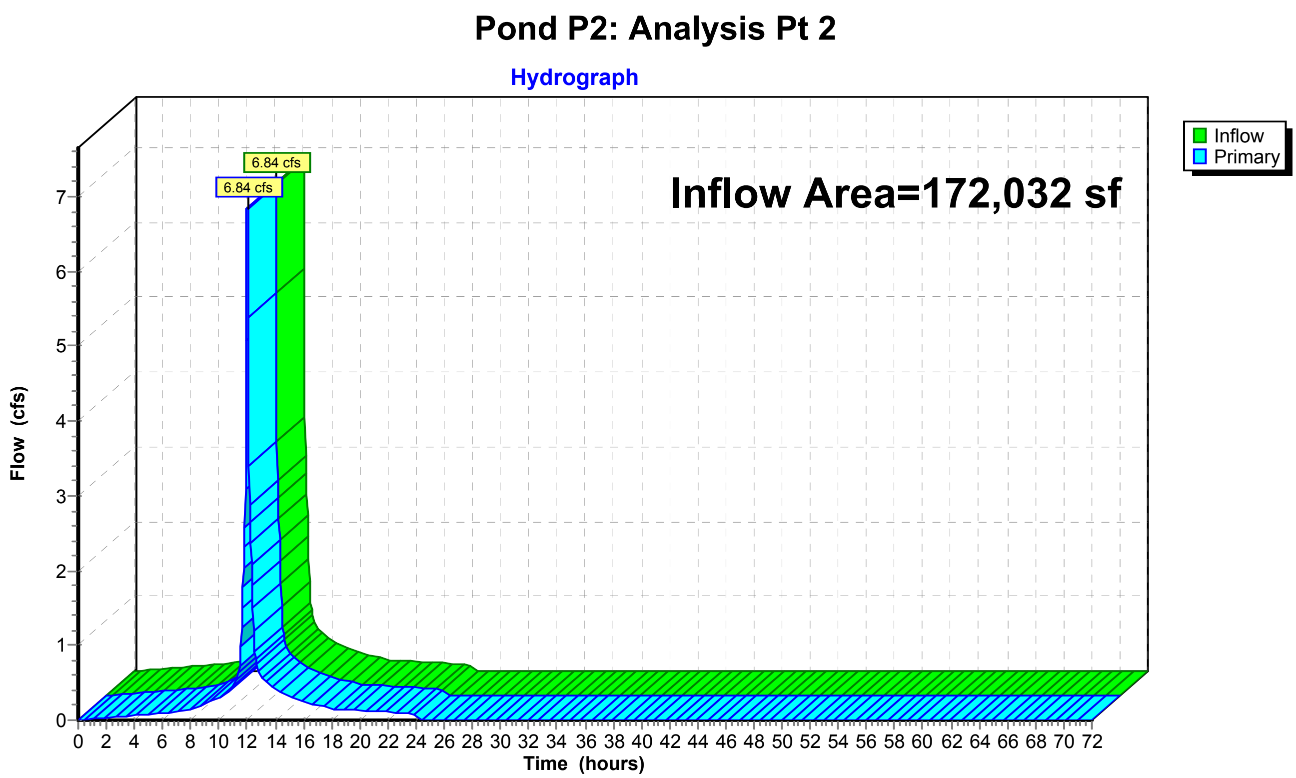


Summary for Pond P2: Analysis Pt 2

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

Inflow Area = 172,032 sf, 23.94% Impervious, Inflow Depth = 1.70" for 25 YR event
Inflow = 6.84 cfs @ 12.00 hrs, Volume= 24,311 cf
Primary = 6.84 cfs @ 12.00 hrs, Volume= 24,311 cf, Atten= 0%, Lag= 0.0 min

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



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

SubcatchmentS1: Subcat S1 Runoff Area=42,037 sf 10.31% Impervious Runoff Depth=1.43"
Tc=5.0 min CN=WQ Runoff=1.03 cfs 5,008 cf

SubcatchmentS2: Subcat S2 Runoff Area=172,032 sf 23.94% Impervious Runoff Depth=2.50"
Tc=0.0 min CN=WQ Runoff=10.02 cfs 35,812 cf

Pond P1: Analysis Pt 1 Inflow=1.03 cfs 5,008 cf
Primary=1.03 cfs 5,008 cf

Pond P2: Analysis Pt 2 Inflow=10.02 cfs 35,812 cf
Primary=10.02 cfs 35,812 cf

Total Runoff Area = 214,069 sf Runoff Volume = 40,821 cf Average Runoff Depth = 2.29"
78.74% Pervious = 168,553 sf 21.26% Impervious = 45,517 sf

Summary for Subcatchment S1: Subcat S1

[49] Hint: Tc<2dt may require smaller dt

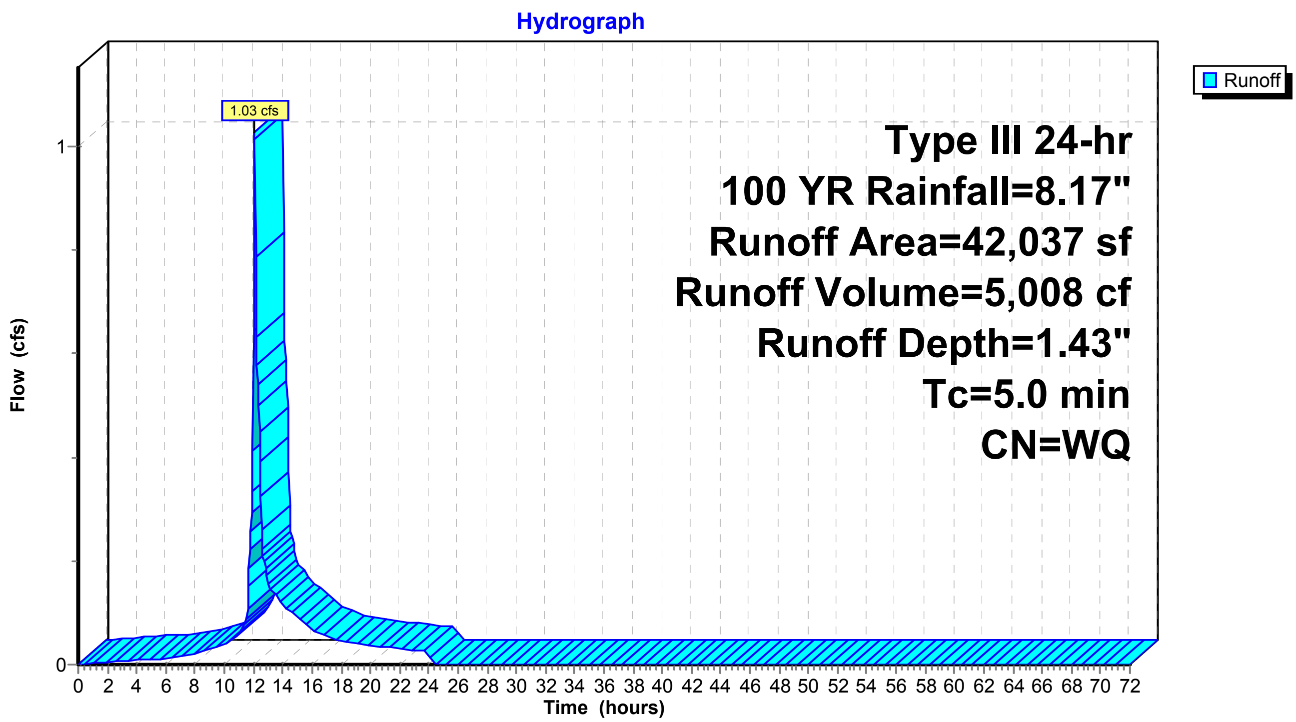
Runoff = 1.03 cfs @ 12.08 hrs, Volume= 5,008 cf, Depth= 1.43"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 YR Rainfall=8.17"

Area (sf)	CN	Description
3,126	39	Pasture/grassland/range, Good, HSG A
7,885	39	Pasture/grassland/range, Good, HSG A
3,872	30	Woods, Good, HSG A
3,391	30	Woods, Good, HSG A
19,431	30	Woods, Good, HSG A
4,333	98	Paved parking, HSG A
42,037		Weighted Average
37,704	33	89.69% Pervious Area
4,333	98	10.31% Impervious Area

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

Subcatchment S1: Subcat S1



Summary for Subcatchment S2: Subcat S2

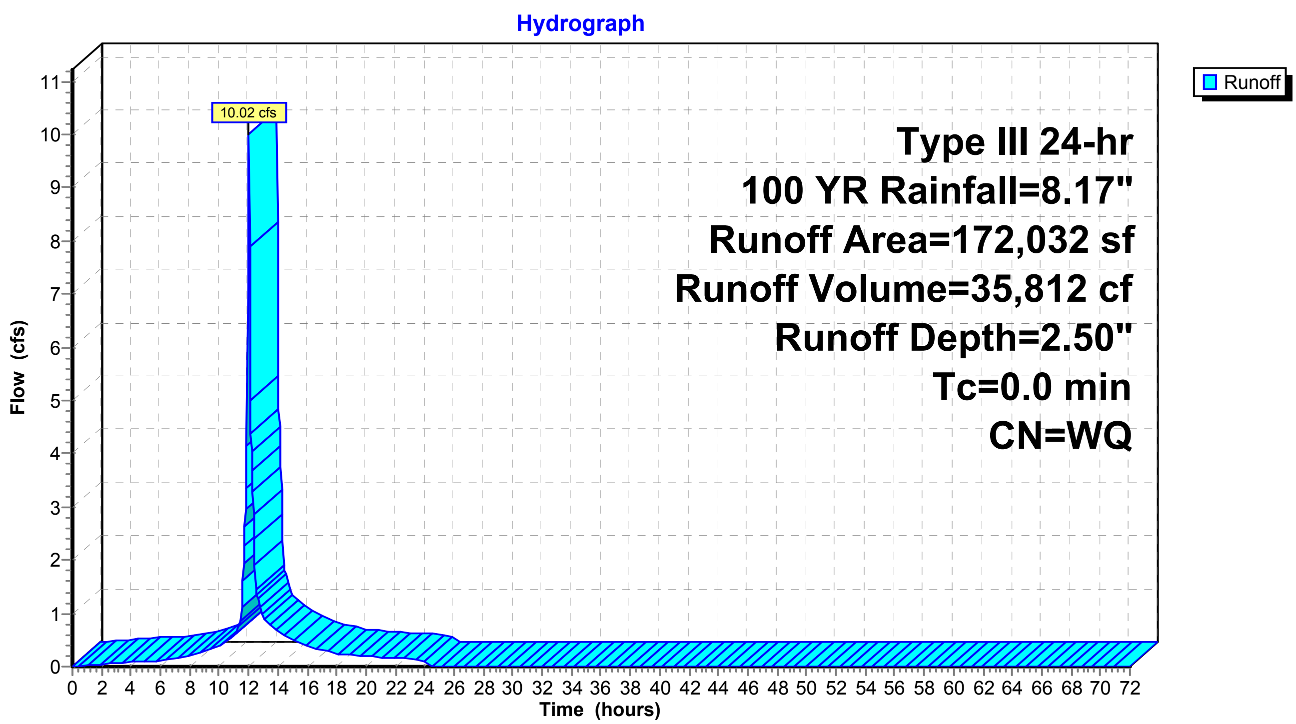
[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 10.02 cfs @ 12.00 hrs, Volume= 35,812 cf, Depth= 2.50"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 YR Rainfall=8.17"

Area (sf)	CN	Description
9	39	Pasture/grassland/range, Good, HSG A
4,136	39	Pasture/grassland/range, Good, HSG A
51,984	39	Pasture/grassland/range, Good, HSG A
19,333	30	Woods, Good, HSG A
2,869	30	Woods, Good, HSG A
16,428	30	Woods, Good, HSG A
2,840	30	Woods, Good, HSG A
360	30	Woods, Good, HSG A
32,889	30	Woods, Good, HSG A
52	98	Paved parking, HSG A
7,859	98	Paved parking, HSG A
33,272	98	Paved parking, HSG A
172,032		Weighted Average
130,848	34	76.06% Pervious Area
41,184	98	23.94% Impervious Area

Subcatchment S2: Subcat S2



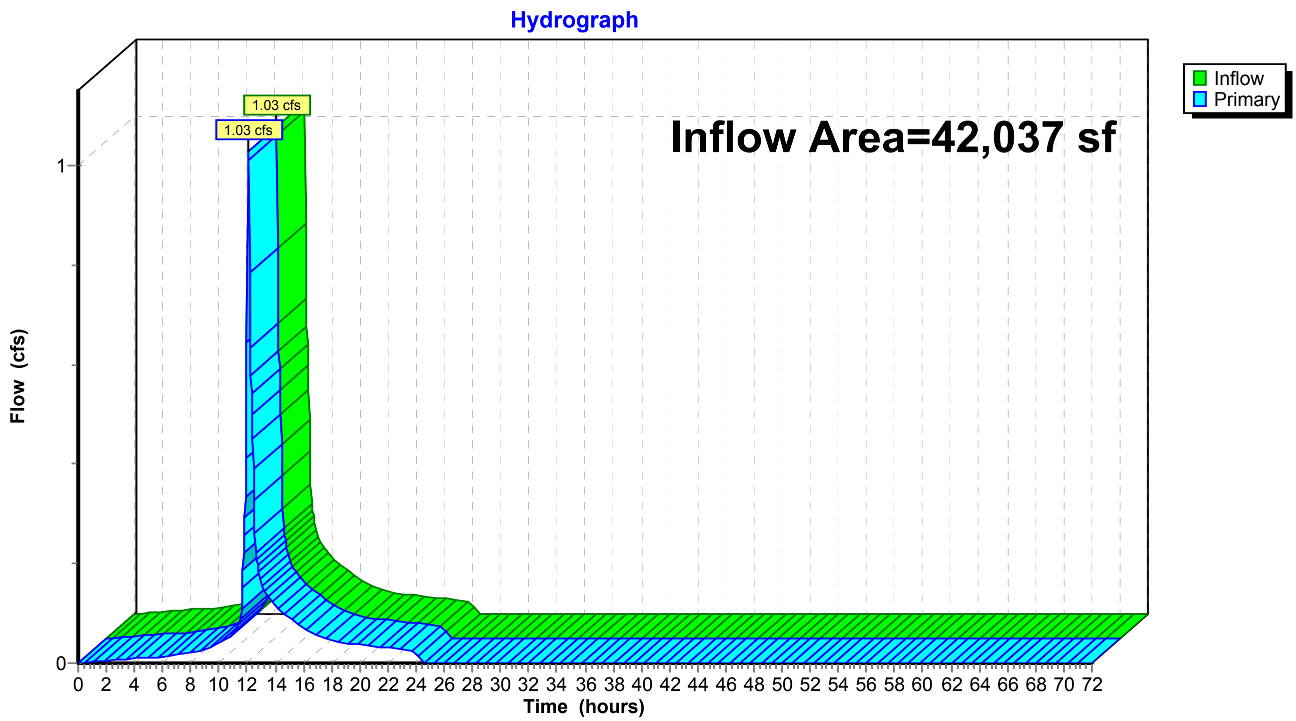
Summary for Pond P1: Analysis Pt 1

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

Inflow Area = 42,037 sf, 10.31% Impervious, Inflow Depth = 1.43" for 100 YR event
Inflow = 1.03 cfs @ 12.08 hrs, Volume= 5,008 cf
Primary = 1.03 cfs @ 12.08 hrs, Volume= 5,008 cf, Atten= 0%, Lag= 0.0 min

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

Pond P1: Analysis Pt 1



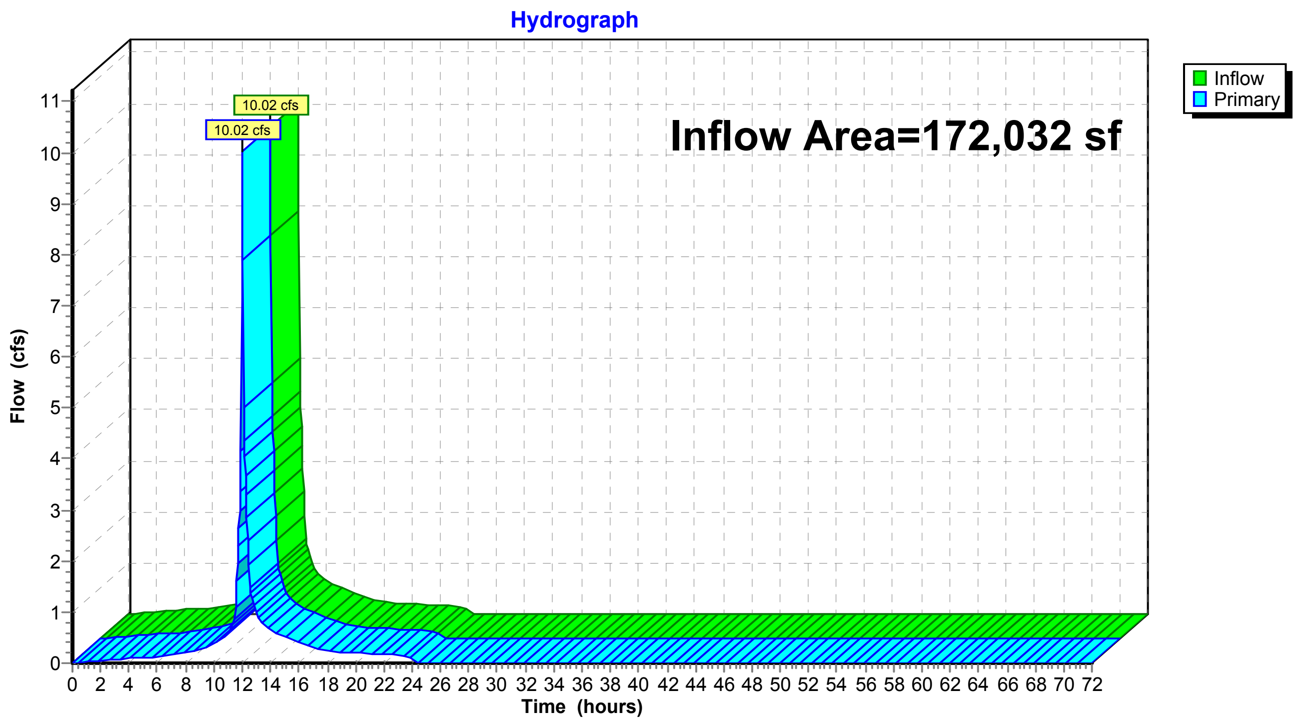
Summary for Pond P2: Analysis Pt 2

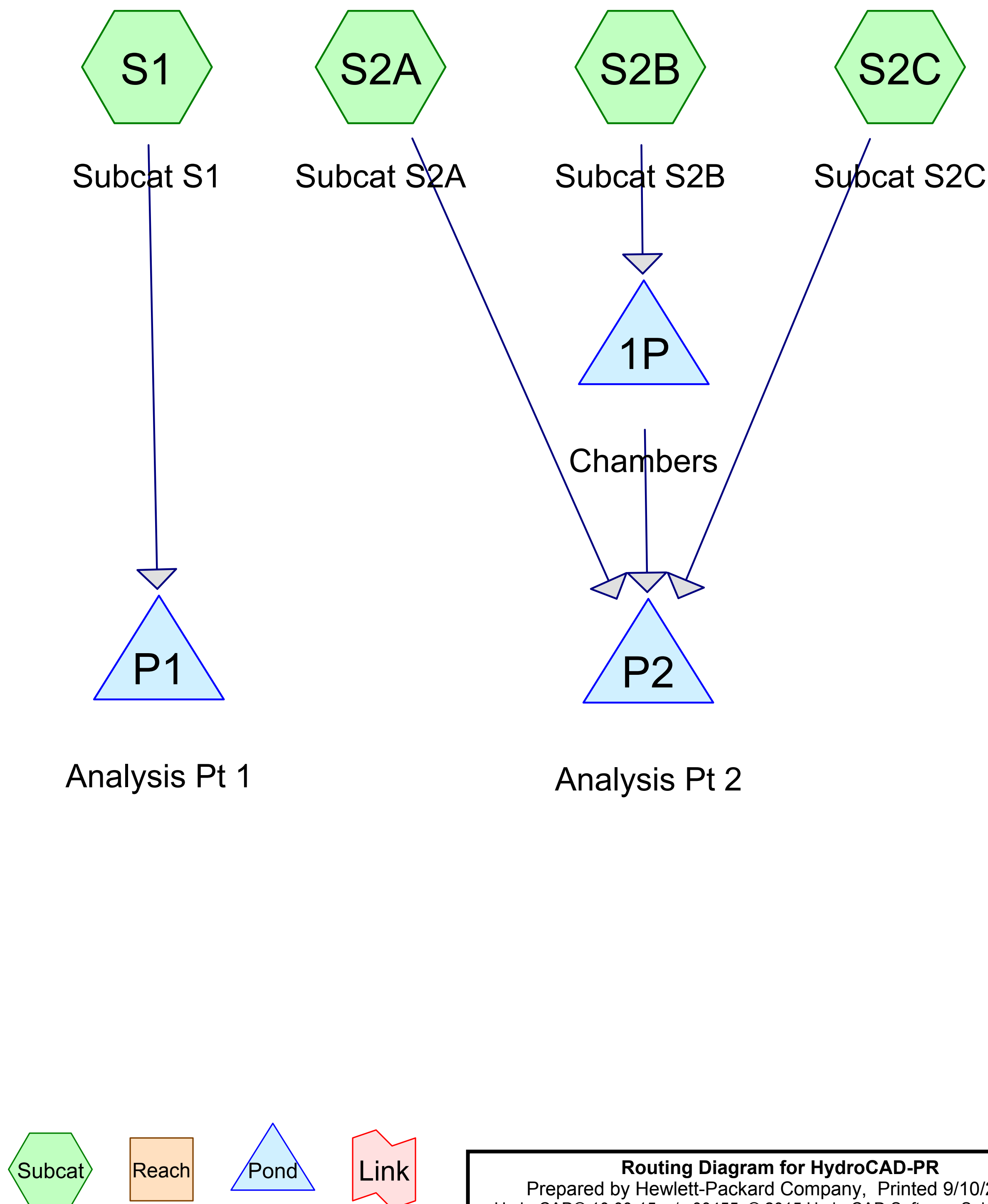
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 172,032 sf, 23.94% Impervious, Inflow Depth = 2.50" for 100 YR event
Inflow = 10.02 cfs @ 12.00 hrs, Volume= 35,812 cf
Primary = 10.02 cfs @ 12.00 hrs, Volume= 35,812 cf, Atten= 0%, Lag= 0.0 min

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

Pond P2: Analysis Pt 2





Routing Diagram for HydroCAD-PR
Prepared by Hewlett-Packard Company, Printed 9/10/2018
HydroCAD® 10.00-15 s/n 00455 © 2015 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
157,990	39	Pasture/grassland/range, Good, HSG A (S1, S2A, S2B, S2C)
48,068	98	Paved parking, HSG A (S1, S2A, S2B, S2C)
8,011	30	Woods, Good, HSG A (S1, S2A, S2C)
214,069	**52**	**TOTAL AREA**

Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
214,069	HSG A	S1, S2A, S2B, S2C
0	HSG B	
0	HSG C	
0	HSG D	
0	Other	
214,069		**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
157,990	0	0	0	0	157,990	Pasture/grassland/range, Good
48,068	0	0	0	0	48,068	Paved parking
8,011	0	0	0	0	8,011	Woods, Good
214,069	**0**	**0**	**0**	**0**	**214,069**	**TOTAL AREA**

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

SubcatchmentS1: Subcat S1 Runoff Area=18,284 sf 11.78% Impervious Runoff Depth=0.04"
Tc=5.0 min CN=WQ Runoff=0.02 cfs 57 cf

SubcatchmentS2A: Subcat S2A Runoff Area=151,520 sf 15.85% Impervious Runoff Depth=0.05"
Tc=0.0 min CN=WQ Runoff=0.23 cfs 636 cf

SubcatchmentS2B: Subcat S2B Runoff Area=23,735 sf 89.08% Impervious Runoff Depth=0.28"
Tc=0.0 min CN=WQ Runoff=0.21 cfs 560 cf

SubcatchmentS2C: Subcat S2C Runoff Area=20,530 sf 3.69% Impervious Runoff Depth=0.01"
Tc=0.0 min CN=WQ Runoff=0.01 cfs 20 cf

Pond 1P: Chambers Peak Elev=193.58' Storage=65 cf Inflow=0.21 cfs 560 cf
Discarded=0.11 cfs 560 cf Primary=0.00 cfs 0 cf Outflow=0.11 cfs 560 cf

Pond P1: Analysis Pt 1 Inflow=0.02 cfs 57 cf
Primary=0.02 cfs 57 cf

Pond P2: Analysis Pt 2 Inflow=0.24 cfs 656 cf
Primary=0.24 cfs 656 cf

Total Runoff Area = 214,069 sf Runoff Volume = 1,273 cf Average Runoff Depth = 0.07"
77.55% Pervious = 166,001 sf 22.45% Impervious = 48,068 sf

Summary for Subcatchment S1: Subcat S1

[49] Hint: Tc<2dt may require smaller dt

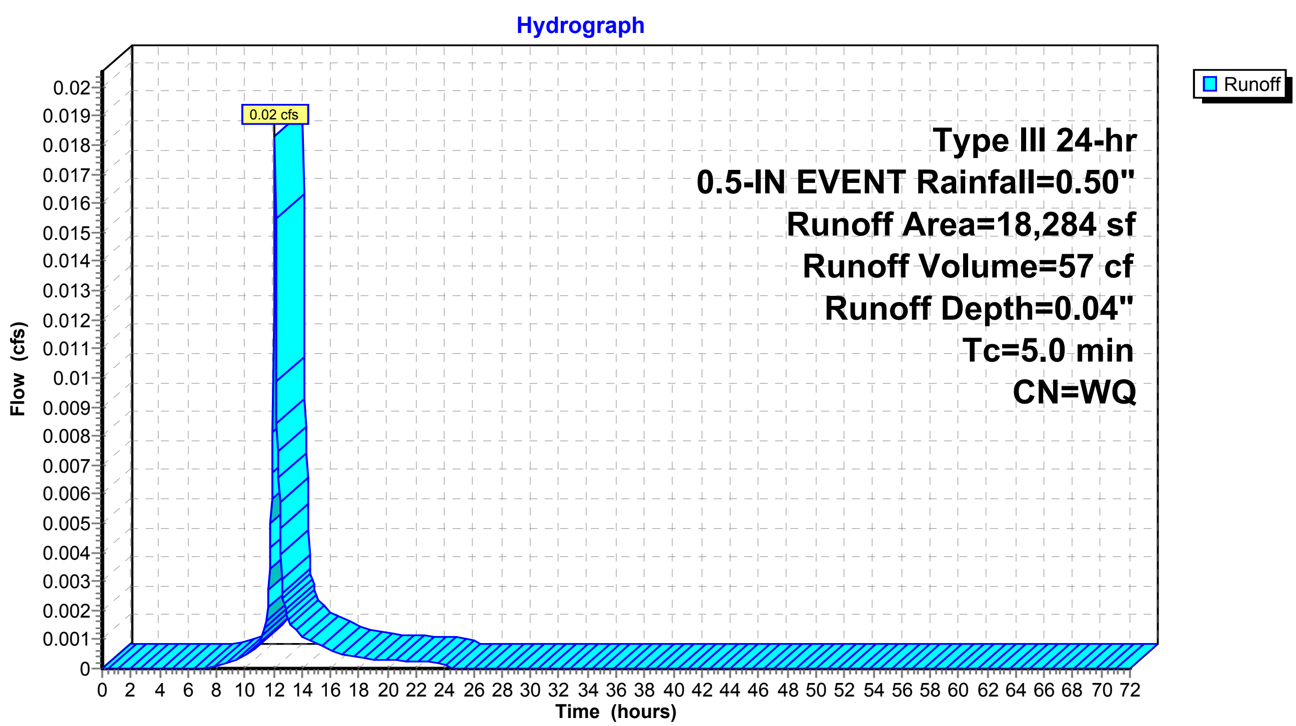
Runoff = 0.02 cfs @ 12.08 hrs, Volume= 57 cf, Depth= 0.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 0.5-IN EVENT Rainfall=0.50"

Area (sf)	CN	Description
13,672	39	Pasture/grassland/range, Good, HSG A
2,410	39	Pasture/grassland/range, Good, HSG A
48	30	Woods, Good, HSG A
2,154	98	Paved parking, HSG A
18,284		Weighted Average
16,130		88.22% Pervious Area
2,154		11.78% Impervious Area

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

Subcatchment S1: Subcat S1



Summary for Subcatchment S2A: Subcat S2A

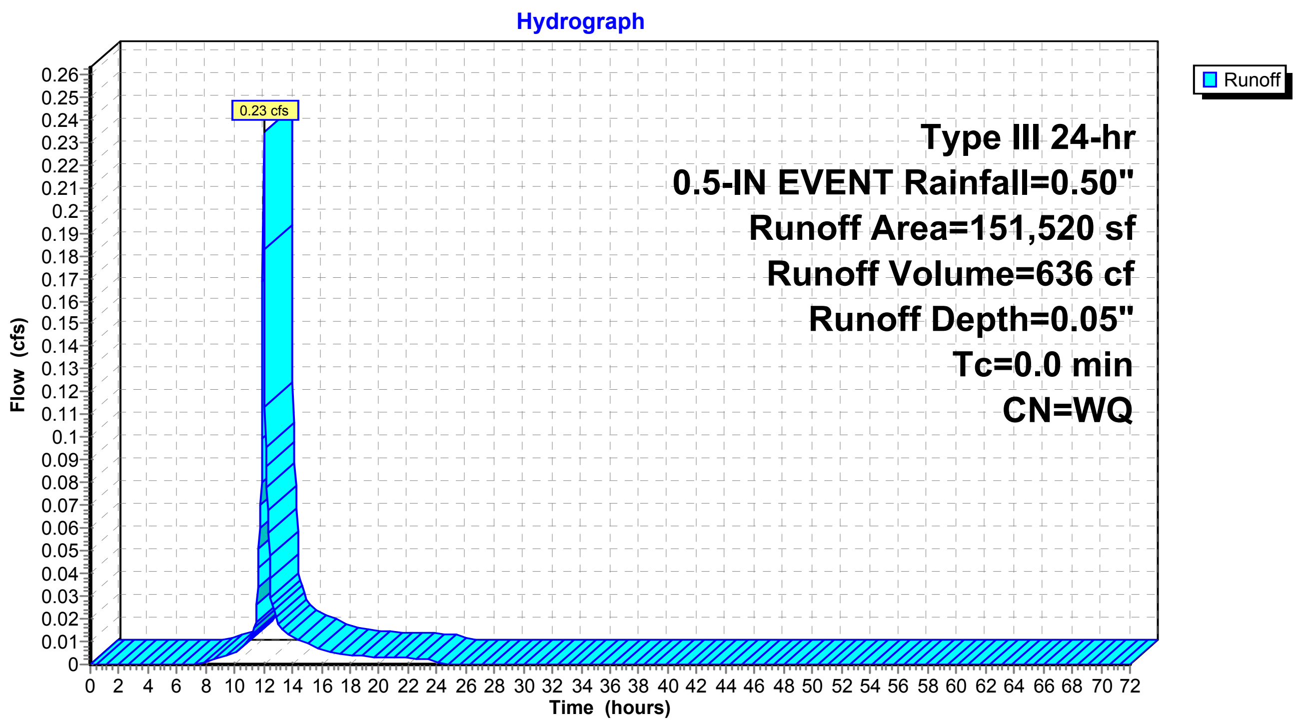
[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 0.23 cfs @ 12.00 hrs, Volume= 636 cf, Depth= 0.05"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 0.5-IN EVENT Rainfall=0.50"

Area (sf)	CN	Description
12,933	39	Pasture/grassland/range, Good, HSG A
8,306	39	Pasture/grassland/range, Good, HSG A
76,277	39	Pasture/grassland/range, Good, HSG A
9	39	Pasture/grassland/range, Good, HSG A
22,045	39	Pasture/grassland/range, Good, HSG A
149	30	Woods, Good, HSG A
360	30	Woods, Good, HSG A
7,184	30	Woods, Good, HSG A
24,012	98	Paved parking, HSG A
246	39	Pasture/grassland/range, Good, HSG A
151,520		Weighted Average
127,508		84.15% Pervious Area
24,012		15.85% Impervious Area

Subcatchment S2A: Subcat S2A



Summary for Subcatchment S2B: Subcat S2B

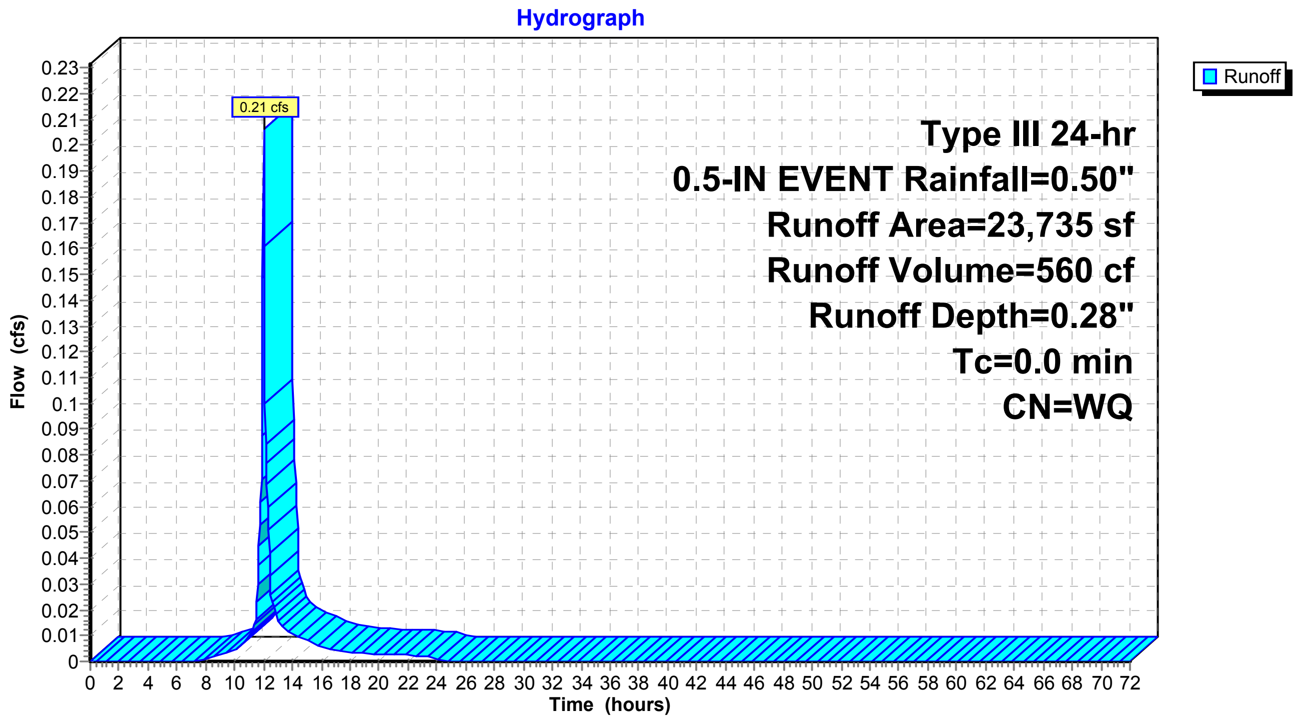
[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 0.21 cfs @ 12.00 hrs, Volume= 560 cf, Depth= 0.28"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 0.5-IN EVENT Rainfall=0.50"

Area (sf)	CN	Description
21,144	98	Paved parking, HSG A
266	39	Pasture/grassland/range, Good, HSG A
40	39	Pasture/grassland/range, Good, HSG A
266	39	Pasture/grassland/range, Good, HSG A
0	39	Pasture/grassland/range, Good, HSG A
2,018	39	Pasture/grassland/range, Good, HSG A
23,735		Weighted Average
2,591		10.92% Pervious Area
21,144		89.08% Impervious Area

Subcatchment S2B: Subcat S2B



Summary for Subcatchment S2C: Subcat S2C

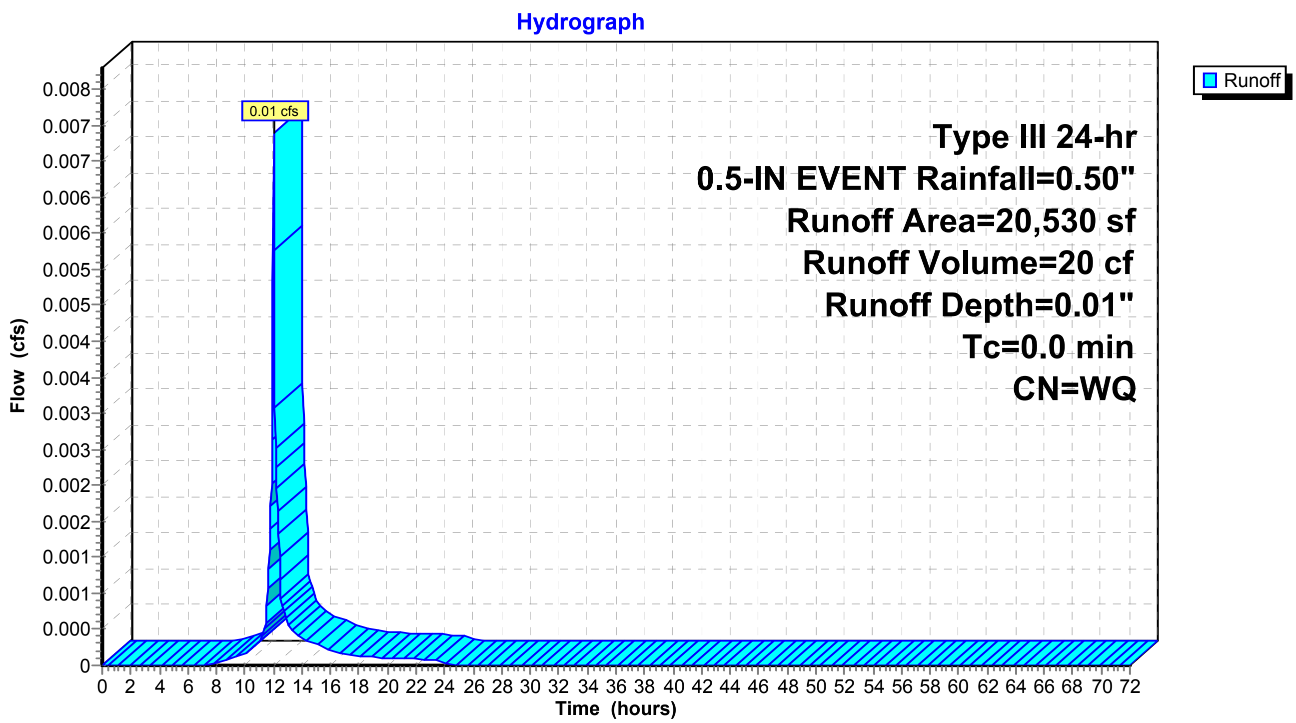
[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 0.01 cfs @ 12.00 hrs, Volume= 20 cf, Depth= 0.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 0.5-IN EVENT Rainfall=0.50"

Area (sf)	CN	Description
1,384	39	Pasture/grassland/range, Good, HSG A
18,118	39	Pasture/grassland/range, Good, HSG A
270	30	Woods, Good, HSG A
757	98	Paved parking, HSG A
20,530		Weighted Average
19,772		96.31% Pervious Area
757		3.69% Impervious Area

Subcatchment S2C: Subcat S2C



Summary for Pond 1P: Chambers

Inflow Area = 23,735 sf, 89.08% Impervious, Inflow Depth = 0.28" for 0.5-IN EVENT event
Inflow = 0.21 cfs @ 12.00 hrs, Volume= 560 cf
Outflow = 0.11 cfs @ 12.10 hrs, Volume= 560 cf, Atten= 45%, Lag= 5.8 min
Discarded = 0.11 cfs @ 12.10 hrs, Volume= 560 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 193.58' @ 12.10 hrs Surf.Area= 2,052 sf Storage= 65 cf

Plug-Flow detention time= 7.5 min calculated for 560 cf (100% of inflow)
Center-of-Mass det. time= 7.5 min (815.2 - 807.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	193.50'	1,838 cf	**25.25'W x 80.76'L x 3.50'H Field A** 7,137 cf Overall - 2,541 cf Embedded = 4,596 cf x 40.0% Voids
#2A	194.00'	2,541 cf	**ADS_StormTech SC-740** x 55 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap Row Length Adjustment= +0.44' x 6.45 sf x 5 rows
#3	193.50'	75 cf	**4.00'D x 6.00'H Vertical Cone/Cylinder**
		4,455 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	193.50'	**2.410 in/hr Exfiltration over Horizontal area** Conductivity to Groundwater Elevation = 0.00'
#2	Primary	197.00'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#3	Primary	195.50'	**8.0" Vert. Orifice/Grate** C= 0.600

Discarded OutFlow Max=0.11 cfs @ 12.10 hrs HW=193.58' (Free Discharge)
└─**1=Exfiltration** (Controls 0.11 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=193.50' (Free Discharge)
├─**2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)
└─**3=Orifice/Grate** (Controls 0.00 cfs)

Pond 1P: Chambers - Chamber Wizard Field A

Chamber Model = ADS_StormTechSC-740 (ADS StormTech®SC-740)
Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
Row Length Adjustment= +0.44' x 6.45 sf x 5 rows

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

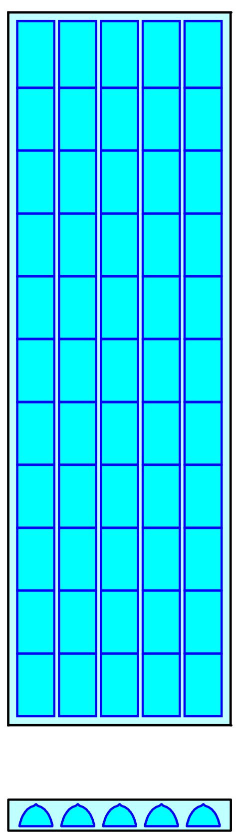
11 Chambers/Row x 7.12' Long +0.44' Row Adjustment = 78.76' Row Length +12.0" End Stone x 2 = 80.76' Base Length
5 Rows x 51.0" Wide + 6.0" Spacing x 4 + 12.0" Side Stone x 2 = 25.25' Base Width
6.0" Base + 30.0" Chamber Height + 6.0" Cover = 3.50' Field Height

55 Chambers x 45.9 cf +0.44' Row Adjustment x 6.45 sf x 5 Rows = 2,540.8 cf Chamber Storage

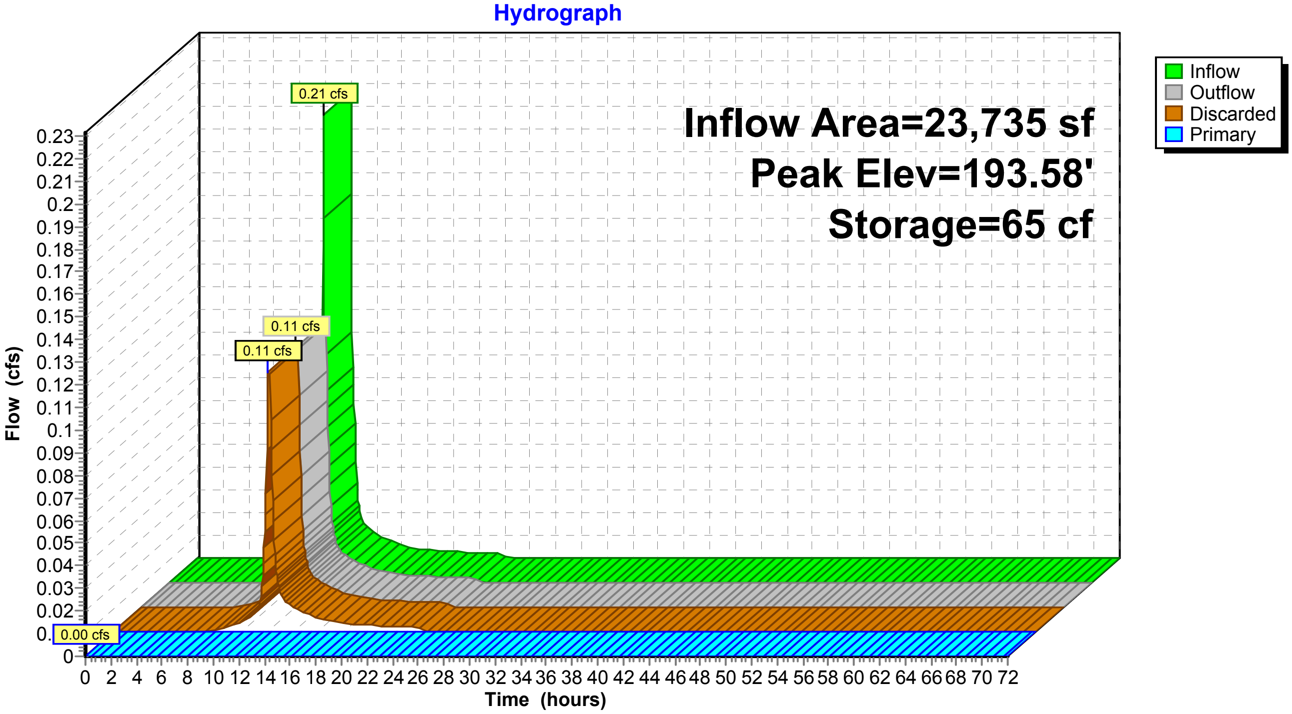
7,137.0 cf Field - 2,540.8 cf Chambers = 4,596.2 cf Stone x 40.0% Voids = 1,838.5 cf Stone Storage

Chamber Storage + Stone Storage = 4,379.3 cf = 0.101 af
Overall Storage Efficiency = 61.4%

55 Chambers
264.3 cy Field
170.2 cy Stone



Pond 1P: Chambers



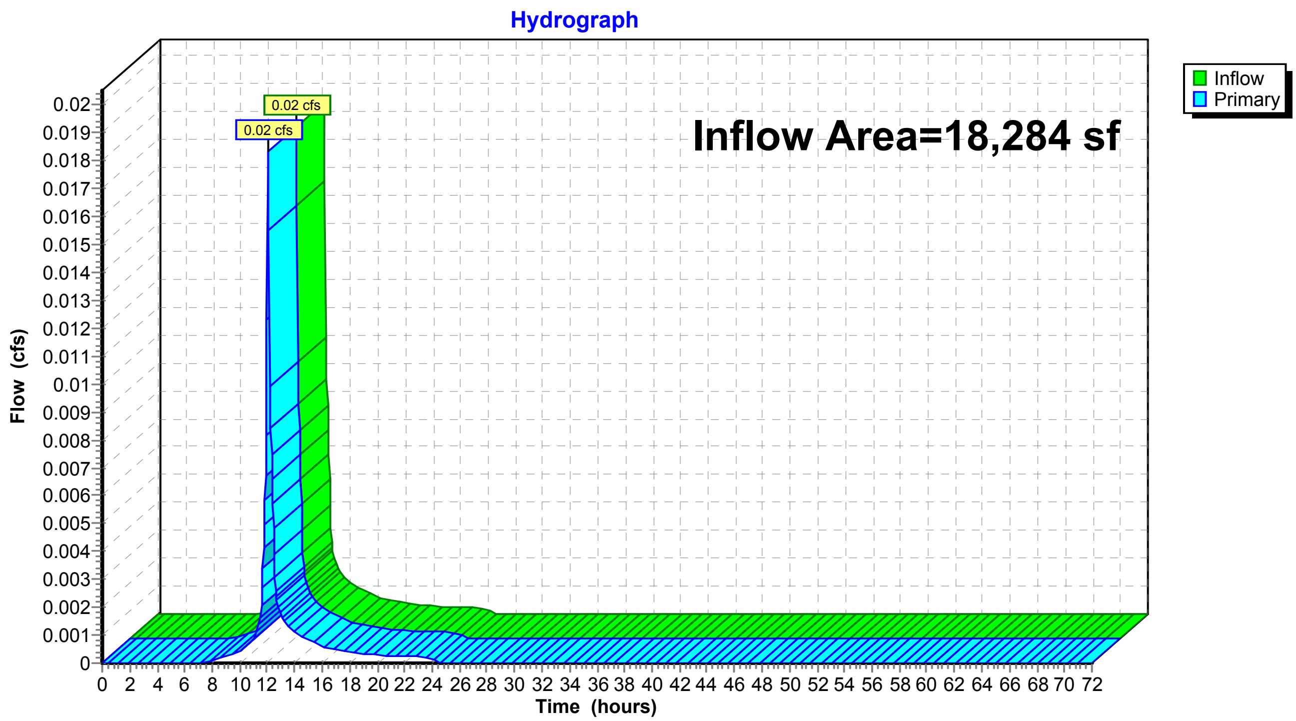
Summary for Pond P1: Analysis Pt 1

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

Inflow Area = 18,284 sf, 11.78% Impervious, Inflow Depth = 0.04" for 0.5-IN EVENT event
Inflow = 0.02 cfs @ 12.08 hrs, Volume= 57 cf
Primary = 0.02 cfs @ 12.08 hrs, Volume= 57 cf, Atten= 0%, Lag= 0.0 min

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

Pond P1: Analysis Pt 1



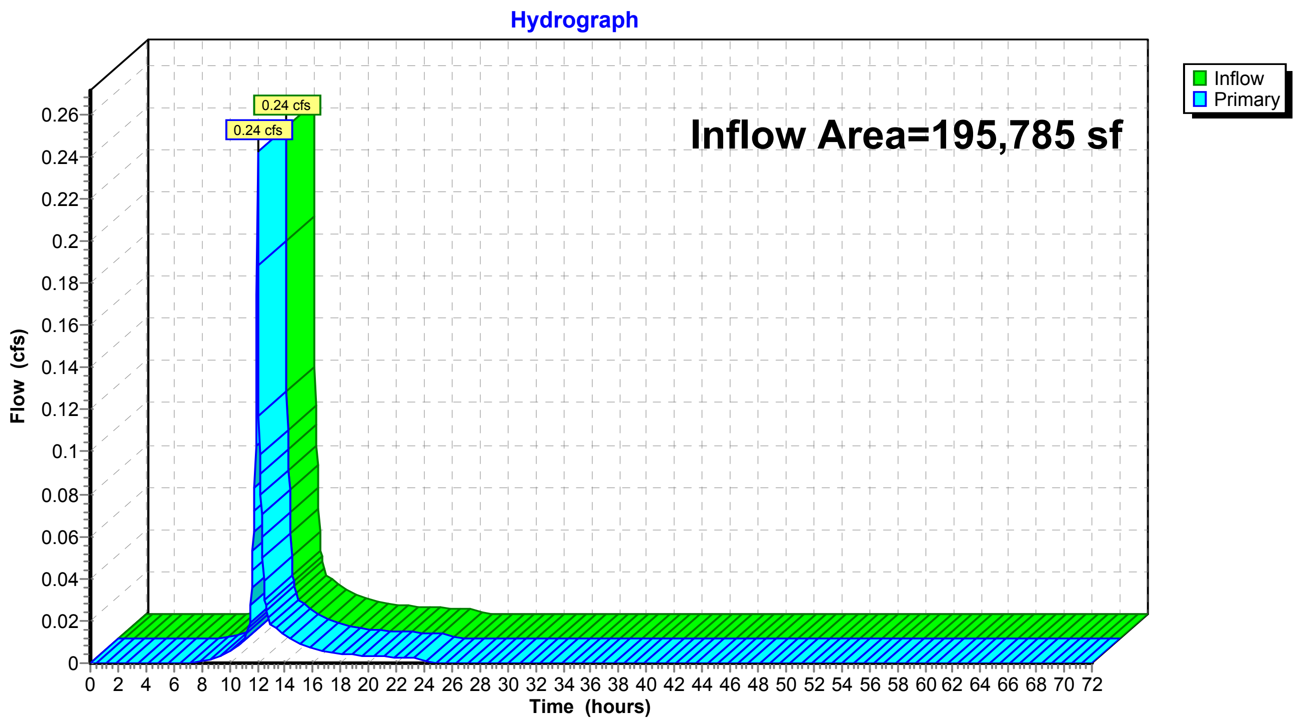
Summary for Pond P2: Analysis Pt 2

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

Inflow Area = 195,785 sf, 23.45% Impervious, Inflow Depth = 0.04" for 0.5-IN EVENT event
Inflow = 0.24 cfs @ 12.00 hrs, Volume= 656 cf
Primary = 0.24 cfs @ 12.00 hrs, Volume= 656 cf, Atten= 0%, Lag= 0.0 min

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

Pond P2: Analysis Pt 2



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

SubcatchmentS1: Subcat S1 Runoff Area=18,284 sf 11.78% Impervious Runoff Depth=0.09"
Tc=5.0 min CN=WQ Runoff=0.04 cfs 142 cf

SubcatchmentS2A: Subcat S2A Runoff Area=151,520 sf 15.85% Impervious Runoff Depth=0.13"
Tc=0.0 min CN=WQ Runoff=0.56 cfs 1,583 cf

SubcatchmentS2B: Subcat S2B Runoff Area=23,735 sf 89.08% Impervious Runoff Depth=0.70"
Tc=0.0 min CN=WQ Runoff=0.49 cfs 1,394 cf

SubcatchmentS2C: Subcat S2C Runoff Area=20,530 sf 3.69% Impervious Runoff Depth=0.03"
Tc=0.0 min CN=WQ Runoff=0.02 cfs 50 cf

Pond 1P: Chambers Peak Elev=193.87' Storage=304 cf Inflow=0.49 cfs 1,394 cf
Discarded=0.11 cfs 1,394 cf Primary=0.00 cfs 0 cf Outflow=0.11 cfs 1,394 cf

Pond P1: Analysis Pt 1 Inflow=0.04 cfs 142 cf
Primary=0.04 cfs 142 cf

Pond P2: Analysis Pt 2 Inflow=0.58 cfs 1,633 cf
Primary=0.58 cfs 1,633 cf

Total Runoff Area = 214,069 sf Runoff Volume = 3,168 cf Average Runoff Depth = 0.18"
77.55% Pervious = 166,001 sf 22.45% Impervious = 48,068 sf

Summary for Subcatchment S1: Subcat S1

[49] Hint: Tc<2dt may require smaller dt

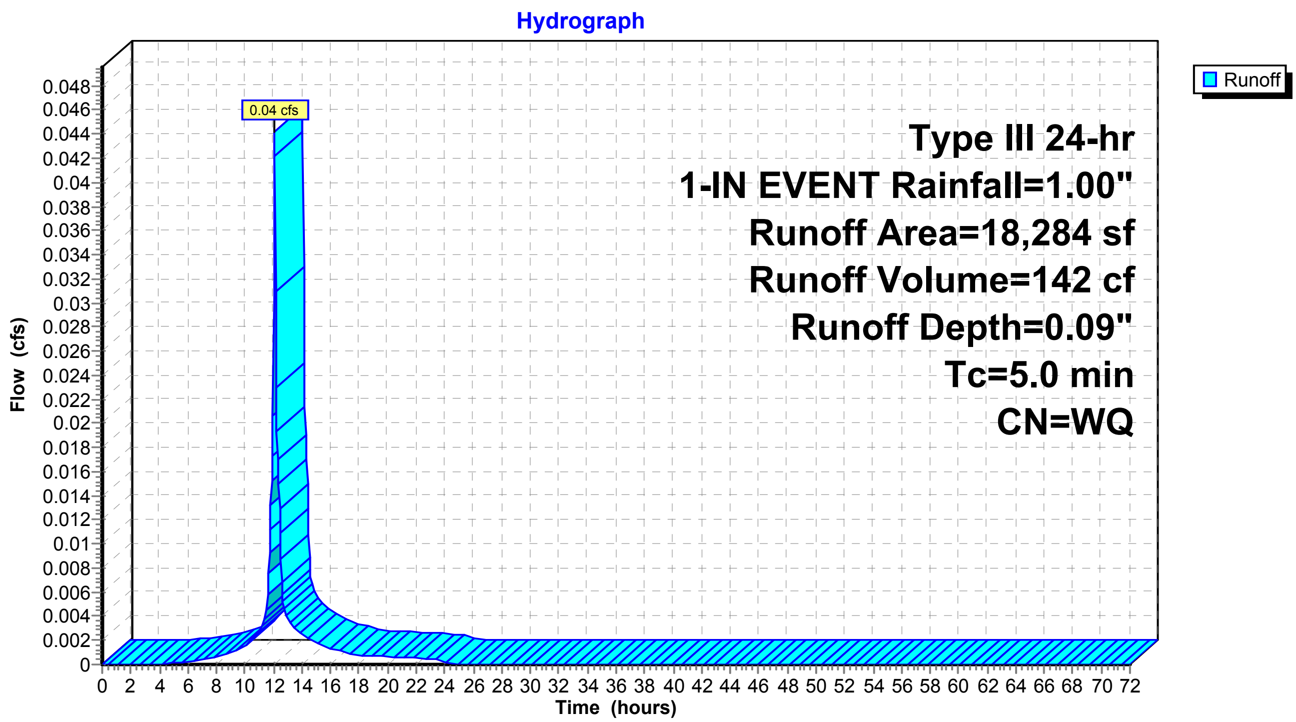
Runoff = 0.04 cfs @ 12.07 hrs, Volume= 142 cf, Depth= 0.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-IN EVENT Rainfall=1.00"

Area (sf)	CN	Description
13,672	39	Pasture/grassland/range, Good, HSG A
2,410	39	Pasture/grassland/range, Good, HSG A
48	30	Woods, Good, HSG A
2,154	98	Paved parking, HSG A
18,284		Weighted Average
16,130		88.22% Pervious Area
2,154		11.78% Impervious Area

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

Subcatchment S1: Subcat S1



Summary for Subcatchment S2A: Subcat S2A

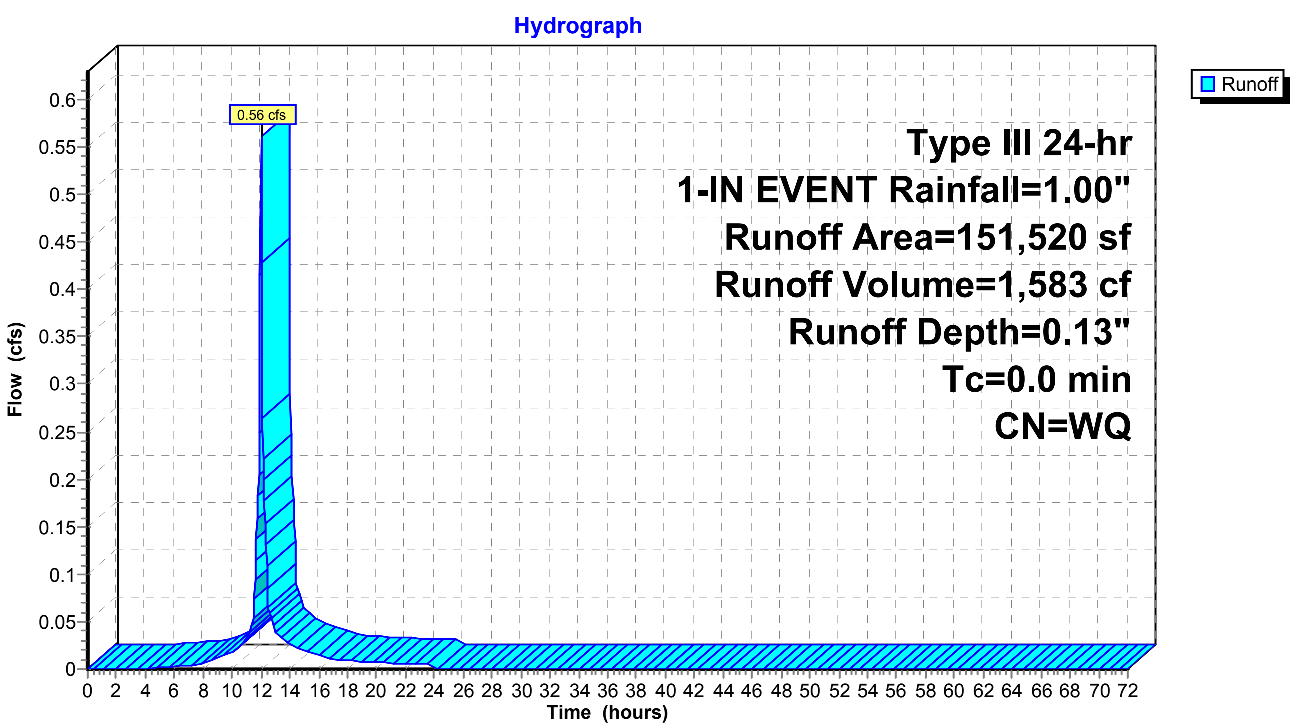
[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 0.56 cfs @ 12.00 hrs, Volume= 1,583 cf, Depth= 0.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-IN EVENT Rainfall=1.00"

Area (sf)	CN	Description
12,933	39	Pasture/grassland/range, Good, HSG A
8,306	39	Pasture/grassland/range, Good, HSG A
76,277	39	Pasture/grassland/range, Good, HSG A
9	39	Pasture/grassland/range, Good, HSG A
22,045	39	Pasture/grassland/range, Good, HSG A
149	30	Woods, Good, HSG A
360	30	Woods, Good, HSG A
7,184	30	Woods, Good, HSG A
24,012	98	Paved parking, HSG A
246	39	Pasture/grassland/range, Good, HSG A
151,520		Weighted Average
127,508		84.15% Pervious Area
24,012		15.85% Impervious Area

Subcatchment S2A: Subcat S2A



Summary for Subcatchment S2B: Subcat S2B

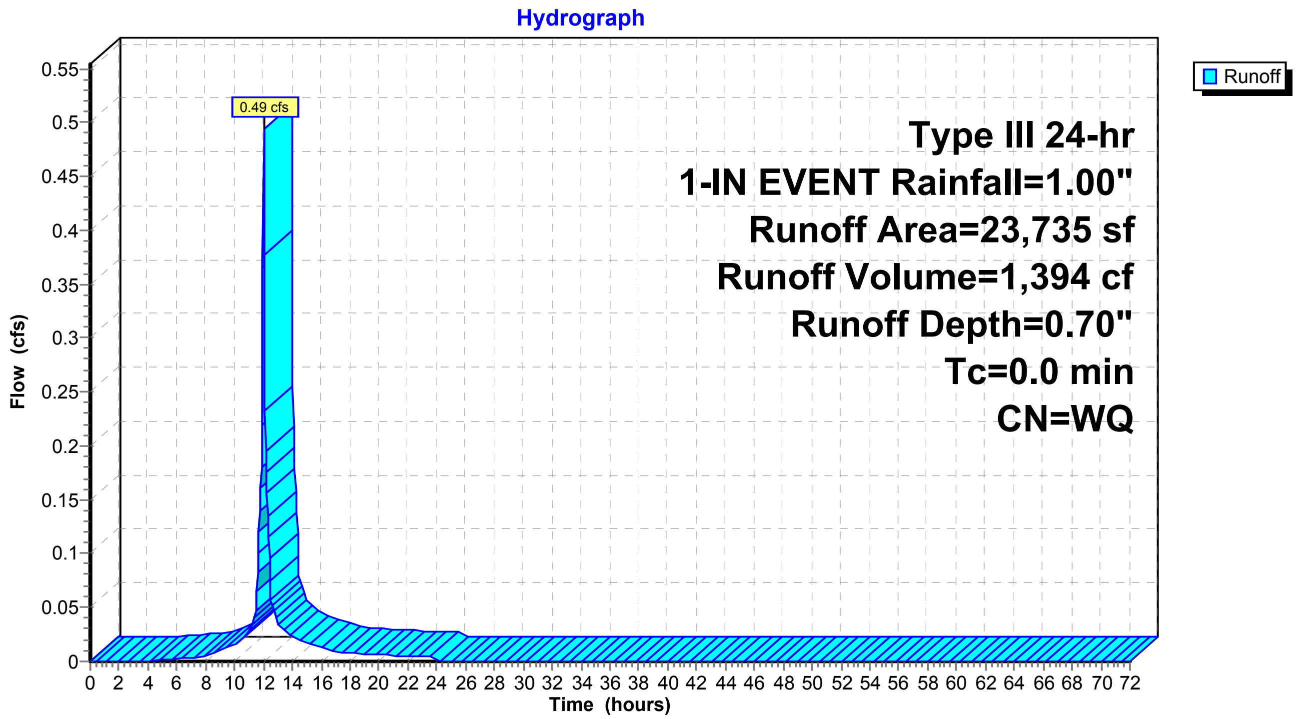
[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 0.49 cfs @ 12.00 hrs, Volume= 1,394 cf, Depth= 0.70"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-IN EVENT Rainfall=1.00"

Area (sf)	CN	Description
21,144	98	Paved parking, HSG A
266	39	Pasture/grassland/range, Good, HSG A
40	39	Pasture/grassland/range, Good, HSG A
266	39	Pasture/grassland/range, Good, HSG A
0	39	Pasture/grassland/range, Good, HSG A
2,018	39	Pasture/grassland/range, Good, HSG A
23,735		Weighted Average
2,591		10.92% Pervious Area
21,144		89.08% Impervious Area

Subcatchment S2B: Subcat S2B



Summary for Subcatchment S2C: Subcat S2C

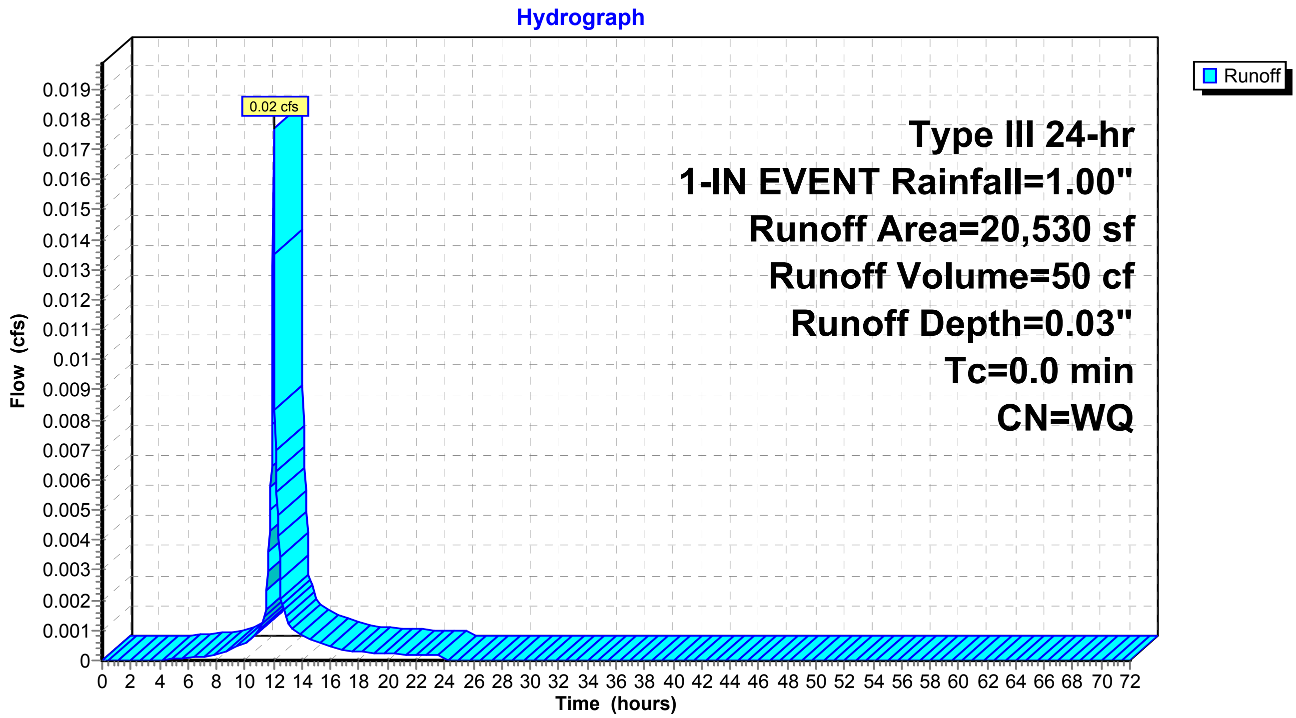
[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 0.02 cfs @ 12.00 hrs, Volume= 50 cf, Depth= 0.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-IN EVENT Rainfall=1.00"

Area (sf)	CN	Description
1,384	39	Pasture/grassland/range, Good, HSG A
18,118	39	Pasture/grassland/range, Good, HSG A
270	30	Woods, Good, HSG A
757	98	Paved parking, HSG A
20,530		Weighted Average
19,772		96.31% Pervious Area
757		3.69% Impervious Area

Subcatchment S2C: Subcat S2C



Summary for Pond 1P: Chambers

Inflow Area = 23,735 sf, 89.08% Impervious, Inflow Depth = 0.70" for 1-IN EVENT event
Inflow = 0.49 cfs @ 12.00 hrs, Volume= 1,394 cf
Outflow = 0.11 cfs @ 12.35 hrs, Volume= 1,394 cf, Atten= 77%, Lag= 21.1 min
Discarded = 0.11 cfs @ 12.35 hrs, Volume= 1,394 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 193.87' @ 12.35 hrs Surf.Area= 2,052 sf Storage= 304 cf

Plug-Flow detention time= 17.3 min calculated for 1,394 cf (100% of inflow)
Center-of-Mass det. time= 17.3 min (799.6 - 782.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	193.50'	1,838 cf	**25.25'W x 80.76'L x 3.50'H Field A** 7,137 cf Overall - 2,541 cf Embedded = 4,596 cf x 40.0% Voids
#2A	194.00'	2,541 cf	**ADS_StormTech SC-740** x 55 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap Row Length Adjustment= +0.44' x 6.45 sf x 5 rows
#3	193.50'	75 cf	**4.00'D x 6.00'H Vertical Cone/Cylinder**
		4,455 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	193.50'	**2.410 in/hr Exfiltration over Horizontal area** Conductivity to Groundwater Elevation = 0.00'
#2	Primary	197.00'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#3	Primary	195.50'	**8.0" Vert. Orifice/Grate** C= 0.600

Discarded OutFlow Max=0.11 cfs @ 12.35 hrs HW=193.87' (Free Discharge)
└─**1=Exfiltration** (Controls 0.11 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=193.50' (Free Discharge)
├─**2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)
└─**3=Orifice/Grate** (Controls 0.00 cfs)

Pond 1P: Chambers - Chamber Wizard Field A

Chamber Model = ADS_StormTechSC-740 (ADS StormTech®SC-740)
Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
Row Length Adjustment= +0.44' x 6.45 sf x 5 rows

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

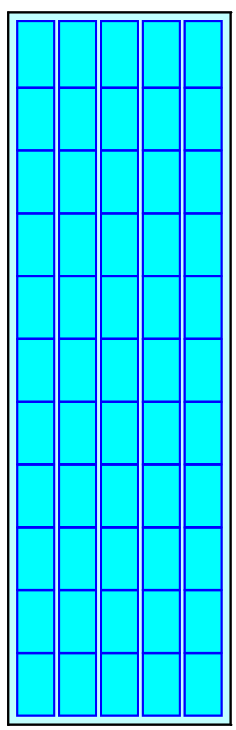
11 Chambers/Row x 7.12' Long +0.44' Row Adjustment = 78.76' Row Length +12.0" End Stone x 2 = 80.76' Base Length
5 Rows x 51.0" Wide + 6.0" Spacing x 4 + 12.0" Side Stone x 2 = 25.25' Base Width
6.0" Base + 30.0" Chamber Height + 6.0" Cover = 3.50' Field Height

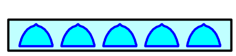
55 Chambers x 45.9 cf +0.44' Row Adjustment x 6.45 sf x 5 Rows = 2,540.8 cf Chamber Storage

7,137.0 cf Field - 2,540.8 cf Chambers = 4,596.2 cf Stone x 40.0% Voids = 1,838.5 cf Stone Storage

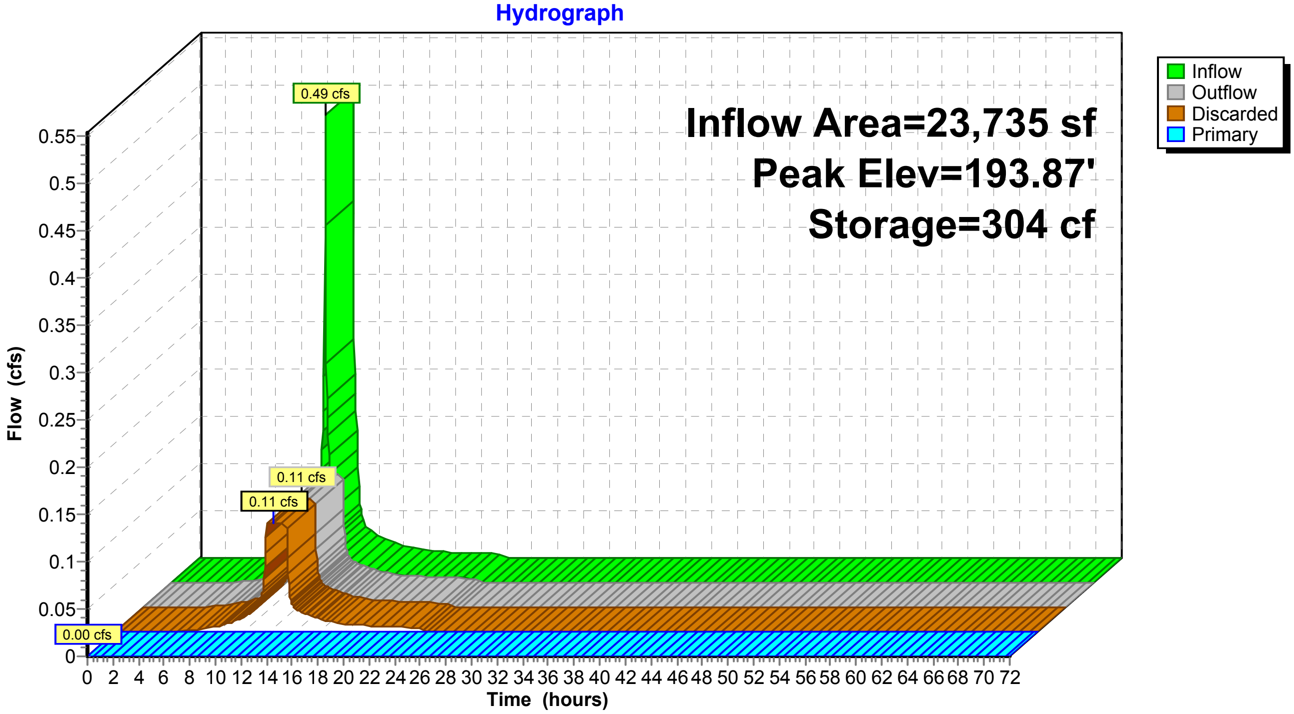
Chamber Storage + Stone Storage = 4,379.3 cf = 0.101 af
Overall Storage Efficiency = 61.4%

55 Chambers
264.3 cy Field
170.2 cy Stone





Pond 1P: Chambers



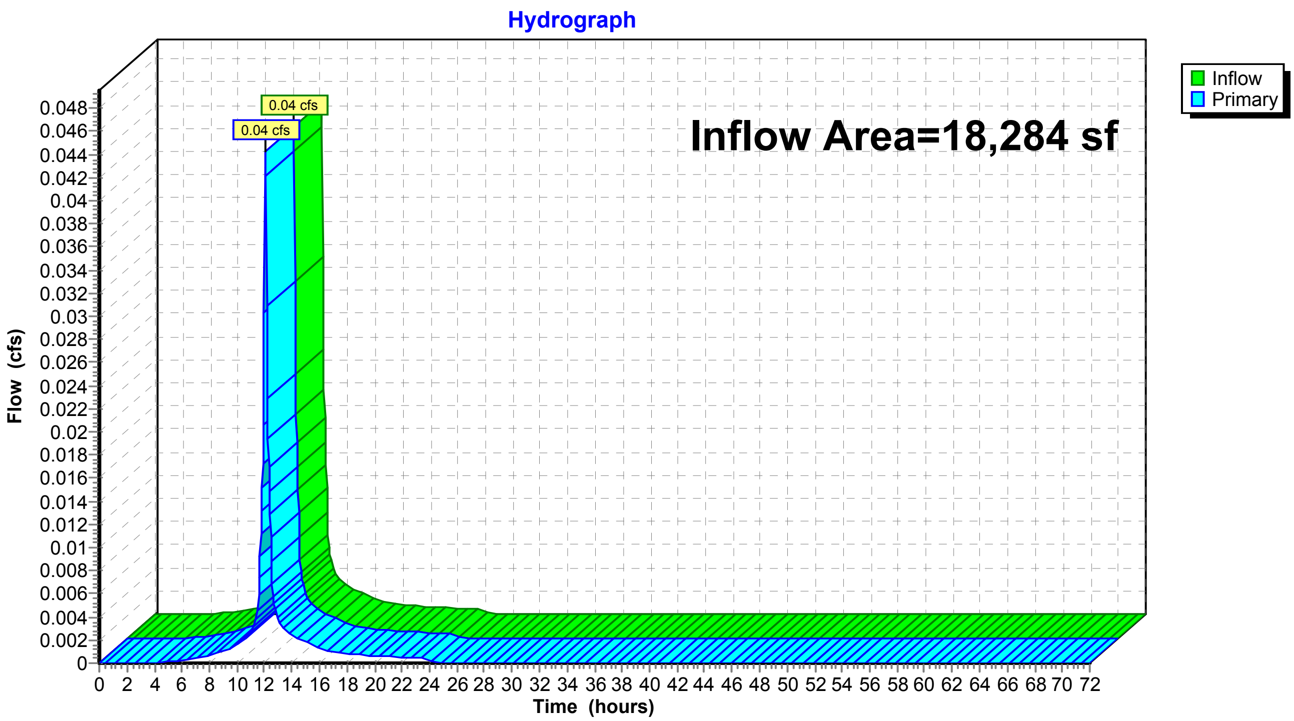
Summary for Pond P1: Analysis Pt 1

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

Inflow Area = 18,284 sf, 11.78% Impervious, Inflow Depth = 0.09" for 1-IN EVENT event
Inflow = 0.04 cfs @ 12.07 hrs, Volume= 142 cf
Primary = 0.04 cfs @ 12.07 hrs, Volume= 142 cf, Atten= 0%, Lag= 0.0 min

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

Pond P1: Analysis Pt 1



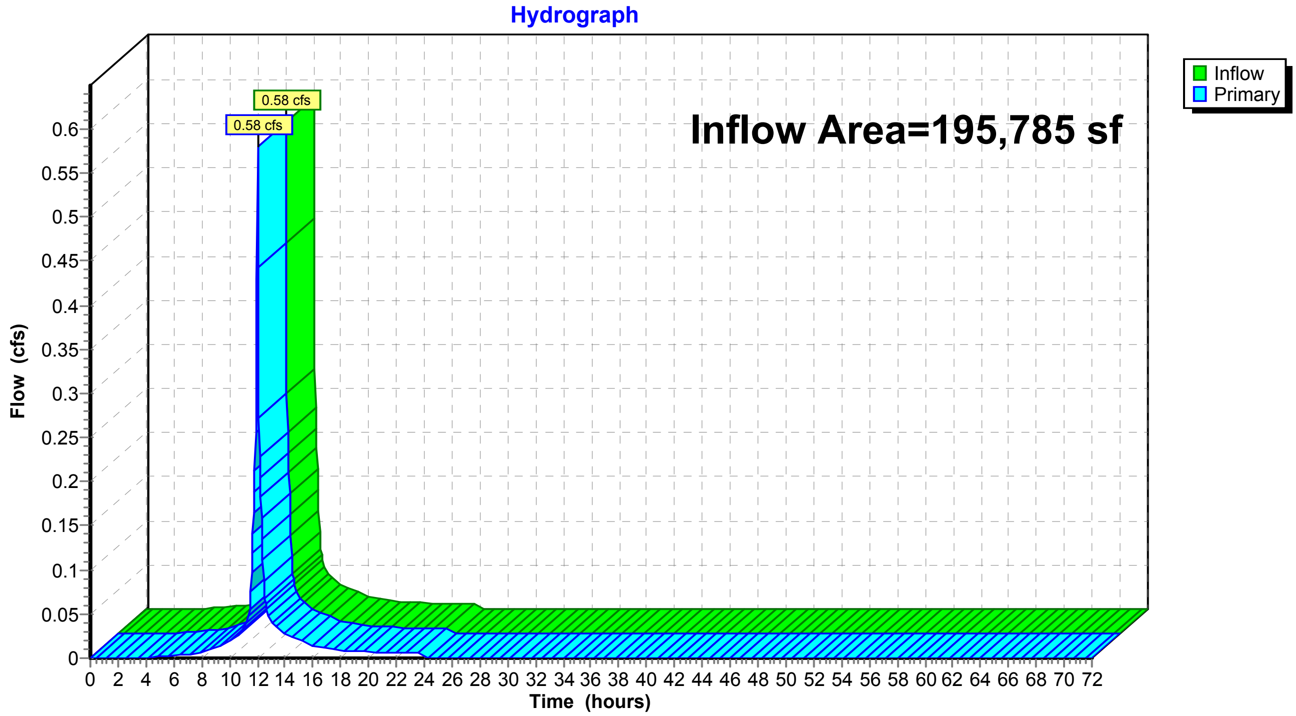
Summary for Pond P2: Analysis Pt 2

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

Inflow Area = 195,785 sf, 23.45% Impervious, Inflow Depth = 0.10" for 1-IN EVENT event
Inflow = 0.58 cfs @ 12.00 hrs, Volume= 1,633 cf
Primary = 0.58 cfs @ 12.00 hrs, Volume= 1,633 cf, Atten= 0%, Lag= 0.0 min

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

Pond P2: Analysis Pt 2



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

SubcatchmentS1: Subcat S1 Runoff Area=18,284 sf 11.78% Impervious Runoff Depth=0.36"
Tc=5.0 min CN=WQ Runoff=0.16 cfs 555 cf

SubcatchmentS2A: Subcat S2A Runoff Area=151,520 sf 15.85% Impervious Runoff Depth=0.49"
Tc=0.0 min CN=WQ Runoff=2.03 cfs 6,178 cf

SubcatchmentS2B: Subcat S2B Runoff Area=23,735 sf 89.08% Impervious Runoff Depth=2.74"
Tc=0.0 min CN=WQ Runoff=1.79 cfs 5,422 cf

SubcatchmentS2C: Subcat S2C Runoff Area=20,530 sf 3.69% Impervious Runoff Depth=0.12"
Tc=0.0 min CN=WQ Runoff=0.06 cfs 198 cf

Pond 1P: Chambers Peak Elev=195.01' Storage=2,091 cf Inflow=1.79 cfs 5,422 cf
Discarded=0.12 cfs 5,422 cf Primary=0.00 cfs 0 cf Outflow=0.12 cfs 5,422 cf

Pond P1: Analysis Pt 1 Inflow=0.16 cfs 555 cf
Primary=0.16 cfs 555 cf

Pond P2: Analysis Pt 2 Inflow=2.09 cfs 6,376 cf
Primary=2.09 cfs 6,376 cf

Total Runoff Area = 214,069 sf Runoff Volume = 12,353 cf Average Runoff Depth = 0.69"
77.55% Pervious = 166,001 sf 22.45% Impervious = 48,068 sf

Summary for Subcatchment S1: Subcat S1

[49] Hint: Tc<2dt may require smaller dt

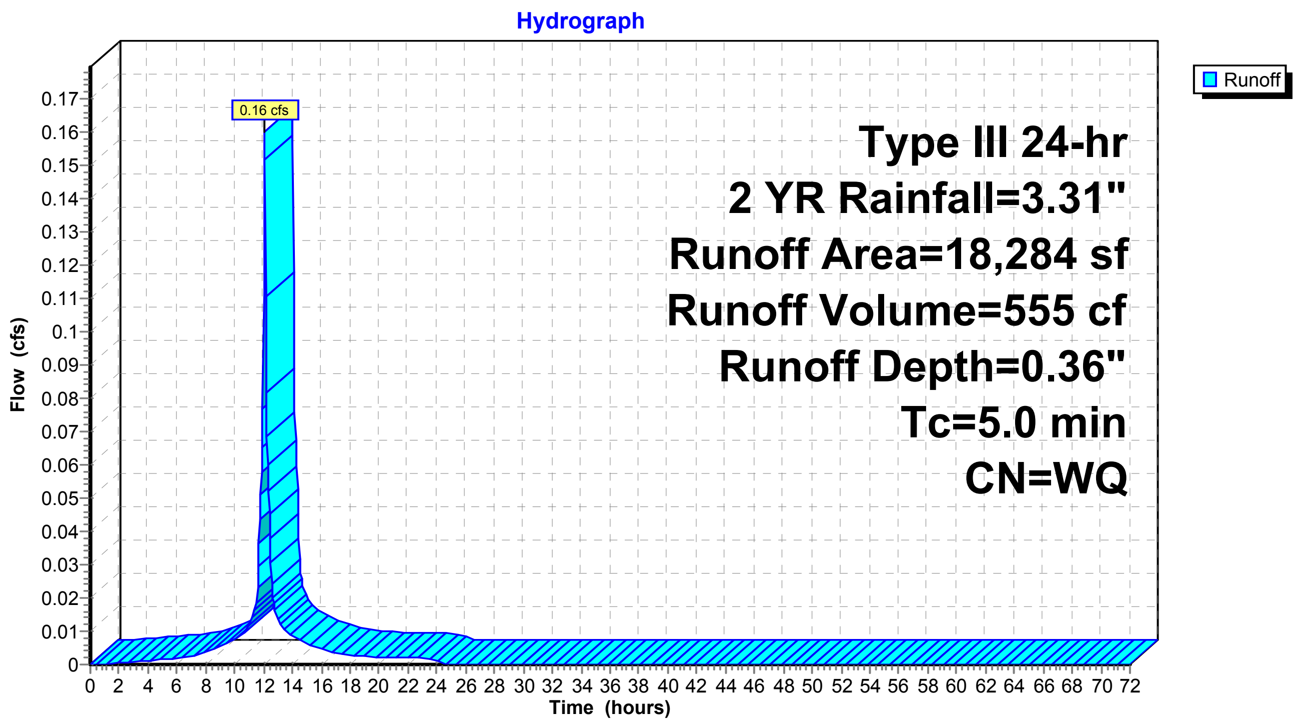
Runoff = 0.16 cfs @ 12.07 hrs, Volume= 555 cf, Depth= 0.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 YR Rainfall=3.31"

Area (sf)	CN	Description
13,672	39	Pasture/grassland/range, Good, HSG A
2,410	39	Pasture/grassland/range, Good, HSG A
48	30	Woods, Good, HSG A
2,154	98	Paved parking, HSG A
18,284		Weighted Average
16,130		88.22% Pervious Area
2,154		11.78% Impervious Area

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

Subcatchment S1: Subcat S1



Summary for Subcatchment S2A: Subcat S2A

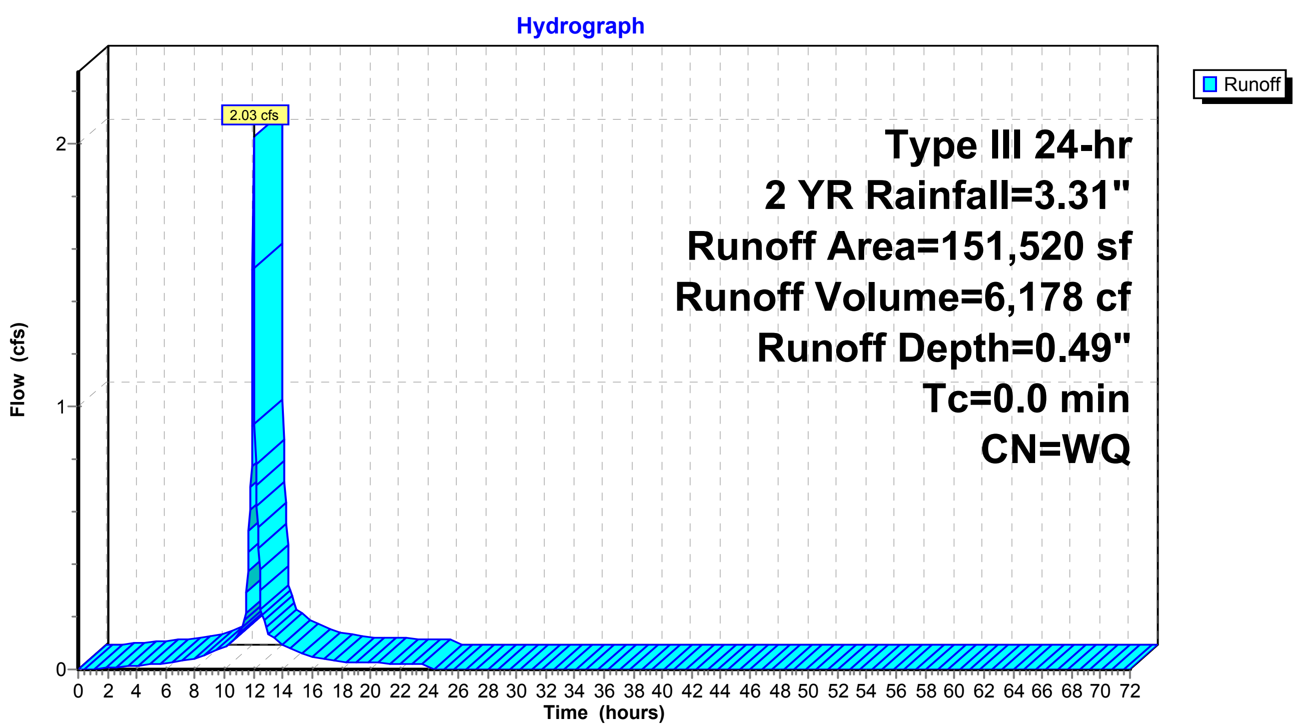
[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 2.03 cfs @ 12.00 hrs, Volume= 6,178 cf, Depth= 0.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 YR Rainfall=3.31"

Area (sf)	CN	Description
12,933	39	Pasture/grassland/range, Good, HSG A
8,306	39	Pasture/grassland/range, Good, HSG A
76,277	39	Pasture/grassland/range, Good, HSG A
9	39	Pasture/grassland/range, Good, HSG A
22,045	39	Pasture/grassland/range, Good, HSG A
149	30	Woods, Good, HSG A
360	30	Woods, Good, HSG A
7,184	30	Woods, Good, HSG A
24,012	98	Paved parking, HSG A
246	39	Pasture/grassland/range, Good, HSG A
151,520		Weighted Average
127,508		84.15% Pervious Area
24,012		15.85% Impervious Area

Subcatchment S2A: Subcat S2A



Summary for Subcatchment S2B: Subcat S2B

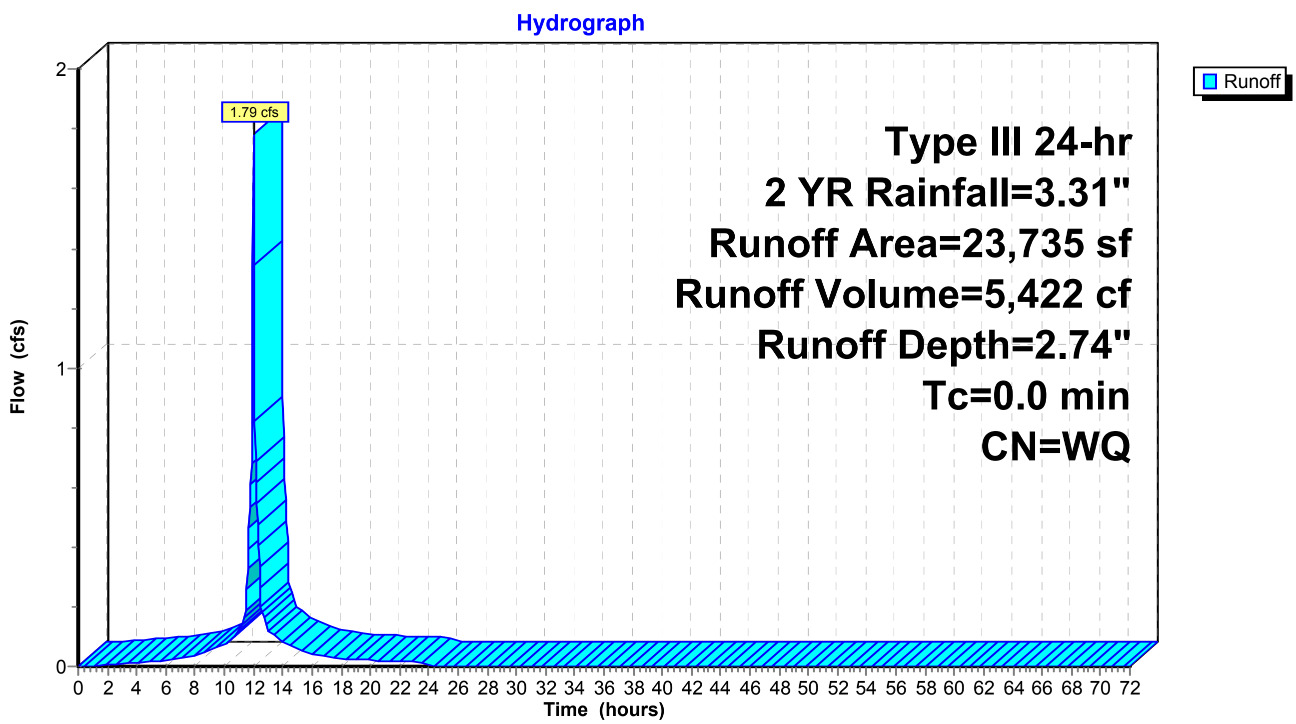
[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 1.79 cfs @ 12.00 hrs, Volume= 5,422 cf, Depth= 2.74"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 YR Rainfall=3.31"

Area (sf)	CN	Description
21,144	98	Paved parking, HSG A
266	39	Pasture/grassland/range, Good, HSG A
40	39	Pasture/grassland/range, Good, HSG A
266	39	Pasture/grassland/range, Good, HSG A
0	39	Pasture/grassland/range, Good, HSG A
2,018	39	Pasture/grassland/range, Good, HSG A
23,735		Weighted Average
2,591		10.92% Pervious Area
21,144		89.08% Impervious Area

Subcatchment S2B: Subcat S2B



Summary for Subcatchment S2C: Subcat S2C

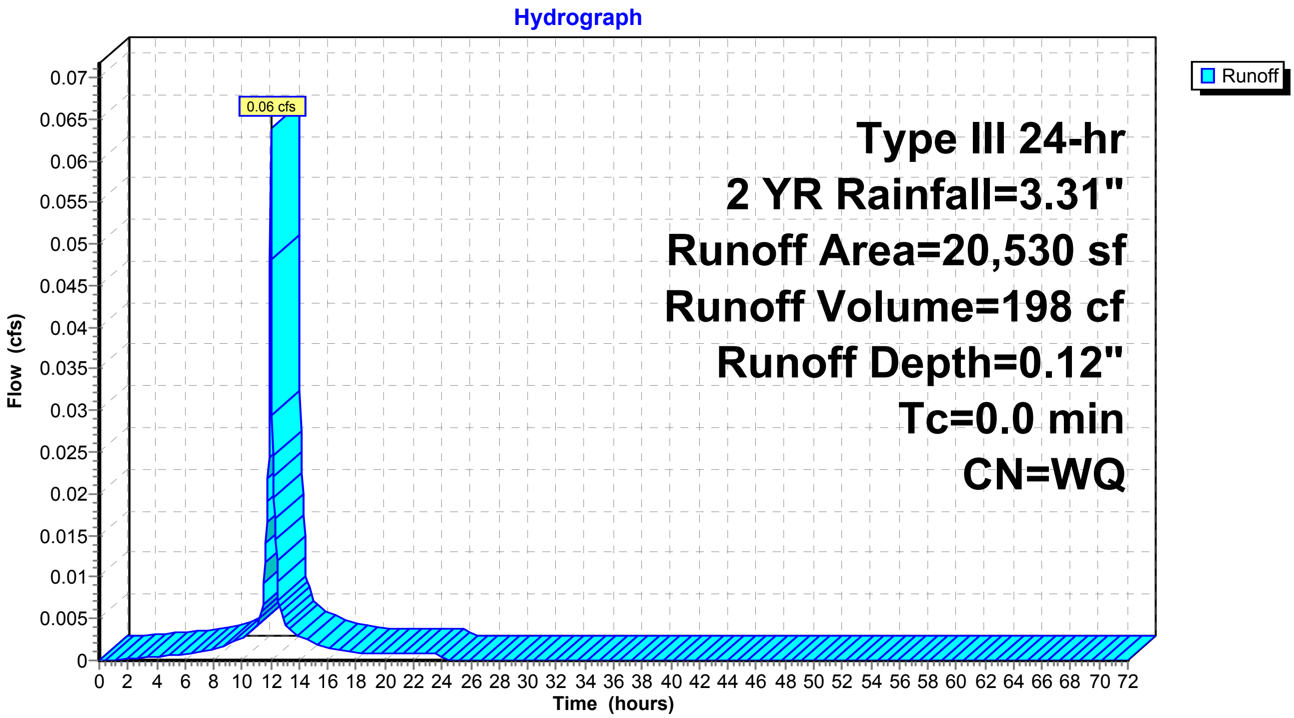
[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 0.06 cfs @ 12.00 hrs, Volume= 198 cf, Depth= 0.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 YR Rainfall=3.31"

Area (sf)	CN	Description
1,384	39	Pasture/grassland/range, Good, HSG A
18,118	39	Pasture/grassland/range, Good, HSG A
270	30	Woods, Good, HSG A
757	98	Paved parking, HSG A
20,530		Weighted Average
19,772		96.31% Pervious Area
757		3.69% Impervious Area

Subcatchment S2C: Subcat S2C



Summary for Pond 1P: Chambers

Inflow Area = 23,735 sf, 89.08% Impervious, Inflow Depth = 2.74" for 2 YR event
Inflow = 1.79 cfs @ 12.00 hrs, Volume= 5,422 cf
Outflow = 0.12 cfs @ 13.06 hrs, Volume= 5,422 cf, Atten= 94%, Lag= 63.6 min
Discarded = 0.12 cfs @ 13.06 hrs, Volume= 5,422 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 195.01' @ 13.06 hrs Surf.Area= 2,052 sf Storage= 2,091 cf

Plug-Flow detention time= 137.6 min calculated for 5,422 cf (100% of inflow)
Center-of-Mass det. time= 137.6 min (887.8 - 750.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	193.50'	1,838 cf	**25.25'W x 80.76'L x 3.50'H Field A**
			7,137 cf Overall - 2,541 cf Embedded = 4,596 cf x 40.0% Voids
#2A	194.00'	2,541 cf	**ADS_StormTech SC-740** x 55 Inside #1
			Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
			Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
			Row Length Adjustment= +0.44' x 6.45 sf x 5 rows
#3	193.50'	75 cf	**4.00'D x 6.00'H Vertical Cone/Cylinder**
		4,455 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	193.50'	**2.410 in/hr Exfiltration over Horizontal area**
			Conductivity to Groundwater Elevation = 0.00'
#2	Primary	197.00'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#3	Primary	195.50'	**8.0" Vert. Orifice/Grate** C= 0.600

Discarded OutFlow Max=0.12 cfs @ 13.06 hrs HW=195.01' (Free Discharge)
└─**1=Exfiltration** (Controls 0.12 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=193.50' (Free Discharge)
├─**2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)
└─**3=Orifice/Grate** (Controls 0.00 cfs)

Pond 1P: Chambers - Chamber Wizard Field A

Chamber Model = ADS_StormTechSC-740 (ADS StormTech®SC-740)
Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
Row Length Adjustment= +0.44' x 6.45 sf x 5 rows

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

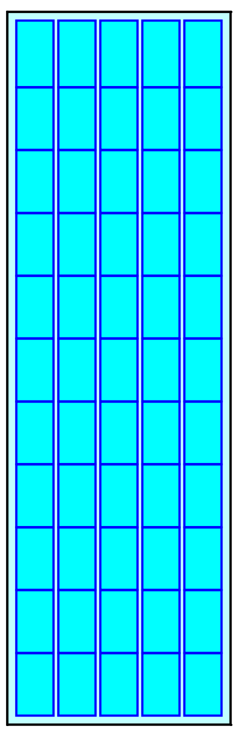
11 Chambers/Row x 7.12' Long +0.44' Row Adjustment = 78.76' Row Length +12.0" End Stone x 2 = 80.76' Base Length
5 Rows x 51.0" Wide + 6.0" Spacing x 4 + 12.0" Side Stone x 2 = 25.25' Base Width
6.0" Base + 30.0" Chamber Height + 6.0" Cover = 3.50' Field Height

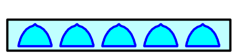
55 Chambers x 45.9 cf +0.44' Row Adjustment x 6.45 sf x 5 Rows = 2,540.8 cf Chamber Storage

7,137.0 cf Field - 2,540.8 cf Chambers = 4,596.2 cf Stone x 40.0% Voids = 1,838.5 cf Stone Storage

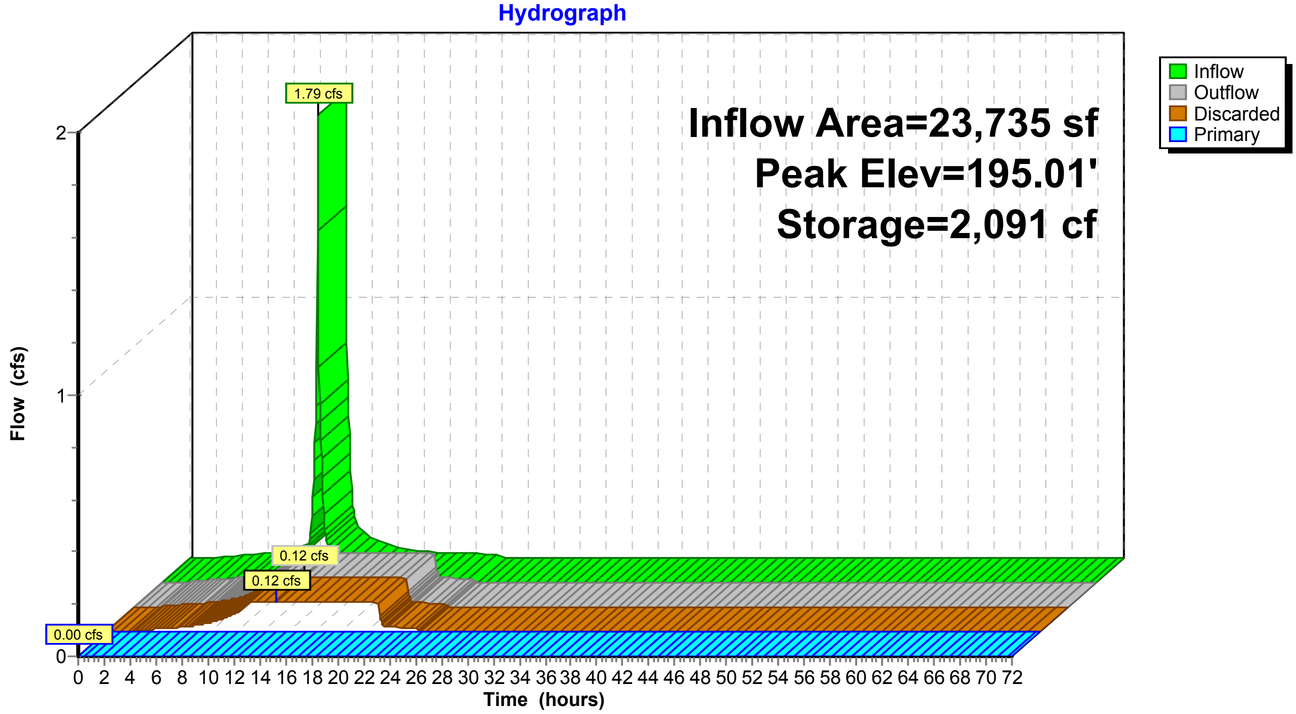
Chamber Storage + Stone Storage = 4,379.3 cf = 0.101 af
Overall Storage Efficiency = 61.4%

55 Chambers
264.3 cy Field
170.2 cy Stone





Pond 1P: Chambers

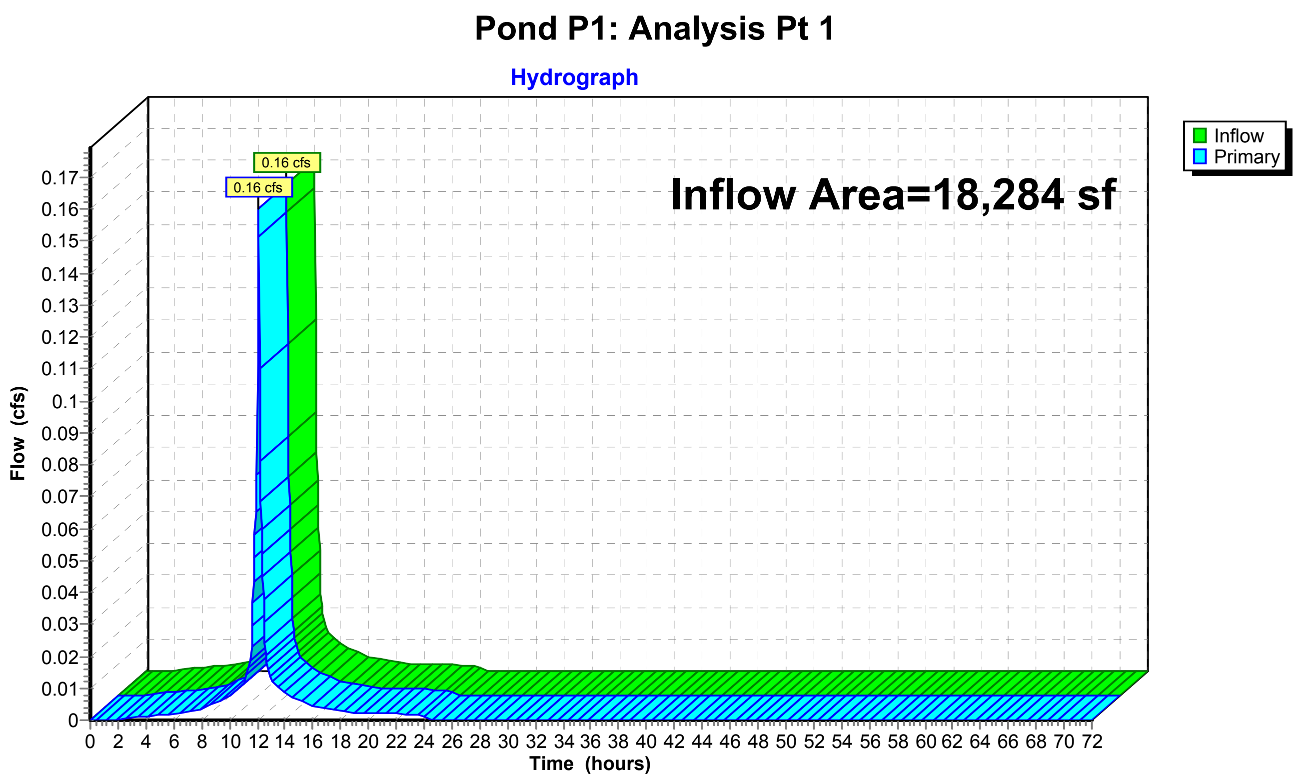


Summary for Pond P1: Analysis Pt 1

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

Inflow Area =	18,284 sf, 11.78% Impervious,	Inflow Depth = 0.36"	for 2 YR event
Inflow =	0.16 cfs @ 12.07 hrs, Volume=	555 cf	
Primary =	0.16 cfs @ 12.07 hrs, Volume=	555 cf, Atten= 0%, Lag= 0.0 min	

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



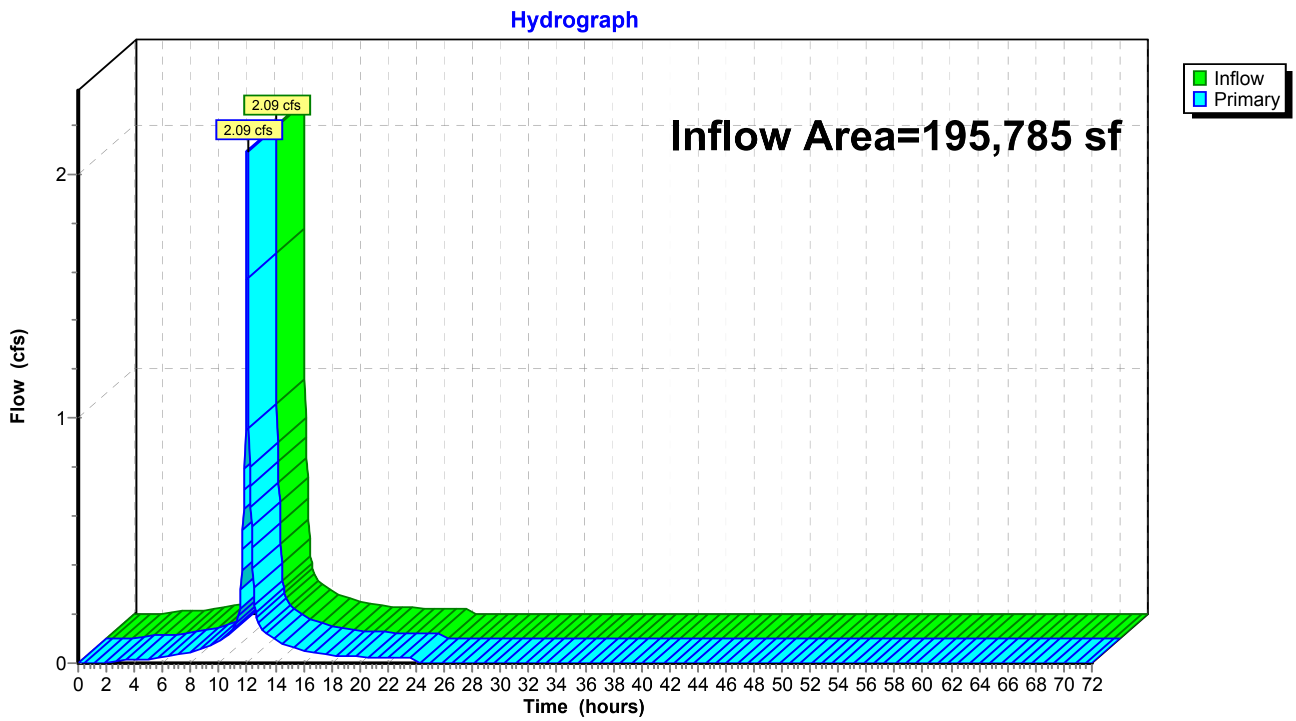
Summary for Pond P2: Analysis Pt 2

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

Inflow Area = 195,785 sf, 23.45% Impervious, Inflow Depth = 0.39" for 2 YR event
Inflow = 2.09 cfs @ 12.00 hrs, Volume= 6,376 cf
Primary = 2.09 cfs @ 12.00 hrs, Volume= 6,376 cf, Atten= 0%, Lag= 0.0 min

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

Pond P2: Analysis Pt 2



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

SubcatchmentS1: Subcat S1 Runoff Area=18,284 sf 11.78% Impervious Runoff Depth=0.79"
Tc=5.0 min CN=WQ Runoff=0.25 cfs 1,211 cf

SubcatchmentS2A: Subcat S2A Runoff Area=151,520 sf 15.85% Impervious Runoff Depth=0.98"
Tc=0.0 min CN=WQ Runoff=3.20 cfs 12,316 cf

SubcatchmentS2B: Subcat S2B Runoff Area=23,735 sf 89.08% Impervious Runoff Depth=4.44"
Tc=0.0 min CN=WQ Runoff=2.82 cfs 8,779 cf

SubcatchmentS2C: Subcat S2C Runoff Area=20,530 sf 3.69% Impervious Runoff Depth=0.41"
Tc=0.0 min CN=WQ Runoff=0.10 cfs 703 cf

Pond 1P: Chambers Peak Elev=195.86' Storage=3,328 cf Inflow=2.82 cfs 8,779 cf
Discarded=0.12 cfs 7,625 cf Primary=0.40 cfs 1,154 cf Outflow=0.52 cfs 8,779 cf

Pond P1: Analysis Pt 1 Inflow=0.25 cfs 1,211 cf
Primary=0.25 cfs 1,211 cf

Pond P2: Analysis Pt 2 Inflow=3.30 cfs 14,173 cf
Primary=3.30 cfs 14,173 cf

Total Runoff Area = 214,069 sf Runoff Volume = 23,009 cf Average Runoff Depth = 1.29"
77.55% Pervious = 166,001 sf 22.45% Impervious = 48,068 sf

Summary for Subcatchment S1: Subcat S1

[49] Hint: Tc<2dt may require smaller dt

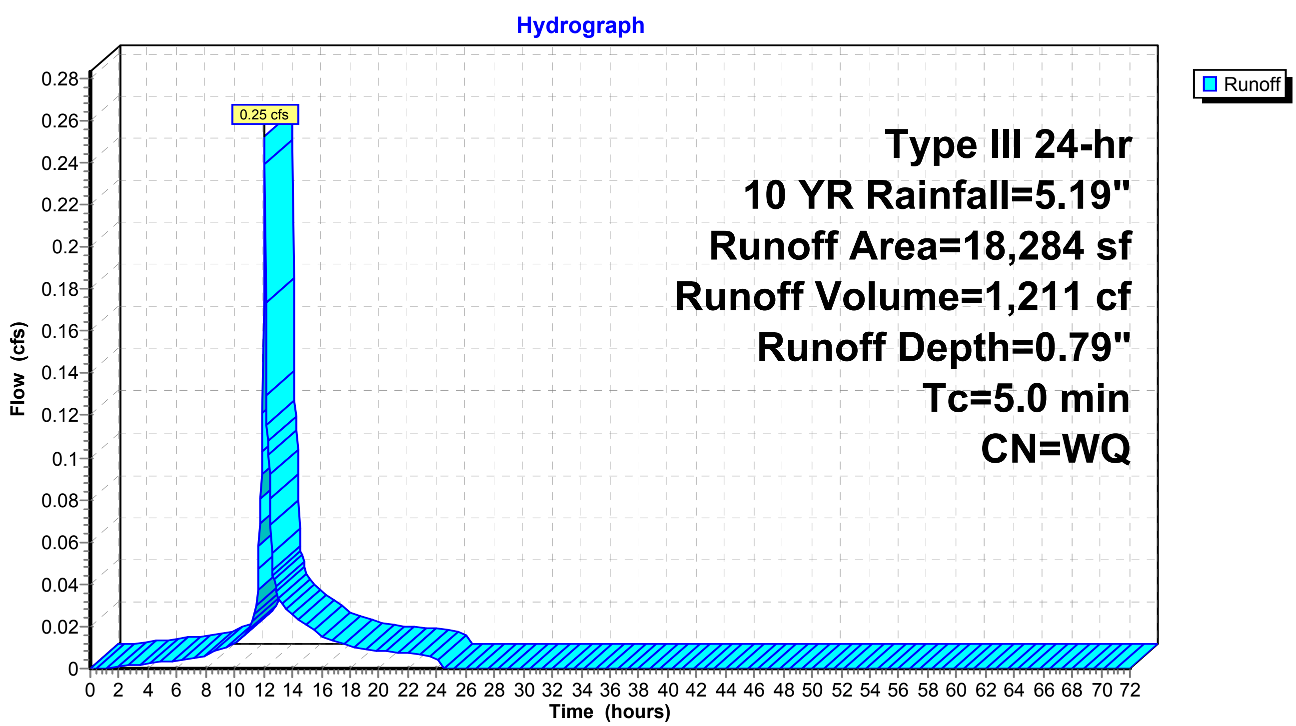
Runoff = 0.25 cfs @ 12.07 hrs, Volume= 1,211 cf, Depth= 0.79"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 YR Rainfall=5.19"

Area (sf)	CN	Description
13,672	39	Pasture/grassland/range, Good, HSG A
2,410	39	Pasture/grassland/range, Good, HSG A
48	30	Woods, Good, HSG A
2,154	98	Paved parking, HSG A
18,284		Weighted Average
16,130		88.22% Pervious Area
2,154		11.78% Impervious Area

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

Subcatchment S1: Subcat S1



Summary for Subcatchment S2A: Subcat S2A

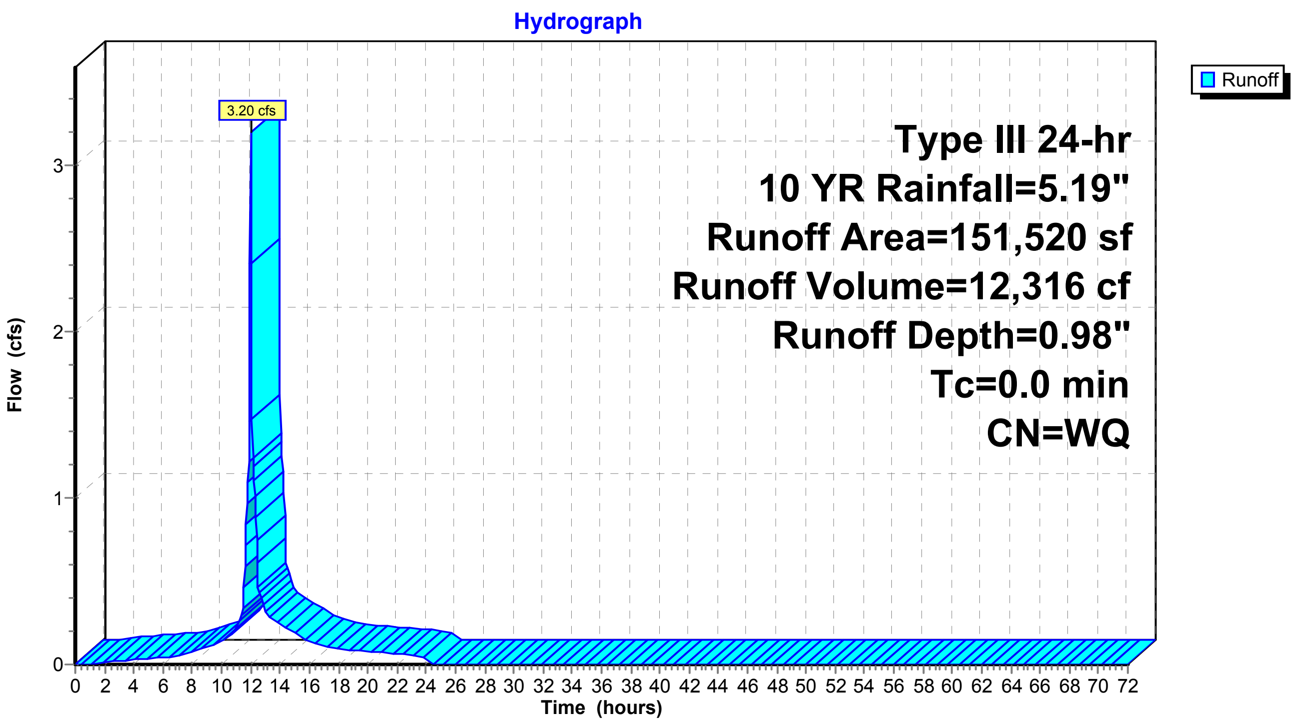
[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 3.20 cfs @ 12.00 hrs, Volume= 12,316 cf, Depth= 0.98"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 YR Rainfall=5.19"

Area (sf)	CN	Description
12,933	39	Pasture/grassland/range, Good, HSG A
8,306	39	Pasture/grassland/range, Good, HSG A
76,277	39	Pasture/grassland/range, Good, HSG A
9	39	Pasture/grassland/range, Good, HSG A
22,045	39	Pasture/grassland/range, Good, HSG A
149	30	Woods, Good, HSG A
360	30	Woods, Good, HSG A
7,184	30	Woods, Good, HSG A
24,012	98	Paved parking, HSG A
246	39	Pasture/grassland/range, Good, HSG A
151,520		Weighted Average
127,508		84.15% Pervious Area
24,012		15.85% Impervious Area

Subcatchment S2A: Subcat S2A



Summary for Subcatchment S2B: Subcat S2B

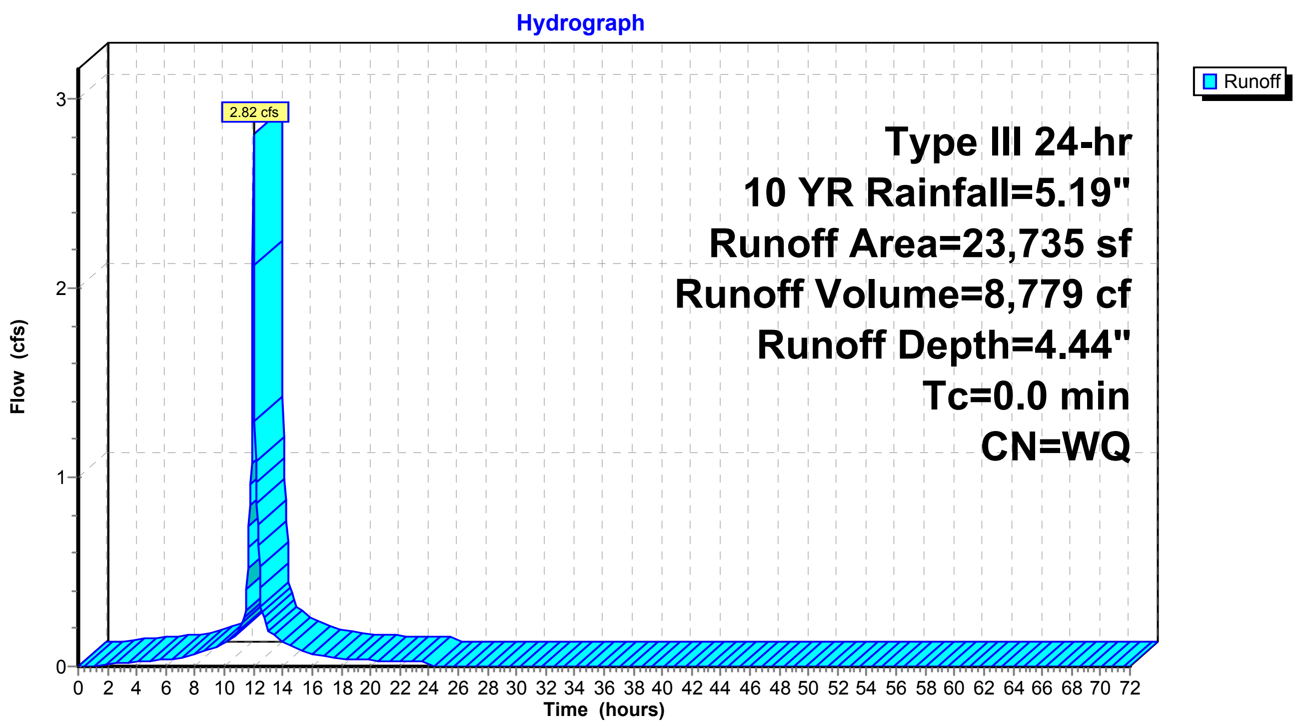
[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 2.82 cfs @ 12.00 hrs, Volume= 8,779 cf, Depth= 4.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 YR Rainfall=5.19"

Area (sf)	CN	Description
21,144	98	Paved parking, HSG A
266	39	Pasture/grassland/range, Good, HSG A
40	39	Pasture/grassland/range, Good, HSG A
266	39	Pasture/grassland/range, Good, HSG A
0	39	Pasture/grassland/range, Good, HSG A
2,018	39	Pasture/grassland/range, Good, HSG A
23,735		Weighted Average
2,591		10.92% Pervious Area
21,144		89.08% Impervious Area

Subcatchment S2B: Subcat S2B



Summary for Subcatchment S2C: Subcat S2C

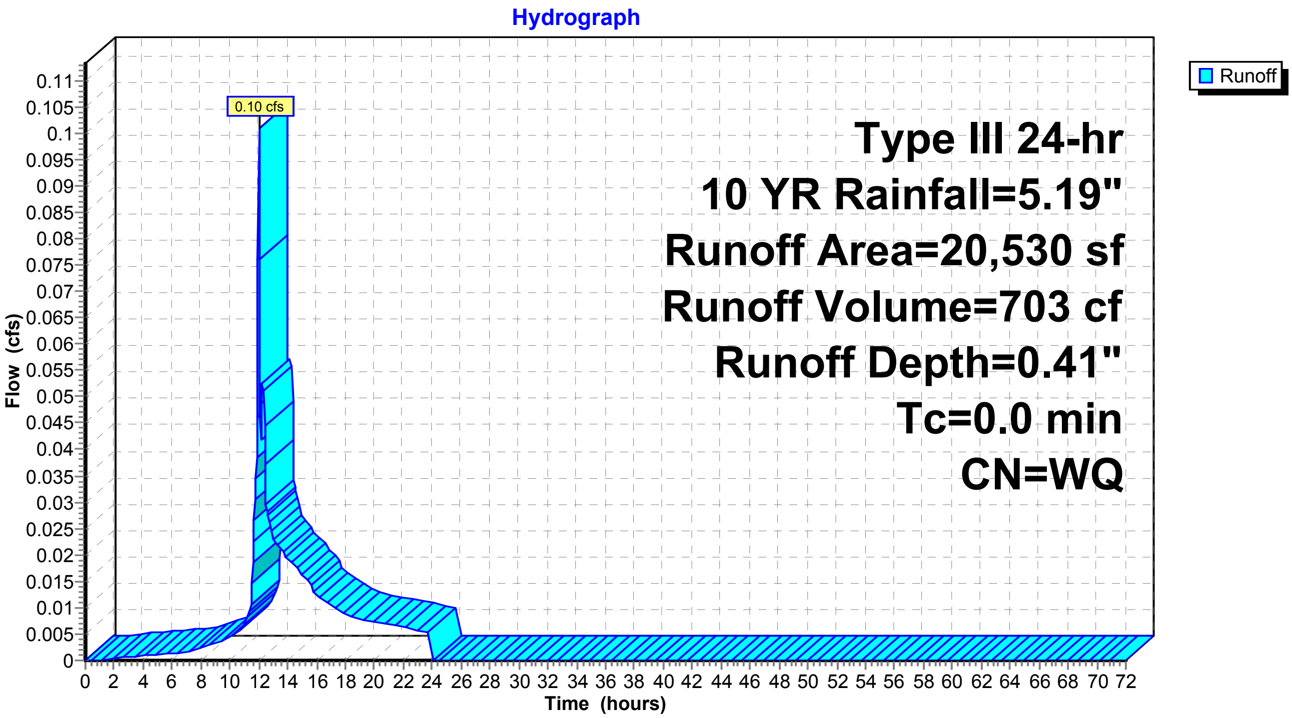
[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 0.10 cfs @ 12.00 hrs, Volume= 703 cf, Depth= 0.41"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 YR Rainfall=5.19"

Area (sf)	CN	Description
1,384	39	Pasture/grassland/range, Good, HSG A
18,118	39	Pasture/grassland/range, Good, HSG A
270	30	Woods, Good, HSG A
757	98	Paved parking, HSG A
20,530		Weighted Average
19,772		96.31% Pervious Area
757		3.69% Impervious Area

Subcatchment S2C: Subcat S2C



Summary for Pond 1P: Chambers

Inflow Area = 23,735 sf, 89.08% Impervious, Inflow Depth = 4.44" for 10 YR event
Inflow = 2.82 cfs @ 12.00 hrs, Volume= 8,779 cf
Outflow = 0.52 cfs @ 12.41 hrs, Volume= 8,779 cf, Atten= 82%, Lag= 24.4 min
Discarded = 0.12 cfs @ 12.41 hrs, Volume= 7,625 cf
Primary = 0.40 cfs @ 12.41 hrs, Volume= 1,154 cf

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 195.86' @ 12.41 hrs Surf.Area= 2,052 sf Storage= 3,328 cf

Plug-Flow detention time= 183.6 min calculated for 8,773 cf (100% of inflow)
Center-of-Mass det. time= 183.6 min (926.9 - 743.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	193.50'	1,838 cf	**25.25'W x 80.76'L x 3.50'H Field A** 7,137 cf Overall - 2,541 cf Embedded = 4,596 cf x 40.0% Voids
#2A	194.00'	2,541 cf	**ADS_StormTech SC-740** x 55 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap Row Length Adjustment= +0.44' x 6.45 sf x 5 rows
#3	193.50'	75 cf	**4.00'D x 6.00'H Vertical Cone/Cylinder**
		4,455 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	193.50'	**2.410 in/hr Exfiltration over Horizontal area** Conductivity to Groundwater Elevation = 0.00'
#2	Primary	197.00'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#3	Primary	195.50'	**8.0" Vert. Orifice/Grate** C= 0.600

Discarded OutFlow Max=0.12 cfs @ 12.41 hrs HW=195.86' (Free Discharge)
└─**1=Exfiltration** (Controls 0.12 cfs)

Primary OutFlow Max=0.40 cfs @ 12.41 hrs HW=195.86' (Free Discharge)
├─**2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)
└─**3=Orifice/Grate** (Orifice Controls 0.40 cfs @ 2.05 fps)

Pond 1P: Chambers - Chamber Wizard Field A

Chamber Model = ADS_StormTechSC-740 (ADS StormTech®SC-740)
Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
Row Length Adjustment= +0.44' x 6.45 sf x 5 rows

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

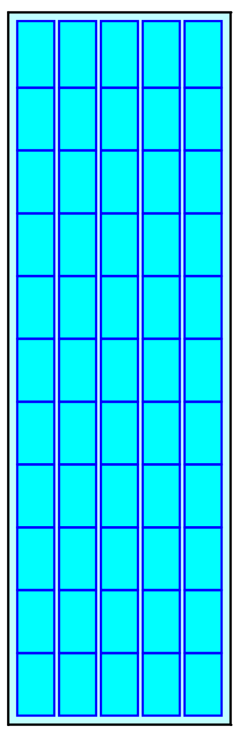
11 Chambers/Row x 7.12' Long +0.44' Row Adjustment = 78.76' Row Length +12.0" End Stone x 2 = 80.76' Base Length
5 Rows x 51.0" Wide + 6.0" Spacing x 4 + 12.0" Side Stone x 2 = 25.25' Base Width
6.0" Base + 30.0" Chamber Height + 6.0" Cover = 3.50' Field Height

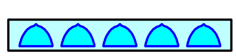
55 Chambers x 45.9 cf +0.44' Row Adjustment x 6.45 sf x 5 Rows = 2,540.8 cf Chamber Storage

7,137.0 cf Field - 2,540.8 cf Chambers = 4,596.2 cf Stone x 40.0% Voids = 1,838.5 cf Stone Storage

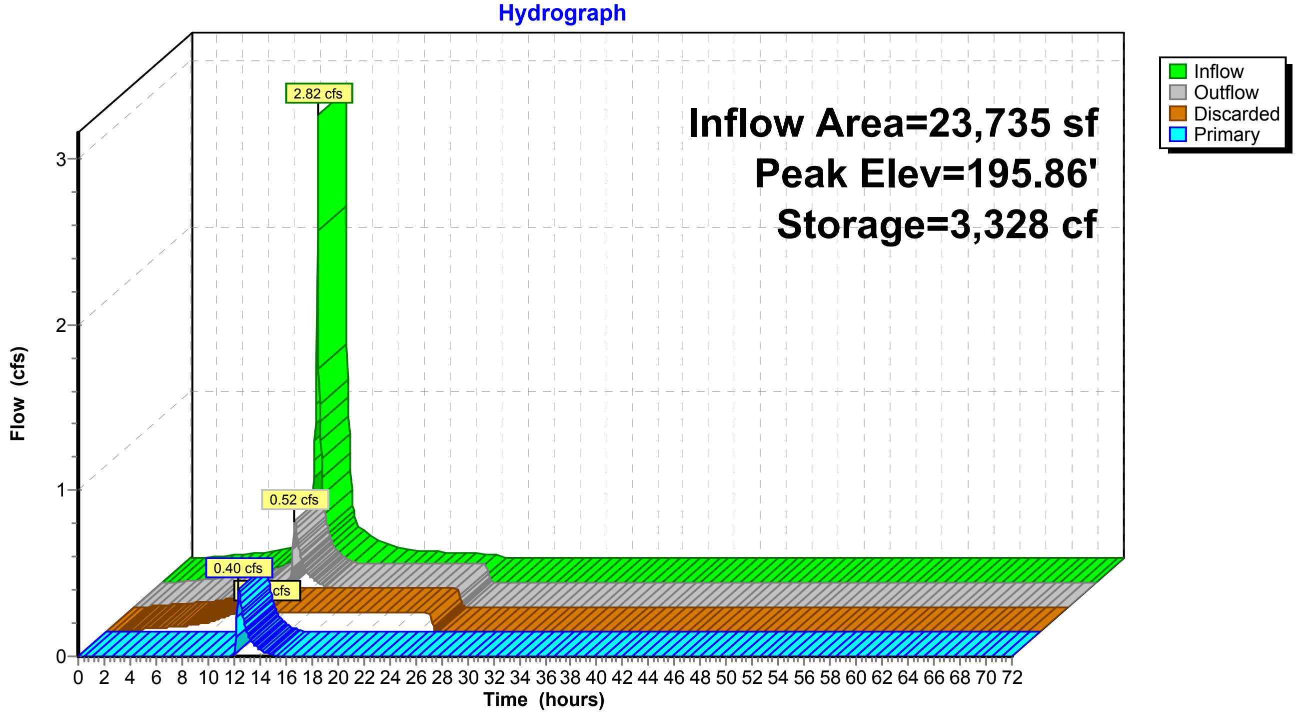
Chamber Storage + Stone Storage = 4,379.3 cf = 0.101 af
Overall Storage Efficiency = 61.4%

55 Chambers
264.3 cy Field
170.2 cy Stone





Pond 1P: Chambers



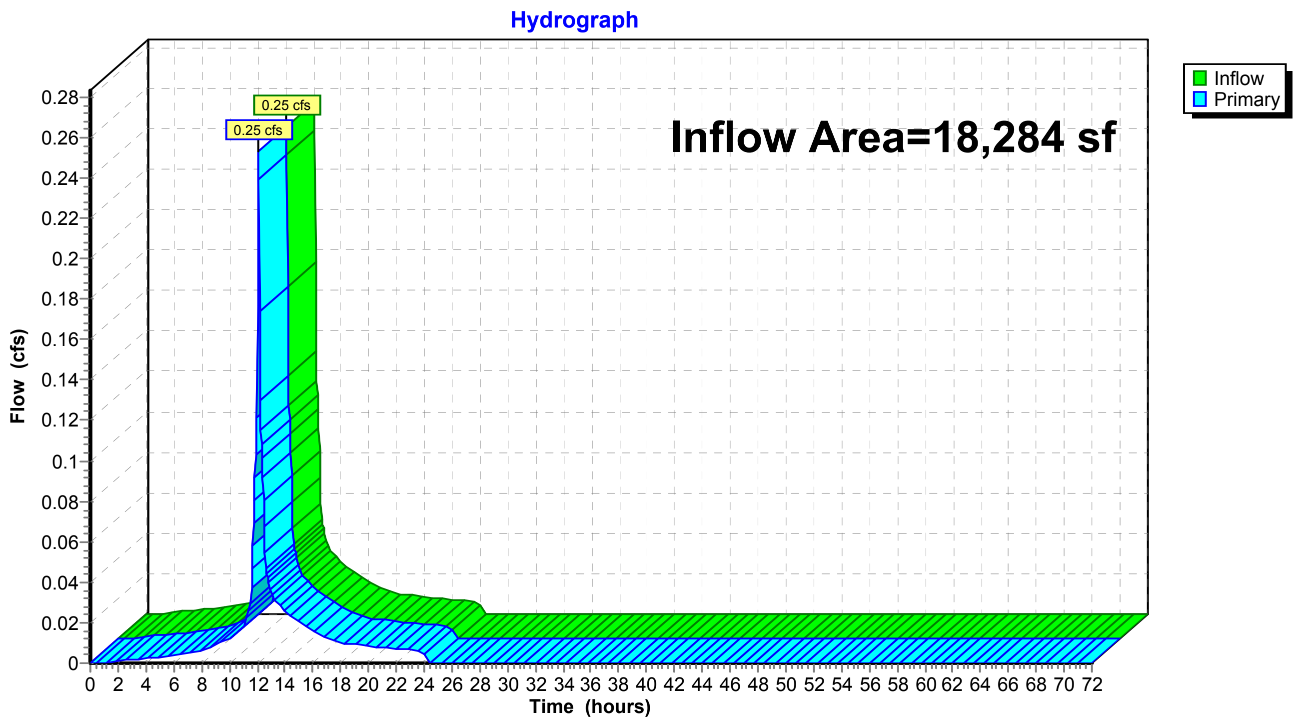
Summary for Pond P1: Analysis Pt 1

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

Inflow Area = 18,284 sf, 11.78% Impervious, Inflow Depth = 0.79" for 10 YR event
Inflow = 0.25 cfs @ 12.07 hrs, Volume= 1,211 cf
Primary = 0.25 cfs @ 12.07 hrs, Volume= 1,211 cf, Atten= 0%, Lag= 0.0 min

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

Pond P1: Analysis Pt 1

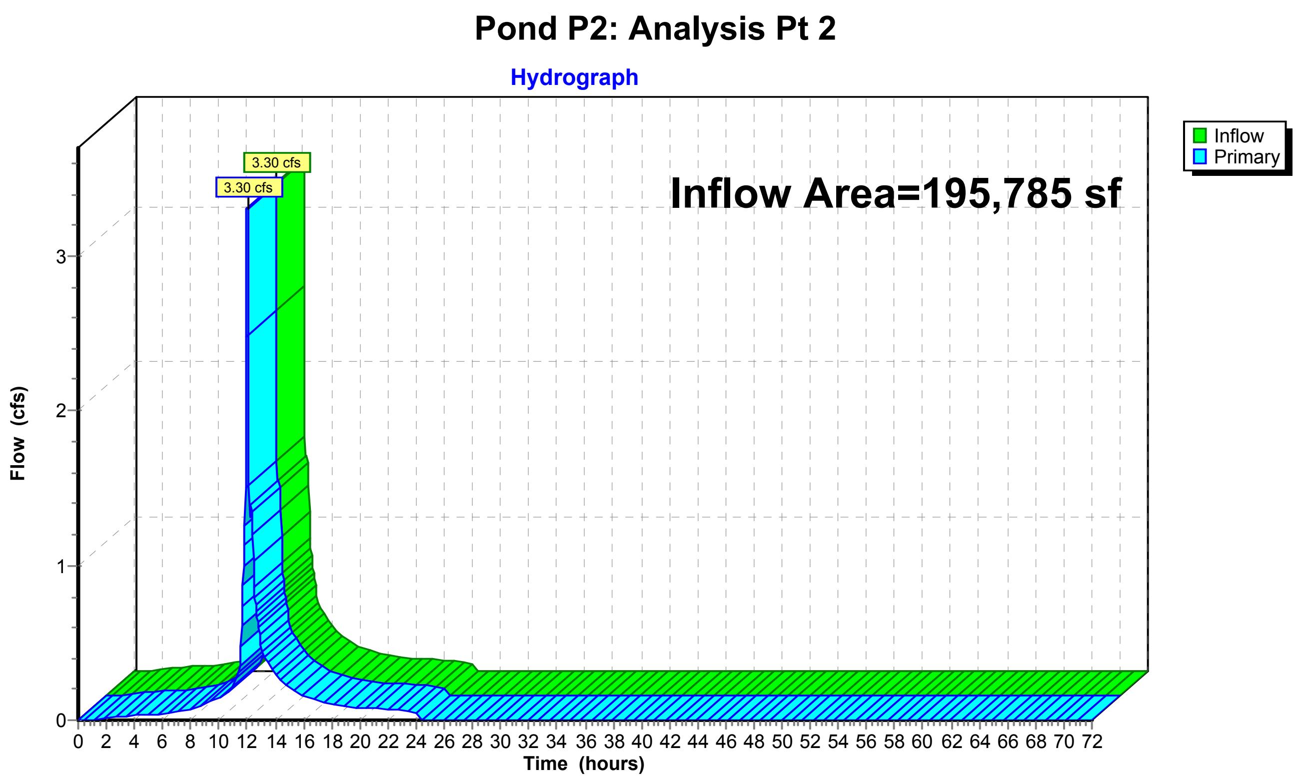


Summary for Pond P2: Analysis Pt 2

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

Inflow Area = 195,785 sf, 23.45% Impervious, Inflow Depth = 0.87" for 10 YR event
Inflow = 3.30 cfs @ 12.00 hrs, Volume= 14,173 cf
Primary = 3.30 cfs @ 12.00 hrs, Volume= 14,173 cf, Atten= 0%, Lag= 0.0 min

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



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

SubcatchmentS1: Subcat S1 Runoff Area=18,284 sf 11.78% Impervious Runoff Depth=1.21"
Tc=5.0 min CN=WQ Runoff=0.35 cfs 1,841 cf

SubcatchmentS2A: Subcat S2A Runoff Area=151,520 sf 15.85% Impervious Runoff Depth=1.41"
Tc=0.0 min CN=WQ Runoff=4.15 cfs 17,848 cf

SubcatchmentS2B: Subcat S2B Runoff Area=23,735 sf 89.08% Impervious Runoff Depth=5.51"
Tc=0.0 min CN=WQ Runoff=3.47 cfs 10,906 cf

SubcatchmentS2C: Subcat S2C Runoff Area=20,530 sf 3.69% Impervious Runoff Depth=0.75"
Tc=0.0 min CN=WQ Runoff=0.20 cfs 1,288 cf

Pond 1P: Chambers Peak Elev=196.15' Storage=3,675 cf Inflow=3.47 cfs 10,906 cf
Discarded=0.12 cfs 8,296 cf Primary=0.95 cfs 2,609 cf Outflow=1.06 cfs 10,906 cf

Pond P1: Analysis Pt 1 Inflow=0.35 cfs 1,841 cf
Primary=0.35 cfs 1,841 cf

Pond P2: Analysis Pt 2 Inflow=4.37 cfs 21,746 cf
Primary=4.37 cfs 21,746 cf

Total Runoff Area = 214,069 sf Runoff Volume = 31,883 cf Average Runoff Depth = 1.79"
77.55% Pervious = 166,001 sf 22.45% Impervious = 48,068 sf

Summary for Subcatchment S1: Subcat S1

[49] Hint: Tc<2dt may require smaller dt

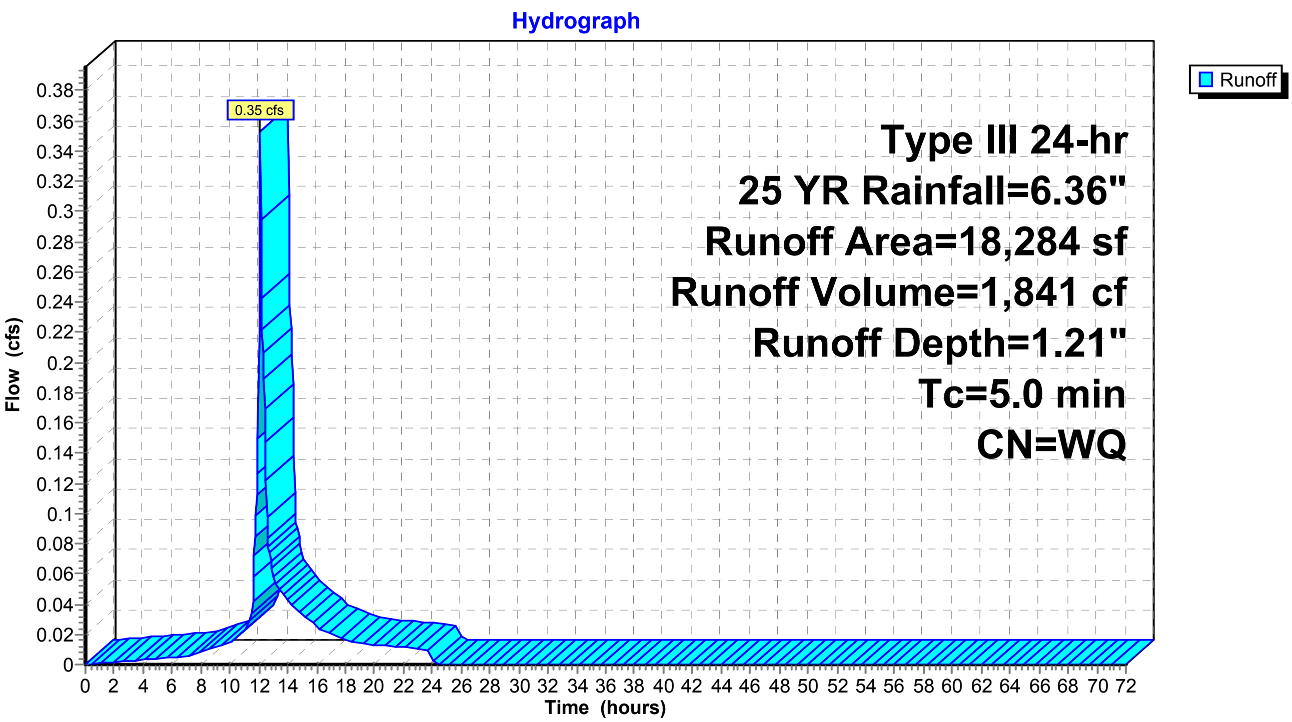
Runoff = 0.35 cfs @ 12.09 hrs, Volume= 1,841 cf, Depth= 1.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 YR Rainfall=6.36"

Area (sf)	CN	Description
13,672	39	Pasture/grassland/range, Good, HSG A
2,410	39	Pasture/grassland/range, Good, HSG A
48	30	Woods, Good, HSG A
2,154	98	Paved parking, HSG A
18,284		Weighted Average
16,130		88.22% Pervious Area
2,154		11.78% Impervious Area

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

Subcatchment S1: Subcat S1



Summary for Subcatchment S2A: Subcat S2A

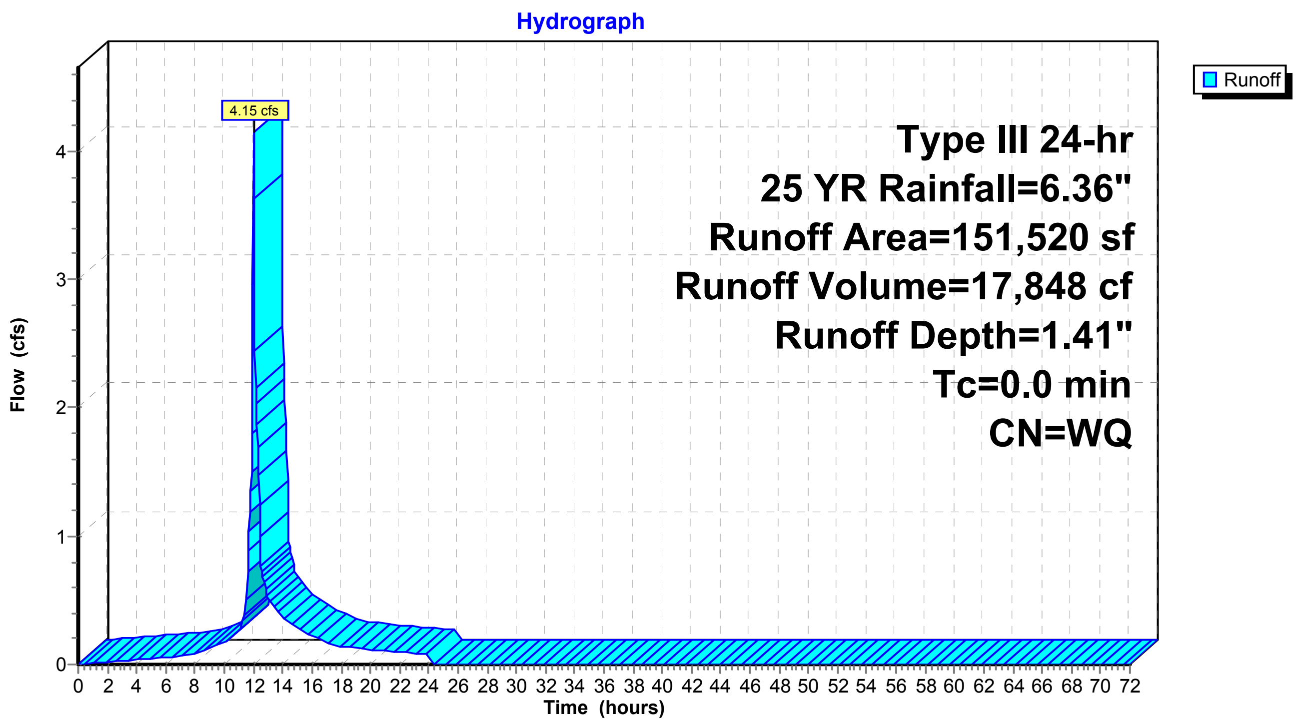
[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 4.15 cfs @ 12.01 hrs, Volume= 17,848 cf, Depth= 1.41"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 YR Rainfall=6.36"

Area (sf)	CN	Description
12,933	39	Pasture/grassland/range, Good, HSG A
8,306	39	Pasture/grassland/range, Good, HSG A
76,277	39	Pasture/grassland/range, Good, HSG A
9	39	Pasture/grassland/range, Good, HSG A
22,045	39	Pasture/grassland/range, Good, HSG A
149	30	Woods, Good, HSG A
360	30	Woods, Good, HSG A
7,184	30	Woods, Good, HSG A
24,012	98	Paved parking, HSG A
246	39	Pasture/grassland/range, Good, HSG A
151,520		Weighted Average
127,508		84.15% Pervious Area
24,012		15.85% Impervious Area

Subcatchment S2A: Subcat S2A



Summary for Subcatchment S2B: Subcat S2B

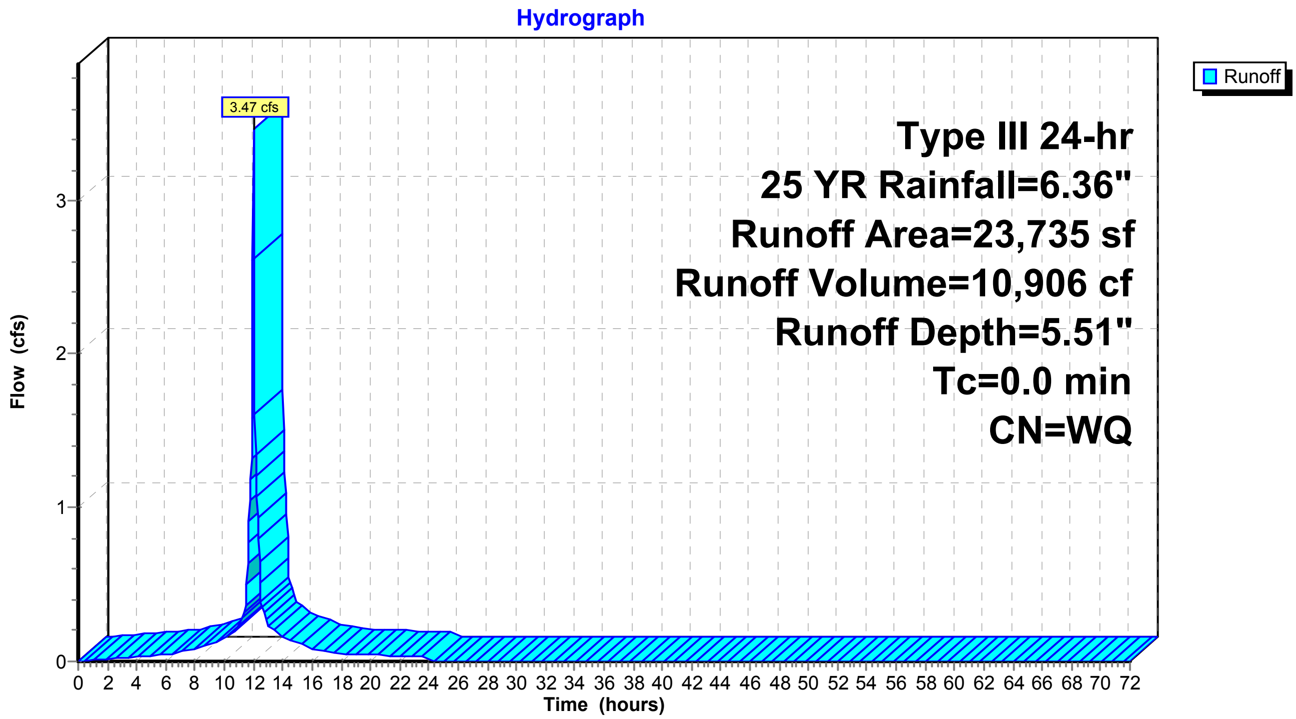
[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 3.47 cfs @ 12.00 hrs, Volume= 10,906 cf, Depth= 5.51"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 YR Rainfall=6.36"

Area (sf)	CN	Description
21,144	98	Paved parking, HSG A
266	39	Pasture/grassland/range, Good, HSG A
40	39	Pasture/grassland/range, Good, HSG A
266	39	Pasture/grassland/range, Good, HSG A
0	39	Pasture/grassland/range, Good, HSG A
2,018	39	Pasture/grassland/range, Good, HSG A
23,735		Weighted Average
2,591		10.92% Pervious Area
21,144		89.08% Impervious Area

Subcatchment S2B: Subcat S2B



Summary for Subcatchment S2C: Subcat S2C

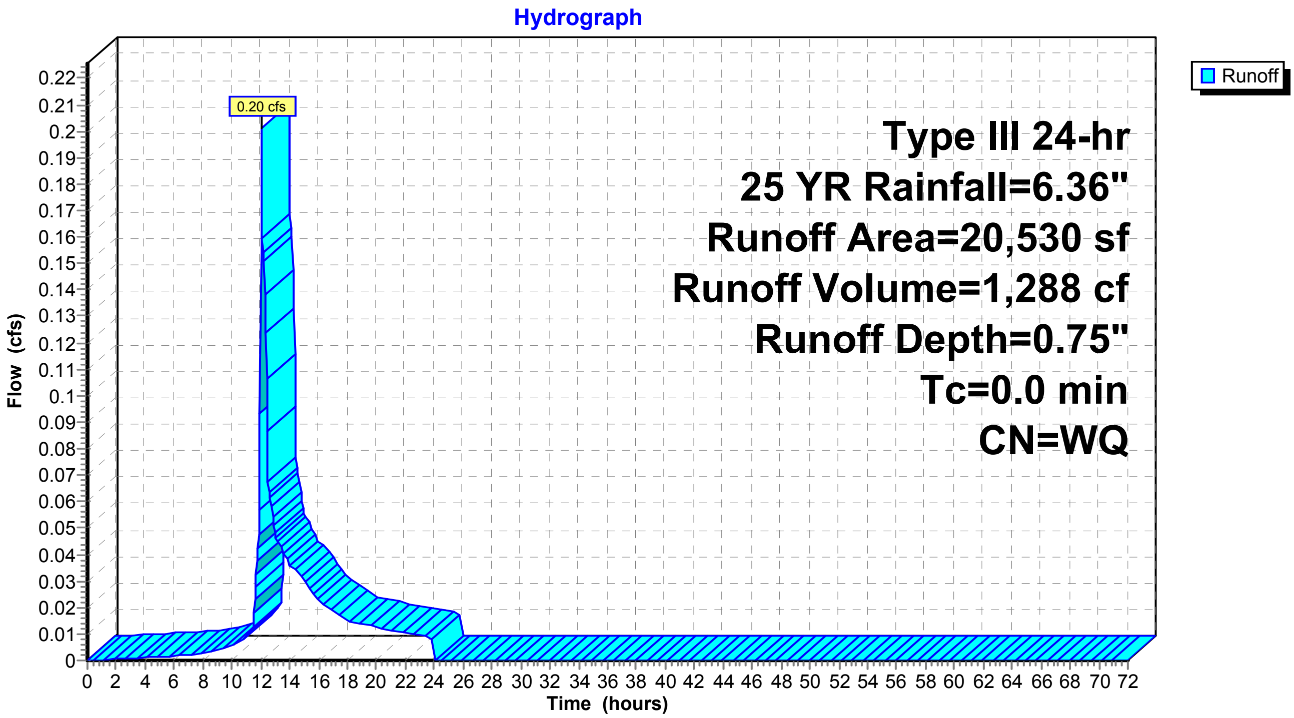
[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 0.20 cfs @ 12.05 hrs, Volume= 1,288 cf, Depth= 0.75"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 YR Rainfall=6.36"

Area (sf)	CN	Description
1,384	39	Pasture/grassland/range, Good, HSG A
18,118	39	Pasture/grassland/range, Good, HSG A
270	30	Woods, Good, HSG A
757	98	Paved parking, HSG A
20,530		Weighted Average
19,772		96.31% Pervious Area
757		3.69% Impervious Area

Subcatchment S2C: Subcat S2C



Summary for Pond 1P: Chambers

Inflow Area = 23,735 sf, 89.08% Impervious, Inflow Depth = 5.51" for 25 YR event
Inflow = 3.47 cfs @ 12.00 hrs, Volume= 10,906 cf
Outflow = 1.06 cfs @ 12.25 hrs, Volume= 10,906 cf, Atten= 69%, Lag= 15.3 min
Discarded = 0.12 cfs @ 12.25 hrs, Volume= 8,296 cf
Primary = 0.95 cfs @ 12.25 hrs, Volume= 2,609 cf

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 196.15' @ 12.25 hrs Surf.Area= 2,052 sf Storage= 3,675 cf

Plug-Flow detention time= 166.8 min calculated for 10,898 cf (100% of inflow)
Center-of-Mass det. time= 166.8 min (907.7 - 741.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	193.50'	1,838 cf	**25.25'W x 80.76'L x 3.50'H Field A** 7,137 cf Overall - 2,541 cf Embedded = 4,596 cf x 40.0% Voids
#2A	194.00'	2,541 cf	**ADS_StormTech SC-740** x 55 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap Row Length Adjustment= +0.44' x 6.45 sf x 5 rows
#3	193.50'	75 cf	**4.00'D x 6.00'H Vertical Cone/Cylinder**
		4,455 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	193.50'	**2.410 in/hr Exfiltration over Horizontal area** Conductivity to Groundwater Elevation = 0.00'
#2	Primary	197.00'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#3	Primary	195.50'	**8.0" Vert. Orifice/Grate** C= 0.600

Discarded OutFlow Max=0.12 cfs @ 12.25 hrs HW=196.15' (Free Discharge)
└─**1=Exfiltration** (Controls 0.12 cfs)

Primary OutFlow Max=0.95 cfs @ 12.25 hrs HW=196.15' (Free Discharge)
├─**2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)
└─**3=Orifice/Grate** (Orifice Controls 0.95 cfs @ 2.74 fps)

Pond 1P: Chambers - Chamber Wizard Field A

Chamber Model = ADS_StormTechSC-740 (ADS StormTech®SC-740)
Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
Row Length Adjustment= +0.44' x 6.45 sf x 5 rows

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

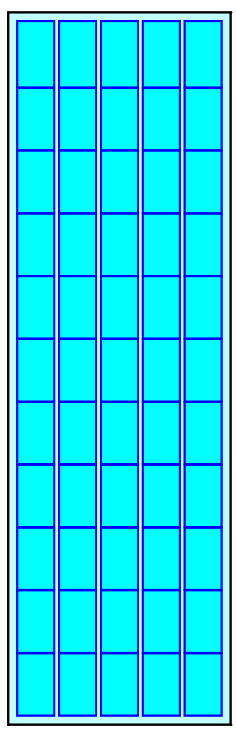
11 Chambers/Row x 7.12' Long +0.44' Row Adjustment = 78.76' Row Length +12.0" End Stone x 2 = 80.76' Base Length
5 Rows x 51.0" Wide + 6.0" Spacing x 4 + 12.0" Side Stone x 2 = 25.25' Base Width
6.0" Base + 30.0" Chamber Height + 6.0" Cover = 3.50' Field Height

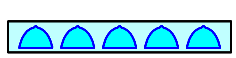
55 Chambers x 45.9 cf +0.44' Row Adjustment x 6.45 sf x 5 Rows = 2,540.8 cf Chamber Storage

7,137.0 cf Field - 2,540.8 cf Chambers = 4,596.2 cf Stone x 40.0% Voids = 1,838.5 cf Stone Storage

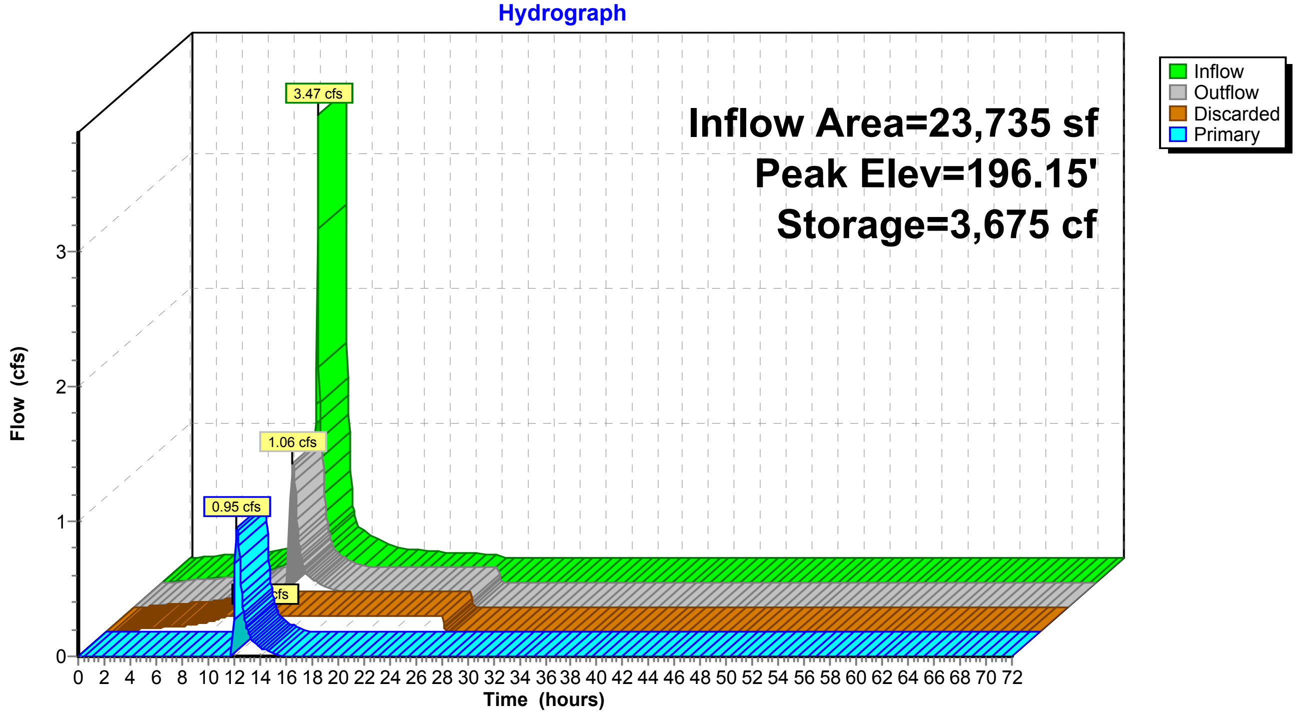
Chamber Storage + Stone Storage = 4,379.3 cf = 0.101 af
Overall Storage Efficiency = 61.4%

55 Chambers
264.3 cy Field
170.2 cy Stone





Pond 1P: Chambers



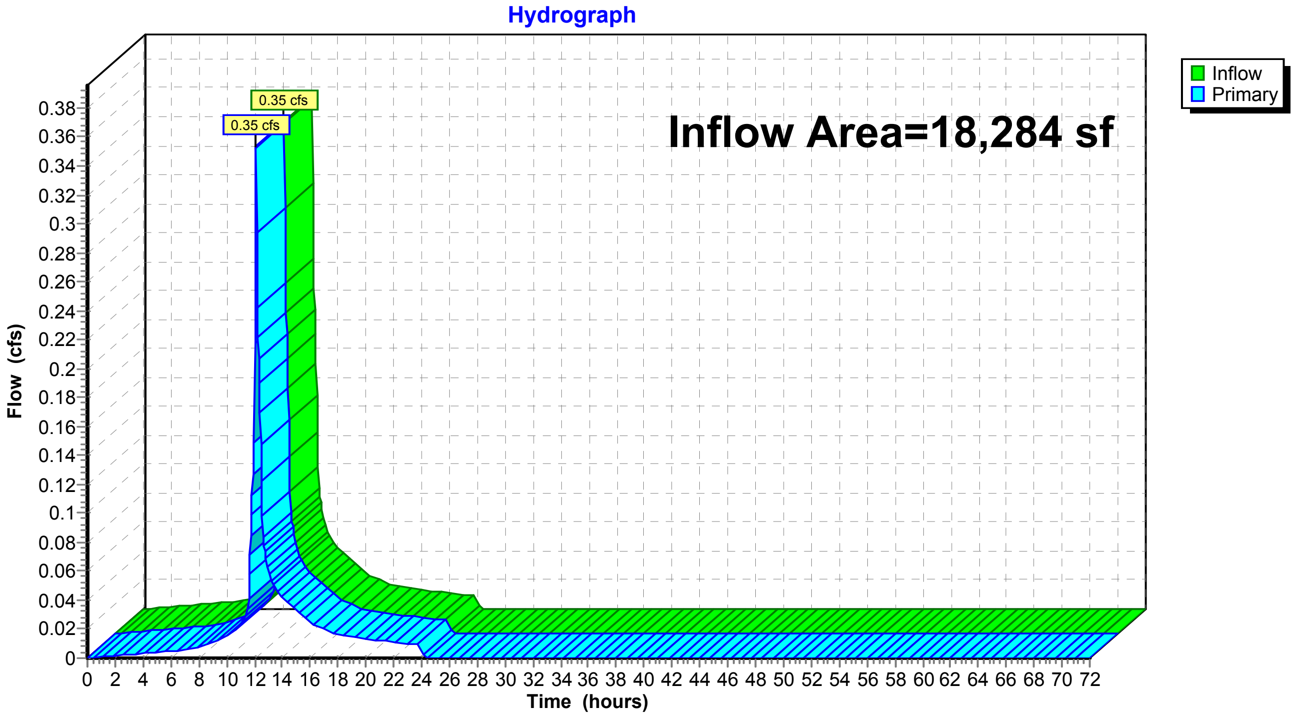
Summary for Pond P1: Analysis Pt 1

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

Inflow Area = 18,284 sf, 11.78% Impervious, Inflow Depth = 1.21" for 25 YR event
Inflow = 0.35 cfs @ 12.09 hrs, Volume= 1,841 cf
Primary = 0.35 cfs @ 12.09 hrs, Volume= 1,841 cf, Atten= 0%, Lag= 0.0 min

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

Pond P1: Analysis Pt 1



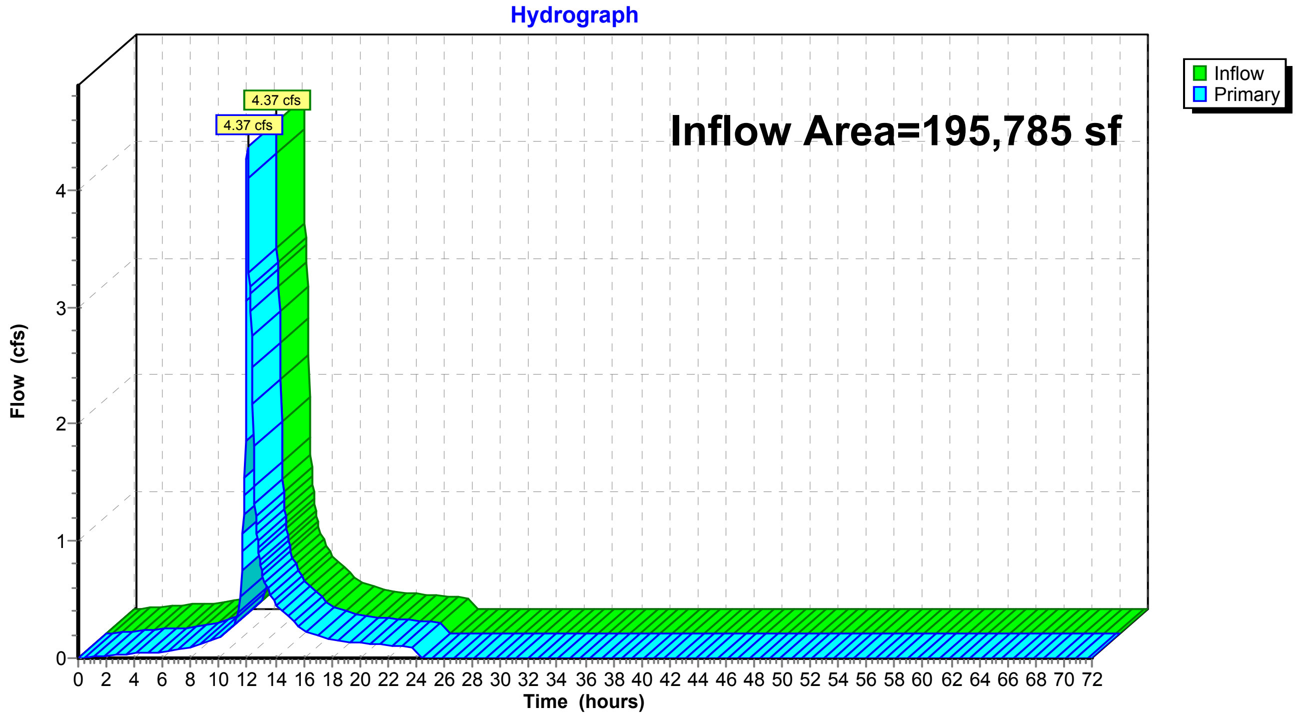
Summary for Pond P2: Analysis Pt 2

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

Inflow Area =	195,785 sf, 23.45% Impervious,	Inflow Depth = 1.33"	for 25 YR event
Inflow =	4.37 cfs @ 12.02 hrs, Volume=	21,746 cf	
Primary =	4.37 cfs @ 12.02 hrs, Volume=	21,746 cf, Atten= 0%, Lag= 0.0 min	

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

Pond P2: Analysis Pt 2



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

SubcatchmentS1: Subcat S1 Runoff Area=18,284 sf 11.78% Impervious Runoff Depth=2.02"
Tc=5.0 min CN=WQ Runoff=0.75 cfs 3,072 cf

SubcatchmentS2A: Subcat S2A Runoff Area=151,520 sf 15.85% Impervious Runoff Depth=2.25"
Tc=0.0 min CN=WQ Runoff=7.97 cfs 28,433 cf

SubcatchmentS2B: Subcat S2B Runoff Area=23,735 sf 89.08% Impervious Runoff Depth=7.20"
Tc=0.0 min CN=WQ Runoff=4.52 cfs 14,238 cf

SubcatchmentS2C: Subcat S2C Runoff Area=20,530 sf 3.69% Impervious Runoff Depth=1.47"
Tc=0.0 min CN=WQ Runoff=0.65 cfs 2,508 cf

Pond 1P: Chambers Peak Elev=196.98' Storage=4,404 cf Inflow=4.52 cfs 14,238 cf
Discarded=0.12 cfs 9,161 cf Primary=1.80 cfs 5,077 cf Outflow=1.91 cfs 14,238 cf

Pond P1: Analysis Pt 1 Inflow=0.75 cfs 3,072 cf
Primary=0.75 cfs 3,072 cf

Pond P2: Analysis Pt 2 Inflow=9.89 cfs 36,018 cf
Primary=9.89 cfs 36,018 cf

Total Runoff Area = 214,069 sf Runoff Volume = 48,252 cf Average Runoff Depth = 2.70"
77.55% Pervious = 166,001 sf 22.45% Impervious = 48,068 sf

Summary for Subcatchment S1: Subcat S1

[49] Hint: Tc<2dt may require smaller dt

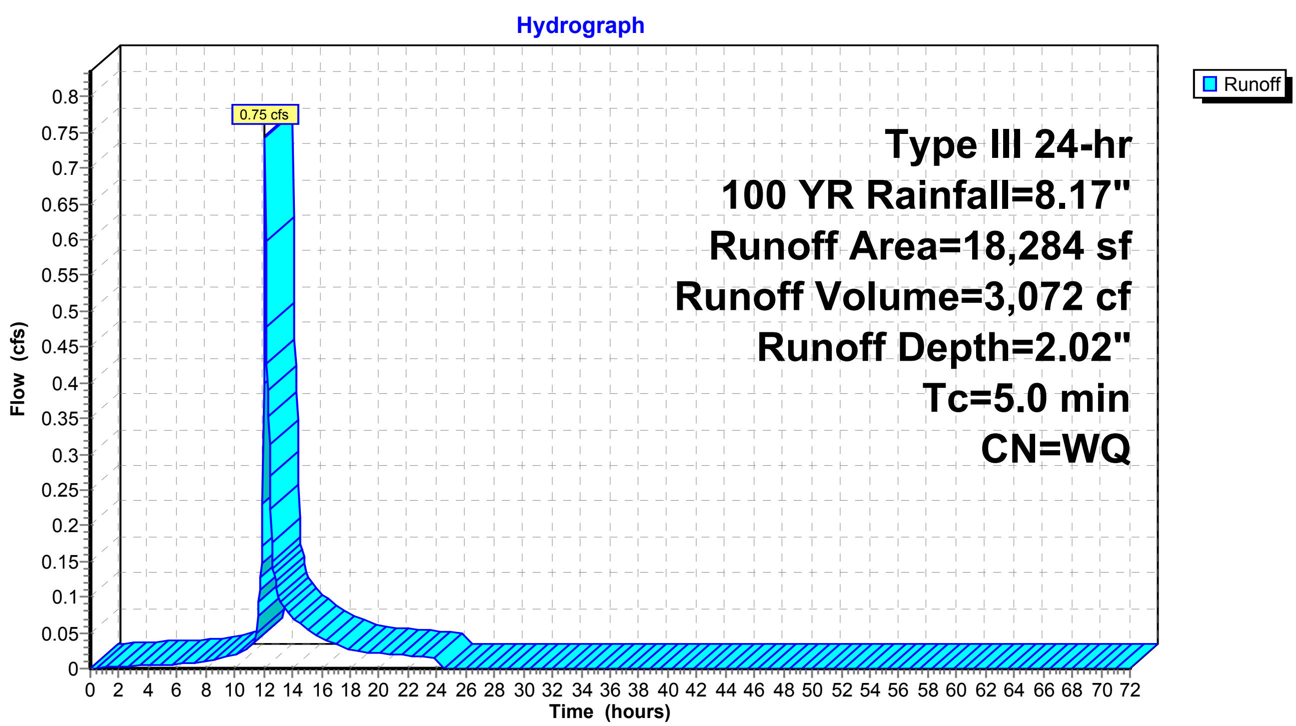
Runoff = 0.75 cfs @ 12.09 hrs, Volume= 3,072 cf, Depth= 2.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 YR Rainfall=8.17"

Area (sf)	CN	Description
13,672	39	Pasture/grassland/range, Good, HSG A
2,410	39	Pasture/grassland/range, Good, HSG A
48	30	Woods, Good, HSG A
2,154	98	Paved parking, HSG A
18,284		Weighted Average
16,130		88.22% Pervious Area
2,154		11.78% Impervious Area

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

Subcatchment S1: Subcat S1



Summary for Subcatchment S2A: Subcat S2A

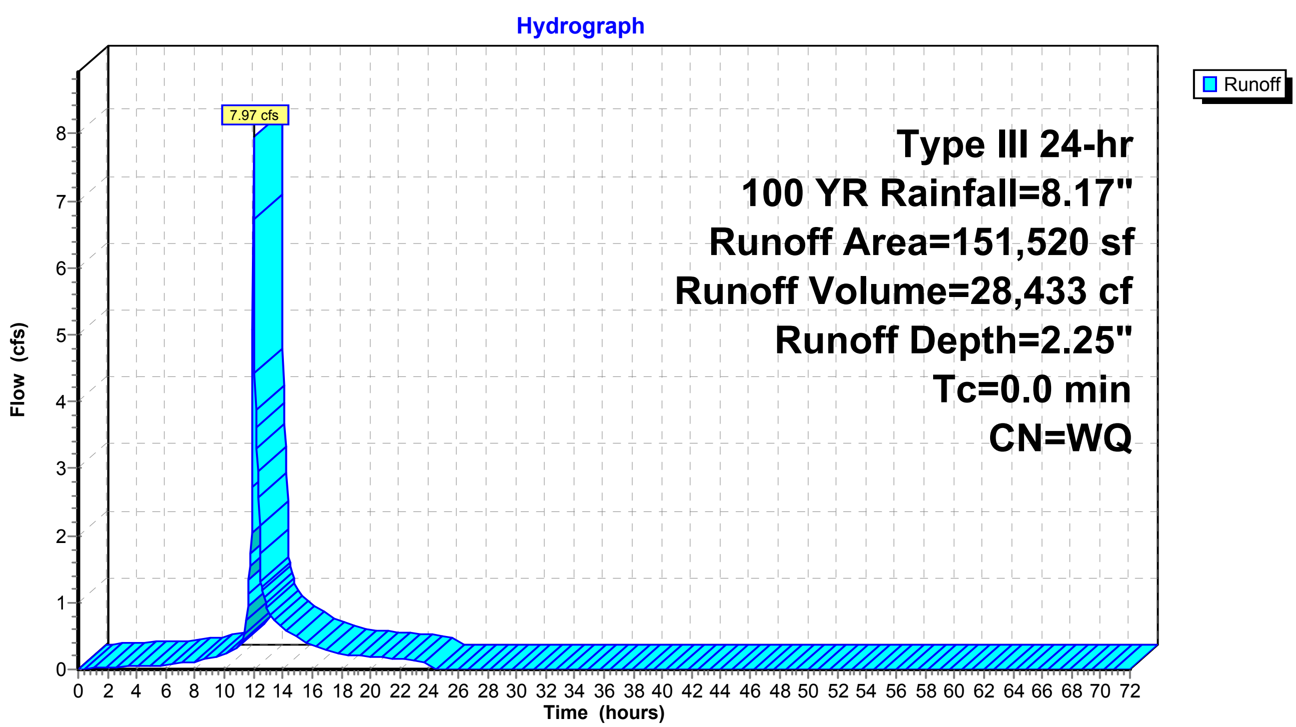
[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 7.97 cfs @ 12.01 hrs, Volume= 28,433 cf, Depth= 2.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 YR Rainfall=8.17"

Area (sf)	CN	Description
12,933	39	Pasture/grassland/range, Good, HSG A
8,306	39	Pasture/grassland/range, Good, HSG A
76,277	39	Pasture/grassland/range, Good, HSG A
9	39	Pasture/grassland/range, Good, HSG A
22,045	39	Pasture/grassland/range, Good, HSG A
149	30	Woods, Good, HSG A
360	30	Woods, Good, HSG A
7,184	30	Woods, Good, HSG A
24,012	98	Paved parking, HSG A
246	39	Pasture/grassland/range, Good, HSG A
151,520		Weighted Average
127,508		84.15% Pervious Area
24,012		15.85% Impervious Area

Subcatchment S2A: Subcat S2A



Summary for Subcatchment S2B: Subcat S2B

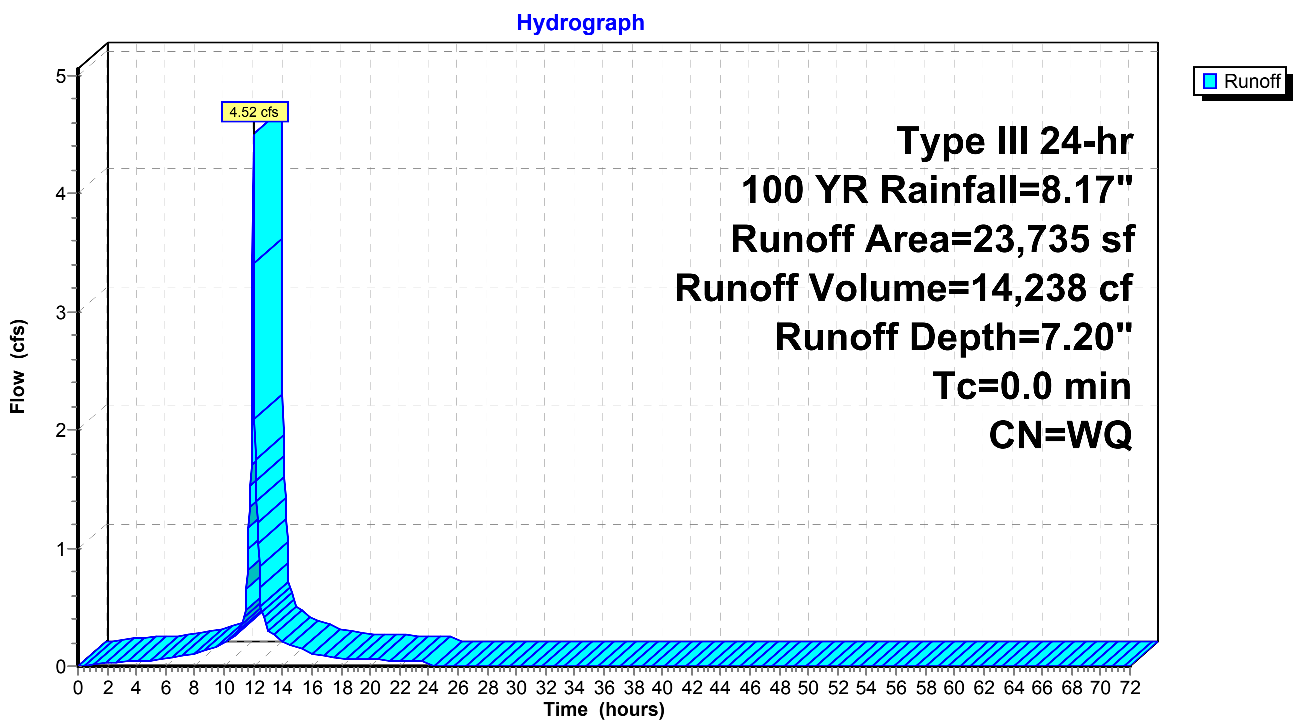
[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 4.52 cfs @ 12.00 hrs, Volume= 14,238 cf, Depth= 7.20"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 YR Rainfall=8.17"

Area (sf)	CN	Description
21,144	98	Paved parking, HSG A
266	39	Pasture/grassland/range, Good, HSG A
40	39	Pasture/grassland/range, Good, HSG A
266	39	Pasture/grassland/range, Good, HSG A
0	39	Pasture/grassland/range, Good, HSG A
2,018	39	Pasture/grassland/range, Good, HSG A
23,735		Weighted Average
2,591		10.92% Pervious Area
21,144		89.08% Impervious Area

Subcatchment S2B: Subcat S2B



Summary for Subcatchment S2C: Subcat S2C

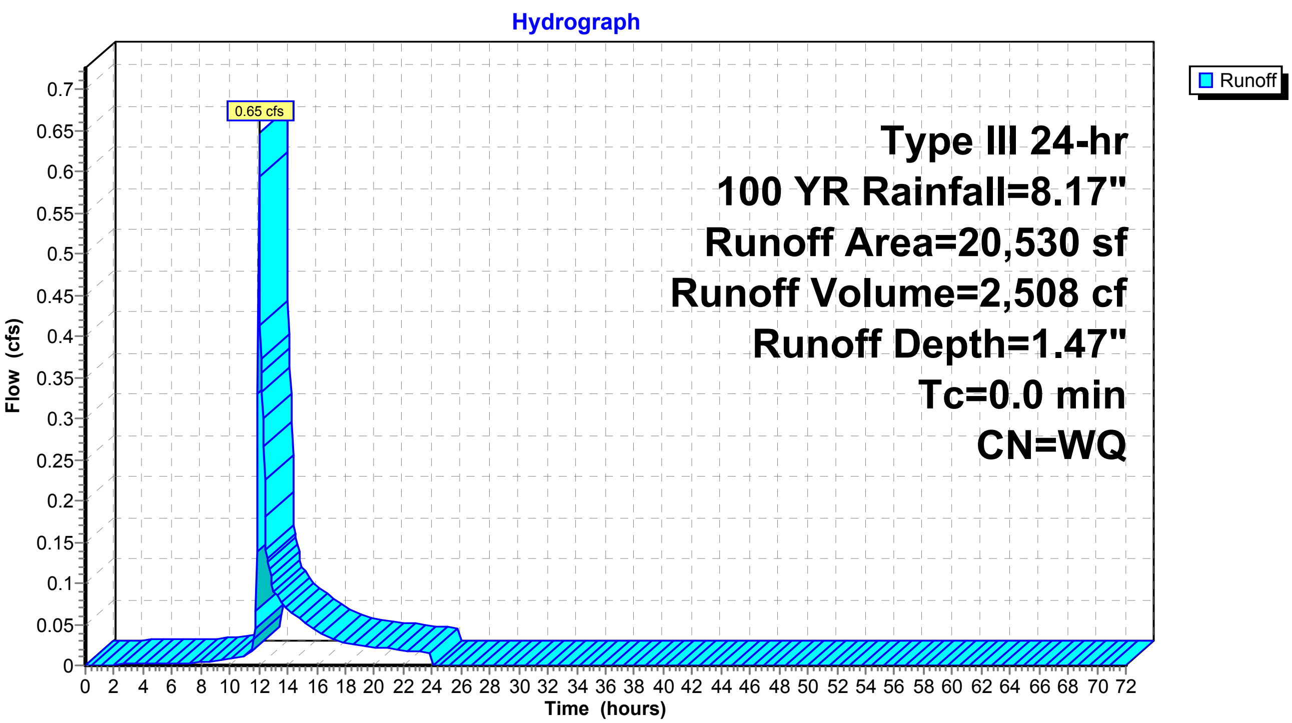
[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 0.65 cfs @ 12.02 hrs, Volume= 2,508 cf, Depth= 1.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 YR Rainfall=8.17"

Area (sf)	CN	Description
1,384	39	Pasture/grassland/range, Good, HSG A
18,118	39	Pasture/grassland/range, Good, HSG A
270	30	Woods, Good, HSG A
757	98	Paved parking, HSG A
20,530		Weighted Average
19,772		96.31% Pervious Area
757		3.69% Impervious Area

Subcatchment S2C: Subcat S2C



Summary for Pond 1P: Chambers

Inflow Area =	23,735 sf,	89.08% Impervious,	Inflow Depth = 7.20"	for 100 YR event	
Inflow =	4.52 cfs @	12.00 hrs,	Volume=	14,238 cf	
Outflow =	1.91 cfs @	12.13 hrs,	Volume=	14,238 cf,	Atten= 58%, Lag= 7.6 min
Discarded =	0.12 cfs @	12.13 hrs,	Volume=	9,161 cf	
Primary =	1.80 cfs @	12.13 hrs,	Volume=	5,077 cf	

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 196.98' @ 12.13 hrs Surf.Area= 2,052 sf Storage= 4,404 cf

Plug-Flow detention time= 149.0 min calculated for 14,229 cf (100% of inflow)
Center-of-Mass det. time= 149.1 min (887.6 - 738.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	193.50'	1,838 cf	**25.25'W x 80.76'L x 3.50'H Field A**
			7,137 cf Overall - 2,541 cf Embedded = 4,596 cf x 40.0% Voids
#2A	194.00'	2,541 cf	**ADS_StormTech SC-740** x 55 Inside #1
			Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
			Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
			Row Length Adjustment= +0.44' x 6.45 sf x 5 rows
#3	193.50'	75 cf	**4.00'D x 6.00'H Vertical Cone/Cylinder**
		4,455 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	193.50'	**2.410 in/hr Exfiltration over Horizontal area**
			Conductivity to Groundwater Elevation = 0.00'
#2	Primary	197.00'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#3	Primary	195.50'	**8.0" Vert. Orifice/Grate** C= 0.600

Discarded OutFlow Max=0.12 cfs @ 12.13 hrs HW=196.97' (Free Discharge)
└─**1=Exfiltration** (Controls 0.12 cfs)

Primary OutFlow Max=1.79 cfs @ 12.13 hrs HW=196.97' (Free Discharge)
├─**2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)
└─**3=Orifice/Grate** (Orifice Controls 1.79 cfs @ 5.13 fps)

Pond 1P: Chambers - Chamber Wizard Field A

Chamber Model = ADS_StormTechSC-740 (ADS StormTech®SC-740)
Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
Row Length Adjustment= +0.44' x 6.45 sf x 5 rows

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

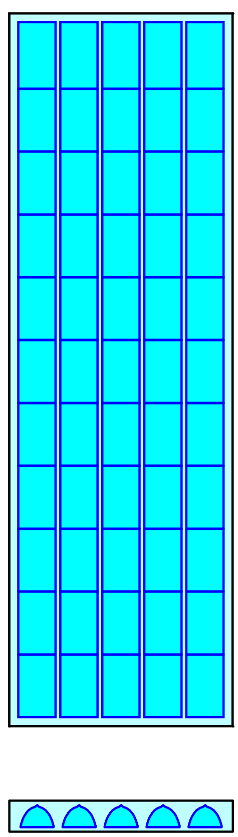
11 Chambers/Row x 7.12' Long +0.44' Row Adjustment = 78.76' Row Length +12.0" End Stone x 2 = 80.76' Base Length
5 Rows x 51.0" Wide + 6.0" Spacing x 4 + 12.0" Side Stone x 2 = 25.25' Base Width
6.0" Base + 30.0" Chamber Height + 6.0" Cover = 3.50' Field Height

55 Chambers x 45.9 cf +0.44' Row Adjustment x 6.45 sf x 5 Rows = 2,540.8 cf Chamber Storage

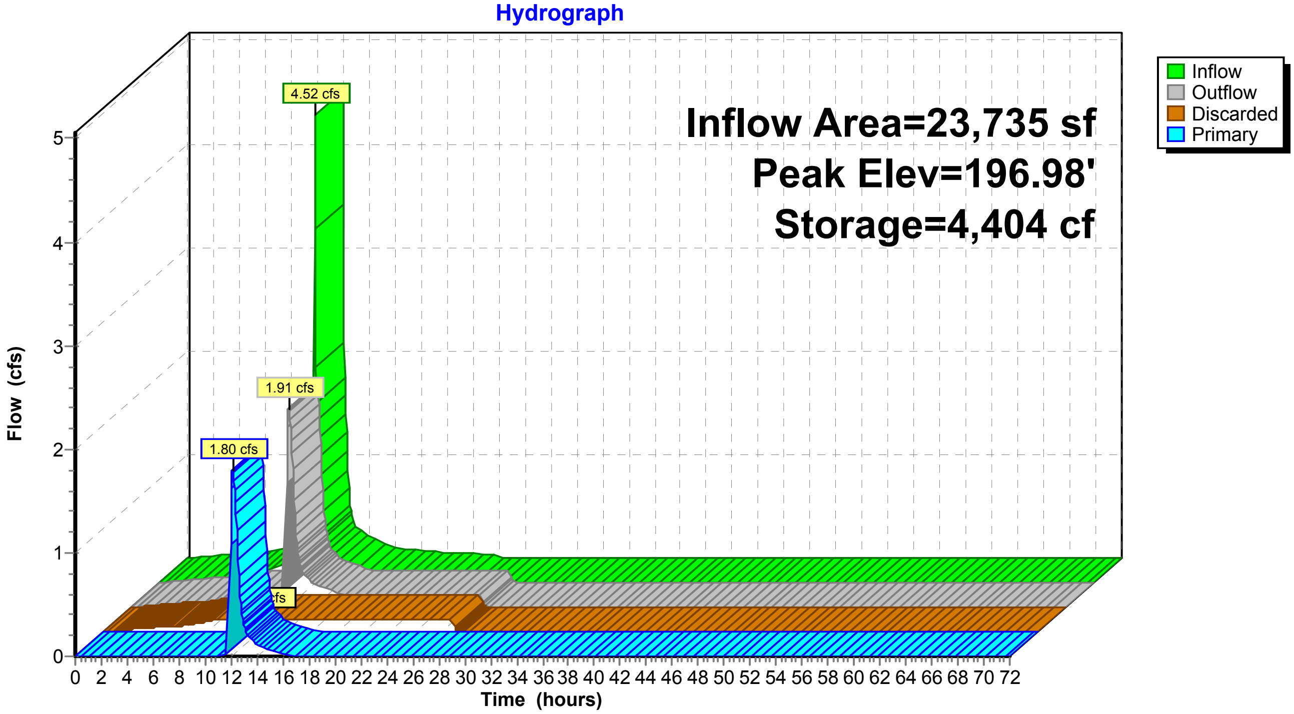
7,137.0 cf Field - 2,540.8 cf Chambers = 4,596.2 cf Stone x 40.0% Voids = 1,838.5 cf Stone Storage

Chamber Storage + Stone Storage = 4,379.3 cf = 0.101 af
Overall Storage Efficiency = 61.4%

55 Chambers
264.3 cy Field
170.2 cy Stone



Pond 1P: Chambers



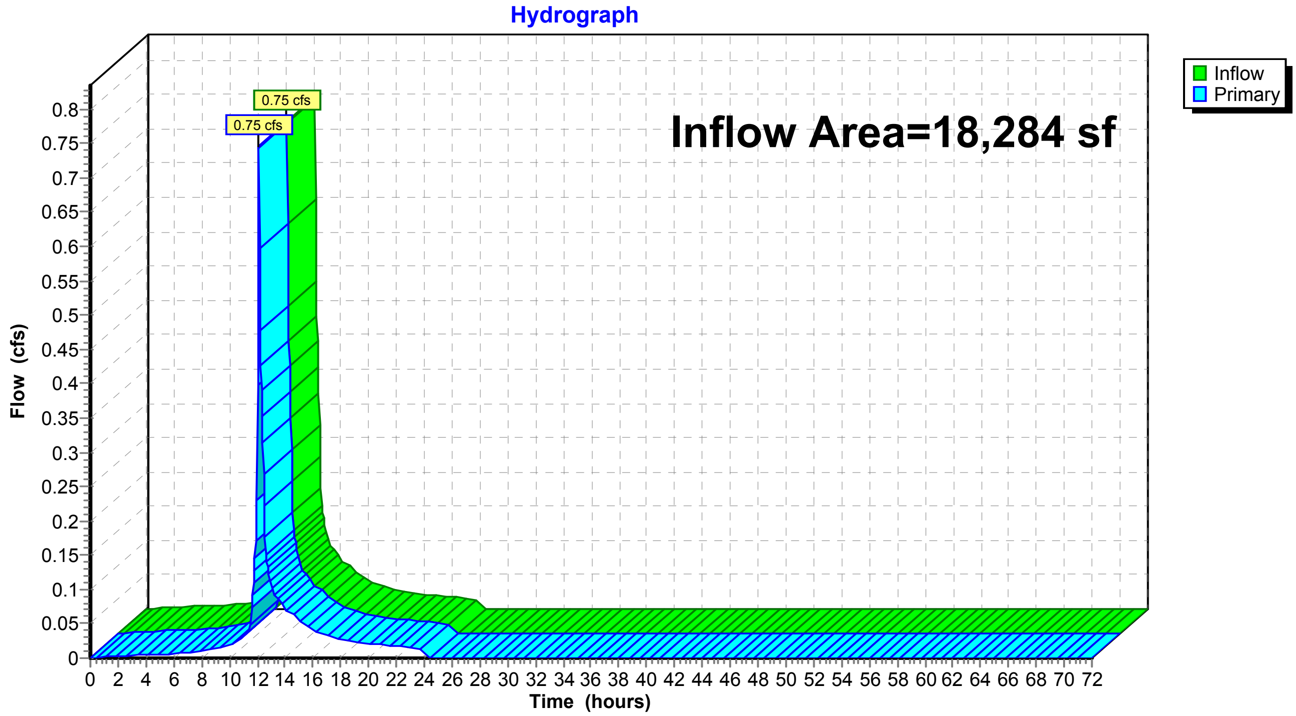
Summary for Pond P1: Analysis Pt 1

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

Inflow Area = 18,284 sf, 11.78% Impervious, Inflow Depth = 2.02" for 100 YR event
Inflow = 0.75 cfs @ 12.09 hrs, Volume= 3,072 cf
Primary = 0.75 cfs @ 12.09 hrs, Volume= 3,072 cf, Atten= 0%, Lag= 0.0 min

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

Pond P1: Analysis Pt 1



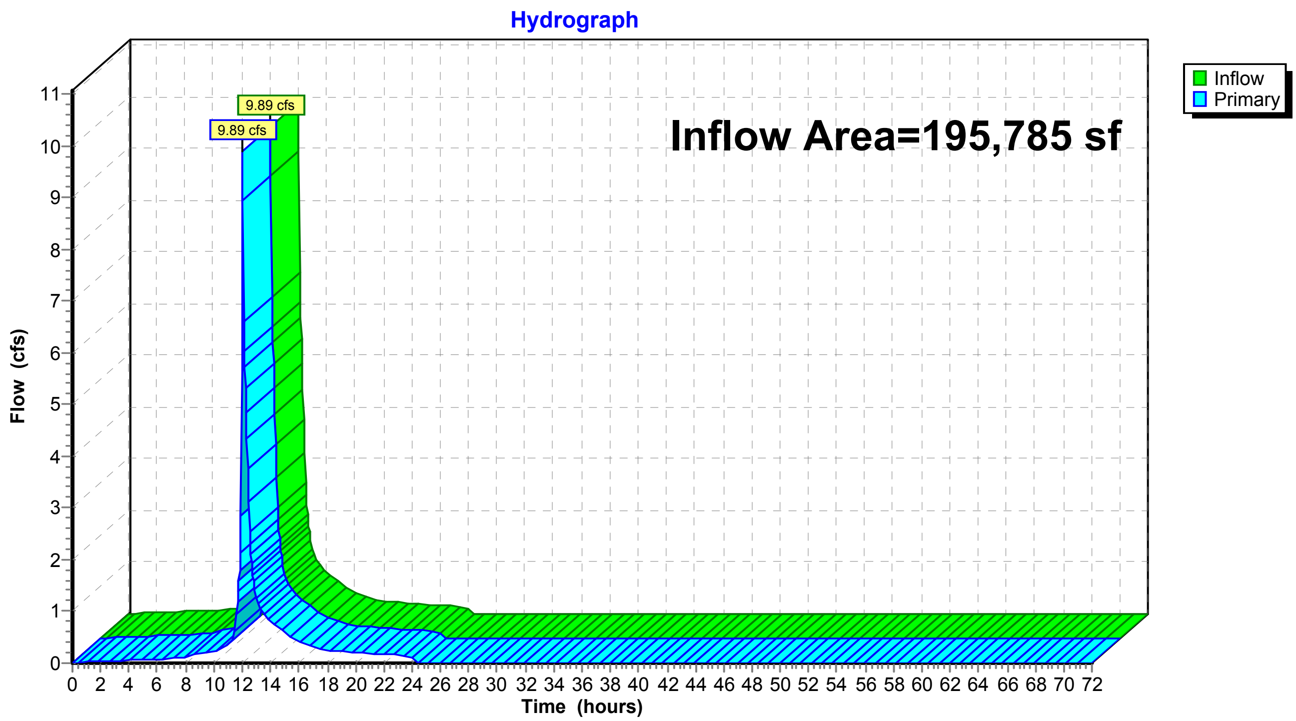
Summary for Pond P2: Analysis Pt 2

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

Inflow Area =	195,785 sf,	23.45% Impervious,	Inflow Depth = 2.21"	for 100 YR event	
Inflow =	9.89 cfs @	12.02 hrs,	Volume=	36,018 cf	
Primary =	9.89 cfs @	12.02 hrs,	Volume=	36,018 cf,	Atten= 0%, Lag= 0.0 min

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

Pond P2: Analysis Pt 2



Attachment E - Calculations

Wayland - Loker Field
Recharge Calculation

Required Recharge

Area Summary	
	Area (SF)*
Existing Impervious	0
Proposed Impervious	21,144
Required Recharge Area *(Proposed - Existing)*	21,144

* Areas calculated in HydroCAD

Note: Site consists of HSG A soils.

Hydrologic Soil Group Summary		
Group	Target Depth Factor (in)	Area (SF)
A	0.6	21,144
B	0.35	0
C	0.25	0
D	0.1	0

Required Recharge (*Rv*) Calculation:

Rv = Target Depth Factor x Δ Impervious Area
Rv = 0.6 x (1/12) x 21,144
Rv = 1,057 CF

Proposed Recharge Summary

Location	Volume (CF)*	Description
Underground Chambers	2,826	Chamber Field A
Total	2,826	

Rv = 1,057 CF
Provided recharge = 2,826 CF

Recharge Requirement is met.

*Note: Volume numbers listed above reflect static volume available in recharge systems. Actual volume of recharged water will be much higher due to dynamic action reflected in the HydroCAD analysis.

Wayland-Loker Field
Water Quality Volume Calculation
Aug-18

Required Water Quality Storage
Proposed Paved Area sf x 1" x 1'/12"= Required WQ Storage CF

Location	Proposed Impervious Area (sqft)	Required WQ Storage (cf)	Provided WQ Storage (cf)	Description
Facility Site	21,144	1,762	2,826	Chamber Field A (Volume below lowest outlet)

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

Version 1, Automated: Mar. 4, 2008

Location: Loker Field Parking Lot

TSS Removal Calculation Worksheet

B BMP[1]	C TSS Removal Rate[1]	D Starting TSS Load*	E Amount Removed (C*D)	F Remaining Load (D-E)
Deep Sump and Hooded Catch Basin	**0.25**	**1.00**	**0.25**	**0.75**
Subsurface Infiltration Structure	**0.80**	**0.75**	**0.60**	**0.15**
	0.00	**0.15**	**0.00**	**0.15**
	0.00	**0.15**	**0.00**	**0.15**
	0.00	**0.15**	**0.00**	**0.15**

Total TSS Removal = 85%

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

Project: **Loker Field**
Prepared By: **JIP**
Date: **7/11/2018**

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

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed
1. From MassDEP Stormwater Handbook Vol. 1

Attachment F - Long Term Pollution Prevention Plan

Long Term Pollution Prevention Plan
Loker Field Improvemetns
Wayland, MA

To meet the requirements of Standard 4 of the Massachusetts Stormwater Handbook, this Long Term Pollution Prevention Plan is provided to identify the proper procedures of practices for source control and pollution prevention.

Storage and Handling of Oil and other Hazardous Materials

There will be no oil or other hazardous materials stored onsite.

Salt Storage

There will be no salt storage onsite.

Vehicle Storage and Washing

Vehicles will only park on a temporary basis during use of the field. Vehicles will not be stored or washed onsite.

Operation and Maintenance of Stormwater Control Structures

Included in Attachment H of this appendix is the Operation and Maintenance plan for this site, which includes street sweeping of the paved areas and periodic removal of sediment from catch basins and other stormwater structures. The Town will be responsible for implementing the plan.

Landscaping

The landscaped areas will be maintained by the Town. Fertilizers will not be stored onsite.

De-icing & Snow Disposal

The Town intends to utilize salt and sand to treat the paved surfaces of the driveways and main circulation areas during snow and ice events.

\\Wse03.local\WSE\Projects\MA\Wayland MA\Wayland High School Athletic Facilities\Permitting\Con Comm\NOI - Loker 2018\Appendix C SW\Working Docs\Att. F_LTPPP.doc

Attachment G - Construction Period Pollution and Erosion and Sedimentation Control Plan

Construction Period Pollution Prevention and
Erosion and Sedimentation Control Plan

SECTION 1: Introduction

The project applicant, the Town of Wayland, is proposing the installation of a multi-purpose athletic field within the Loker Conservation and Recreation Area. The project includes field installation, field lighting, parking, trail improvements, and the addition of a stormwater management system. There would also be improvements to the existing emergency access road and parking area. The goal of this project is to utilize the Loker Conservation and Recreation Area to provide the Town of Wayland with a multi-purpose athletic field. Currently there is existing open field space on the property. By expanding this open space there will be room for the new athletic field. There is also an existing parking lot that will also be expanded on to allow for additional parking. In addition to the field and parking lot, new lighting will be added to allow for field use after daylight hours. The existing emergency access road will also be improved upon to allow for easier use, and miscellaneous paved areas in various locations of the site will be removed and converted to grassed space.

As part of this project, this "Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan" has been created to insure that no further disturbance to the wetland resource is created during the construction of these repairs.

SECTION 2: Construction Period Pollution Prevention Measures

Best Management Practices (BMPs) will be utilized as Construction Period Pollution Prevention Measures to reduce potential pollutants and prevent any off-site discharge. The objectives of the BMPs for construction activity are to minimize the disturbed areas, stabilize any disturbed areas, control the site perimeter and retain sediment. Both erosion and sedimentation controls and non-stormwater best management measures will be used to minimize site disturbance and ensure compliance with the performance standards of the WPA and Stormwater Standards. Measures will be taken to minimize the area disturbed by construction activities to reduce the potential for soil erosion and stormwater pollution problems. In addition, good housekeeping measures will be followed for the day-to-day operation of the construction site under the control of the contractor to minimize the impact of construction. This section describes the control practices that will be in place during construction activities. All recommended control practices will comply with the standards set in the MA DEP Stormwater Policy Handbook.

2.1 Minimize Disturbed Area and Protect Natural Features and Soil

In order to minimize disturbed areas all work will be completed within well-defined work limits. These work limits are shown on the construction plans. The Contractor shall not disturb native vegetation in the undisturbed wetland area without prior approval from the Engineer. The Contractor will be responsible to make sure that all workers know the proper work limits and do not extend their work into the undisturbed areas. The protective measures are described in more detail in the following sections.

2.2 Control Stormwater Flowing onto and through the project

All construction areas adjacent to wetlands will be lined with compost filter tubes and silt fence. The tubes and silt fence will be inspected daily and accumulated silt will be removed as appropriate. In addition, any storage of material will require a second level of protection by surrounding the areas with another row of compost filter tubes. A stabilized truck entrance/exit is proposed so that equipment visiting the site can remove any accumulated dirt and mud from vehicles to prevent tracking the mud onto public roads.

2.3 Stabilize Soils

The Contractor shall limit the area of land which is exposed and free from vegetation during construction. In areas where the period of exposure will be greater than two (2) months, mulching, the use of erosion control mats, or other protective measures shall be provided as specified.

The Contractor shall take account of the conditions of the soil where erosion control seeding will take place to insure that materials used for re-vegetation are adaptive to the sediment control.

2.4 Proper storage and cover of any stockpiles

The location of the Contractor's storage areas for equipment and/or materials shall be upon cleared portions of the job site or areas to be cleared as a part of this project, and shall require written approval of the Engineer.

No excavated materials or materials used in backfill operations shall be stored within a minimum distance of fifty (50) feet of any watercourse or any wetlands. Adequate measures for erosion and sediment control such as the placement of compost filter tubes around the downstream perimeter of stockpiles shall be employed to protect any downstream areas from siltation.

There shall be no storage of equipment or materials in areas designated as wetlands.

The Engineer may designate a particular area or areas where the Contractor may store materials used in his operations.

2.5 Perimeter Controls and Sediment Barriers

Erosion control lines as described in Section 5 will be utilized to ensure that no sedimentation occurs outside the perimeter of the work area.

2.6 Storm Drain Inlet Protection

Storm Drain inlets (catch basins) will be fitted with a protective insert.

2.7 Retain Sediment On-Site

The Contractor will be responsible to monitor all erosion control measures. Whenever necessary the Contractor will clear all sediment from the compost filter tubes and silt fence that have been silted up during construction. Daily monitoring shall be conducted using the attached Monitoring Form.

The following good housekeeping practices will be followed on-site during the construction project.

2.8 Material Handling and Waste Management

All materials stored on-site will be stored in a neat, orderly manner in appropriate containers. All materials will be kept in their original containers with the original manufacturer's label. Substances will not be mixed with one another unless recommended by the manufacturer.

All waste materials will be collected and stored in a securely lidded metal container from a licensed management company. The waste and any construction debris from the site will be hauled off-site daily and disposed of properly. The contractor will be responsible for all waste removal. Manufacturer's recommendations for proper use and disposal will be followed for all materials. Sanitary waste will be collected from the portable units a minimum of once a week, by a licensed sanitary waste management contractor.

2.9 Designated Washout Areas

The Contractor shall use washout facilities at their own facilities, unless otherwise directed by the Engineer.

2.10 Proper Equipment/Vehicle Fueling and Maintenance Practices

On-site vehicles will be monitored for leaks and receive regular preventative maintenance to reduce the risk of leakage. To ensure that leaks on stored equipment do not contaminate the site, oil-absorbing mats will be placed under all equipment during storage. Regular fueling and service of the equipment shall not be performed. Repair of equipment or machinery shall not be allowed in any event within 100' of wetlands. Any petroleum products will be stored in tightly sealed containers that are clearly labeled.

2.11 Equipment/Vehicle Washing

The Contractor will be responsible to ensure that no equipment is washed on-site.

SECTION 3: Spill Prevention and Control Plan

The Contractor will be responsible for preventing spills in accordance with the project specifications and applicable federal, state and local regulations. The Contractor will identify a properly trained site employee, involved with the day-to-day site operations to be the spill prevention and cleanup coordinator. The name(s) of the responsible spill personnel will be posted on-site. Each employee will be instructed that all spills are to be reported to the spill prevention and cleanup coordinator.

3.1 Spill Control Equipment

Spill control/containment equipment will be kept in the Work Area. Materials and equipment necessary for spill cleanup will be kept either in the Work Area or in an otherwise accessible on-site location. Equipment and materials will include, but not be limited to, absorbent booms/mats, brooms, dust pans, mops, rags, gloves, goggles, sand, plastic and metal containers specifically for this purpose. It is the responsibility of the Contractor to ensure the inventory will be readily accessible and maintained.

3.2 Notification

All workers will be directed to inform the on-site supervisor of a spill event. The supervisor will assess the incident and initiate proper containment and response procedures immediately upon notification. Workers should avoid direct contact with spilled materials during the containment procedures. Primary notification of a spill should be made to the local Fire Department and Police Departments. Secondary Notification will be to the certified cleanup contractor if deemed necessary by Fire and/or Police personnel. The third level of notification is to the DEP. The specific cleanup contractor to be used will be identified by the Contractor prior to commencement of construction activities.

3.3 Spill Containment and Clean-Up Measures

Spills will be contained with granular sorbent material, sand, sorbent pads, booms or all of the above to prevent spreading. Certified cleanup contractors should complete spill cleanup. The material manufacturer’s recommended methods for spill cleanup will be clearly posted and on-site personnel will be made aware of the procedures and the location of the information and cleanup supplies.

3.4 Hazardous Materials Spill Report

The Contractor will report and record any spill. The spill report will present a description of the release, including the quantity and type of material, date of the spill, circumstances leading to the release, location of spill, response actions and personnel, documentation of notifications and corrective measures implemented to prevent reoccurrence.

This document does not relieve the Contractor of the Federal reporting requirements of 40 CFR Part 110, 40 CFR Part 117, 40 CFR Part 302 and the State requirements specified under the Massachusetts Contingency Plan (M.C.P) relating to spills or other releases of oils or hazardous substances. Where a release containing a hazardous substance or oil in an amount equal to or in excess of a reportable quantity established under either 40 CFR Part 110, 40 CFR Part 117 or 40 CFR Part 302, occurs during a twenty-four (24) hour period, the Contractor is required to comply with the response requirements of the above mentioned regulations. Spills of oil or hazardous material in excess of the reportable quantity will be reported to the National Response Center (NRC).

SECTION 4: Contact Information/Responsible Parties

Owner/Operator:
Town of Wayland
41 Cochituate Road
Wayland, MA 01778

Engineer:
James Pearson, P.E.
Weston & Sampson, Inc.
5 Centennial Drive
Peabody, MA 01960
978-532-1900

Site Inspector:
TBD

Contractor:
TBD

SECTION 5: Erosion and Sedimentation Control

Erosion and Sedimentation Controls are shown on the project plans. In addition a technical specification (***Section 01570 Environmental Protection***) has been included as part of Appendix D, which details all Erosion and Sedimentation controls.

SECTION 6: Site Development Plans

A full set of site development plans are included with this submittal.

SECTION 7: Operation and Maintenance of Erosion Control

The erosion control measures will be installed as detailed in the technical specification ***01570 Environmental Protection***. If there is a failure to the controls the Contractor, under the supervision of the Engineer, will be required to stop work until the failure is repaired.

Periodically throughout the work, the sediment that has been deposited against the controls shall be removed pursuant to DEP guidelines to ensure that the controls are working properly.

SECTION 8: Inspection Schedule

During construction the erosion and sedimentation controls will be inspected daily. Once the Contractor is selected, an on site inspector will be selected to work closely with the Engineer to insure that all erosion and sedimentation controls are in place and working properly. An Inspection Form is included.

Inspection Form

Inspected By: ________________________________ Date: ___________Time:________

YES	NO	DOES NOT APPLY	ITEM
			Do any erosion/siltation control measures require repair or clean out to maintain adequate function?
			Is there any evidence that sediment is leaving the site and entering the wetlands?
			Are any temporary soil stockpiles or construction materials located in non-approved areas?
			Are on-site construction traffic routes, parking, and storage of equipment and supplies located in areas not specifically designed for them?

Specific location, current weather conditions, and action to be taken:

____

____

____

____

____

Other Comments:

____

____

Pending the actions noted above I certify that the site is in compliance with the Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan.

Signature: _______________________________ Date: ____________________________

Attachment H - Operations and Maintenance Plan

Attachment H –
Long-Term Operation and Maintenance Plan

1.0 Introduction

The following document has been written to comply with the stormwater guidelines set forth by the Massachusetts Department of Environmental Protection (MassDEP). The intent of these guidelines is to encourage Low Impact Development techniques to improve the quality of the stormwater runoff. These techniques, also known as Best Management Practices (BMPs) collect, store, and treat the runoff before discharging to adjacent environmental resources.

2.0 Purpose

This Operation and Maintenance Plan (O&M Plan) is intended to provide a mechanism for the consistent inspection and maintenance of each BMP installed on the project site. Included in this O&M Plan is a description of each BMP type and an inspection form for each BMP. The Town of Wayland is the owner and operator of the system and is responsible for its upkeep and maintenance.

This work will be funded on an annual basis through the town's operating budget. The estimated budget to maintain these BMPs utilizing the Municipal Services Department workforce and equipment is approximately $2,000 per year. This budget assumes that Town equipment will be utilized and no additional equipment rental is required.

In the event the Town sells the property, it is the Town's responsibility to transfer this plan as well as the past three years of operation and maintenance records to the new property owner.

3.0 BMP Description and Locations

3.1 Street Sweeping

Street sweeping consists of using a street sweeping machine to clean impervious areas of accumulated sediment, debris, and trash at parking areas.

3.2 Deep Sump Catch Basins

Deep sump catch basins will be located throughout the site and used as pre-treatment before entering the stormwater detention/infiltration basin. The deep sump catch basins are designed to remove trash, debris, and coarse sediment from the stormwater runoff.

3.4 Stormwater Infiltration Chambers

There is one underground infiltration chamber field in the facility that will receive stormwater. A stormwater infiltration chamber field will be built beneath the parking lot area of the site. This structure also significantly mitigates TSS and provides for stormwater detention to mitigate peak discharges from the site.

4.0 Inspection, Maintenance Checklist and Schedule

4.1 Street Sweeping

Street sweeping shall be performed on the proposed parking lot areas at least twice per year, primarily in the spring and fall. Street sweeping shall be performed using an appropriate street sweeping machine.

In the event of contamination by a spill or other means, all street sweeping cleanings must be evaluated in accordance with the Hazardous Waste Regulations, 310 CMR 30.000 and handled as hazardous waste.

In the absence of evidence of contamination, street sweeping cleanings may be taken to a landfill or other facility permitted by MassDEP to accept Solid Waste without any prior approval by MassDEP. Please note that current MassDEP regulations prevent landfills from accepting materials that contain free-draining liquids. Also see attached operations and maintenance standards (reproduced from the Massachusetts Stormwater Handbook) at the end of this section

4.2 Deep Sump Catch Basins

Inspect and/or clean catch basin at least four times per year and at the end of foliage and snow removal seasons. Sediments must be removed whenever the depth of deposits is greater than or equal to one half the depth from the bottom of the invert of the lowest pipe in the basin. The catch basin and oil-grit separators should be cleaned a minimum of four times per year regardless of the amount of sediment in the basin. Catch basins shall be cleaned with clamshell buckets or vacuum trucks.

In the event of contamination by a spill or other means, all cleanings must be evaluated in accordance with the Hazardous Waste Regulations, 310 CMR 30.000 and handled as hazardous waste.

In the absence of evidence of contamination, catch basin cleanings may be taken to a landfill or other facility permitted by MassDEP to accept Solid Waste without any prior approval by MassDEP. Please note that current MassDEP regulations prevent landfills from accepting materials that contain free-draining liquids. Also see attached operations and maintenance standards (reproduced from the Massachusetts Stormwater Handbook) at the end of this section

4.3 Stormwater Infiltration Chambers

The stormwater infiltration chamber field shall be inspected every six months during the first year, and annually thereafter. All accumulated sediment and debris in the isolation row(s) shall be removed using water jetting and vacuum truck equipment as described in manufacturer literature for the chamber system.

4.4 Inspections and Record Keeping

- An inspection form should be filled out each and every time maintenance work is performed.

- A binder should be kept by the owner that contains all of the completed inspection forms and any other related materials.

- A review of all Operation & Maintenance actions should take place annually to ensure that these Stormwater BMPs are being taken care of in the manner illustrated in this Operation & Maintenance Plan.

- All operation and maintenance log forms for the last three years, at a minimum, shall be kept on site at the owner.

- The inspection and maintenance schedule may be refined in the future based on the findings and results of this operation and maintenance program or policy.

5.0 Public Safety Features

Underground stormwater system measures are protected from access via manhole covers and grates.

6.0 Stormwater Management System Owner/Responsible Party

Town of Wayland
41 Cochituate Road
Wayland, MA 01778

This operation and Maintenance Plan will be recorded with the registry of deeds so that current and future owners are aware of the requirement for proper operation and maintenance of the onsite stormwater system.

Town of Wayland
Loker Recreation Area
Permanent BMP Inspection Checklist

☐ **Street Sweeping**

Frequency: Monthly, primarily in the spring and fall.

Location: Parking Lots and Driveways

Inspected By: __________________ Date: _____________

Observations: ______________________________________
____
____

Actions Taken: ______________________________________
____
____

Instructions: Sweep parking lot using street sweeping machine. All trash, debris, and sediments should be disposed of in accordance with local, state, and federal regulations.

☐ **Deep Sump Catch Basins**

Frequency: Inspect and clean deep sump catch basins in March, June, September and December.

Structure Number: ______________________________________

Inspected By: ___________________ Date: _____________

Observations: ______________________________________
____
____

Actions Taken: ______________________________________
____
____

Instructions: Clean units four times per year or whenever the depth of the deposits is greater than or equal to one half the depth from the bottom of the invert to the lowest pipe in the structure.

☐ **Stormwater Detention/Infiltration Chambers**

Frequency: The detention/infiltration chambers shall be inspected every six months during the first year and annually thereafter.

Structure No.: ______________________________________

Inspected By: ___________________ Date: _____________

Observations: _______________________________________
____
____

Actions Taken: _______________________________________
____
____

Instructions: Inspect isolation rows. If visible sediment deposition has occurred, insert reverse water jet into isolation row via access manhole and jet sediment backward into manhole. Remove sediment with vacuum truck and dispose of sediment as required.

Attachment I - Illicit Discharge Compliance Statement

Illicit Discharge Compliance Statement

Section I – Purpose/Intent

The purpose of this document is to provide for the health, safety, and general welfare of the citizens of Wayland, Massachusetts through the regulation of non-stormwater discharges into existing outstanding resource areas near the Wayland Public Works Facility to the maximum extent practicable, as required by federal and state law. This document establishes methods for controlling the introduction of pollutants into existing outstanding resource areas to comply with requirements of the National Pollutant Discharge Elimination System (NPDES) permit process.

Section II - Definitions

For the purposes of this statement, the following shall mean:

Best Management Practices (BMPs): Schedules of activities, prohibitions of practices, general good housekeeping practices, pollution prevention and educational practices, maintenance procedures, and other management practices to prevent or reduce the discharge of pollutants directly or indirectly to stormwater, receiving waters, or stormwater conveyance systems. BMPs also include treatment practices, operating procedures, and practices to control site runoff, spillage or leaks, sludge or water disposal, or drainage from raw materials storage.

Clean Water Act: The federal Water Pollution Control Act (33 U.S.C § 1251 et seq.), and any subsequent amendments thereto.

Construction Activity: Activities subject to the Massachusetts Erosion and Sedimentation Control Act or NPDES Construction Permits. Such activities include but are not limited to clearing and grubbing, grading, excavating, and demolition.

Hazardous Materials: Any material, including any substance, waste, or combination thereof, which because of its quantity, concentration, or physical, chemical, or infectious characteristics may cause, or significantly contribute to, a substantial present or potential hazard to human health, safety, property, or the environment when improperly treated, stored, transported, disposed of, or otherwise managed.

Illegal Connection: An illegal connection is defined as either of the following:

a. Any pipe, open channel, drain or conveyance, whether on the surface or subsurface, which allows an illicit discharge to enter the outstanding resource area including but not limited to any conveyances which allow any non-stormwater discharge including sewage, process wastewater, and wash water, regardless of whether said drain or connection has been previously allowed, permitted, or approved by an authorized enforcement agency; or
b. Any pipe, open channel, drain or conveyance connected to the Town of Wayland storm water treatment system which has not been documented in plans, maps, or equivalent records and approved by an authorized enforcement agency.

Illicit Discharge: Any direct or indirect non-stormwater discharge to the Town of Wayland stormwater treatment system, except as exempted in Section II of this ordinance.

Industrial Activity: Activities subject to NPDES Industrial Permits as defined in 40CFR, Section 122.26 (b) (14).

National Pollutant Discharge Elimination System (NPDES) Stormwater Discharge Permit: A permit issued by MassDEP under authority delegated pursuant to 33 USC § 1342 (b) that authorizes the discharge of pollutants to waters of the United States, whether the permit is applicable on an individual, group, or general area-wide basis.

Town of Wayland Stormwater Treatment System: Any facility, owned or maintained by the town, designed or used for collecting and/or conveying stormwater, including but not limited to roads with drainage systems, Town of Wayland streets, curbs, gutters, inlets, catch basins, piped storm drains, pumping facilities, infiltration, retention and detention basins, natural and man-made or altered drainage channels, reservoirs, and other drainage structures.

Non-Stormwater Discharge: Any discharge to the storm drain system that is not composed entirely of stormwater.

Person: Any individual, association, organization, partnership, firm, joint venture, public or private corporation, trust, estate, commission, board, public or private institution, utility, cooperative, city, county or other political subdivision of the State, interstate body, or any other legal entity.

Pollutant: Anything which causes or contributes to pollution. Pollutants may include, but are not limited to: paints, varnishes, and solvents; petroleum hydrocarbons; automotive fluids; cooking grease; detergents (biodegradable or otherwise); degreasers; cleaning chemicals; non-hazardous liquid and solid wastes; refuse, rubbish, garbage, litter, or other discarded or abandoned objects and accumulations, so that same may cause or contribute to pollution; floatables; pesticides, herbicides, and fertilizers; liquid and solid wastes; sewage, fecal coliform and pathogens; dissolved and particulate metals; animal wastes; wastes and residues that result from constructing a building or structure; concrete and cement; and noxious or offensive matter of any kind.

Pollution: Contamination or other alteration of any water's physical, chemical, or biological properties by addition of any constituent including but not limited to a change in temperature, taste, color, turbidity, or odor of such waters, or the discharge of any liquid, gaseous, solid, radioactive, or other substance into any such waters as will or is likely to create a nuisance or render such waters harmful, detrimental, or injurious to the public health, safety, welfare, or environment, or to domestic, commercial, industrial, agricultural, recreational, or other legitimate beneficial uses, or to livestock, wild animals, birds, fish or other aquatic life.

Premises: Any building, lot, parcel of land, or portion of land whether improved or unimproved including adjacent sidewalks and parking strips.

Stormwater: Any surface flow, runoff, and drainage consisting entirely of water from any form of natural precipitation, and resulting from such precipitation.

Wastewater: Any water or other liquid discharged from a facility, that has been used, as for washing, flushing, or in a manufacturing process, and so contains waste products.

Section III - Prohibitions

Prohibition of Illicit Discharges:

No person shall throw, drain, or otherwise discharge, cause or allow others under its control to throw, drain, or otherwise discharge into the Town of Wayland stormwater treatment system or watercourses any materials, including but not limited to, any pollutants or waters containing any pollutants, other than stormwater. The commencement, conduct or continuance of any illicit discharge to the storm drain system is prohibited except as described as follows:

1. Water line flushing performed by a government agency, other potable water sources, landscape irrigation or lawn watering, diverted stream flows, rising ground water, ground water infiltration to storm drains, uncontaminated pumped ground water, foundation or footing drains (not including active groundwater dewatering systems), crawl space pumps, air conditioning condensation, springs, natural riparian habitat or wetland flows, and any other water source not containing pollutants;

2. Discharges or flows from fire fighting, and other discharges specified in writing by the Town of Wayland as being necessary to protect public health and safety;

3. Dye testing is an allowable discharge, but requires a verbal notification to the Town of Wayland prior to the time of the test;

4. Any non-stormwater discharge permitted under an NPDES permit, waiver, or waste discharge order issued to the discharger and administered under the authority of the Federal Environmental Protection Agency, provided that the discharger is in full compliance with all requirements of the permit, waiver, or order and other applicable laws and regulations, and provided that written approval has been granted for a discharge to the Town of Wayland stormwater treatment system.

Section IV - Industrial or Construction Activity Discharges

Any person subject to an industrial or construction activity NPDES stormwater discharge permit shall comply with all provisions of such permit. Proof of compliance with said permit may be required in a form acceptable to the Town of Wayland Department of Public Works prior to allowing discharges to the Wayland stormwater treatment system.

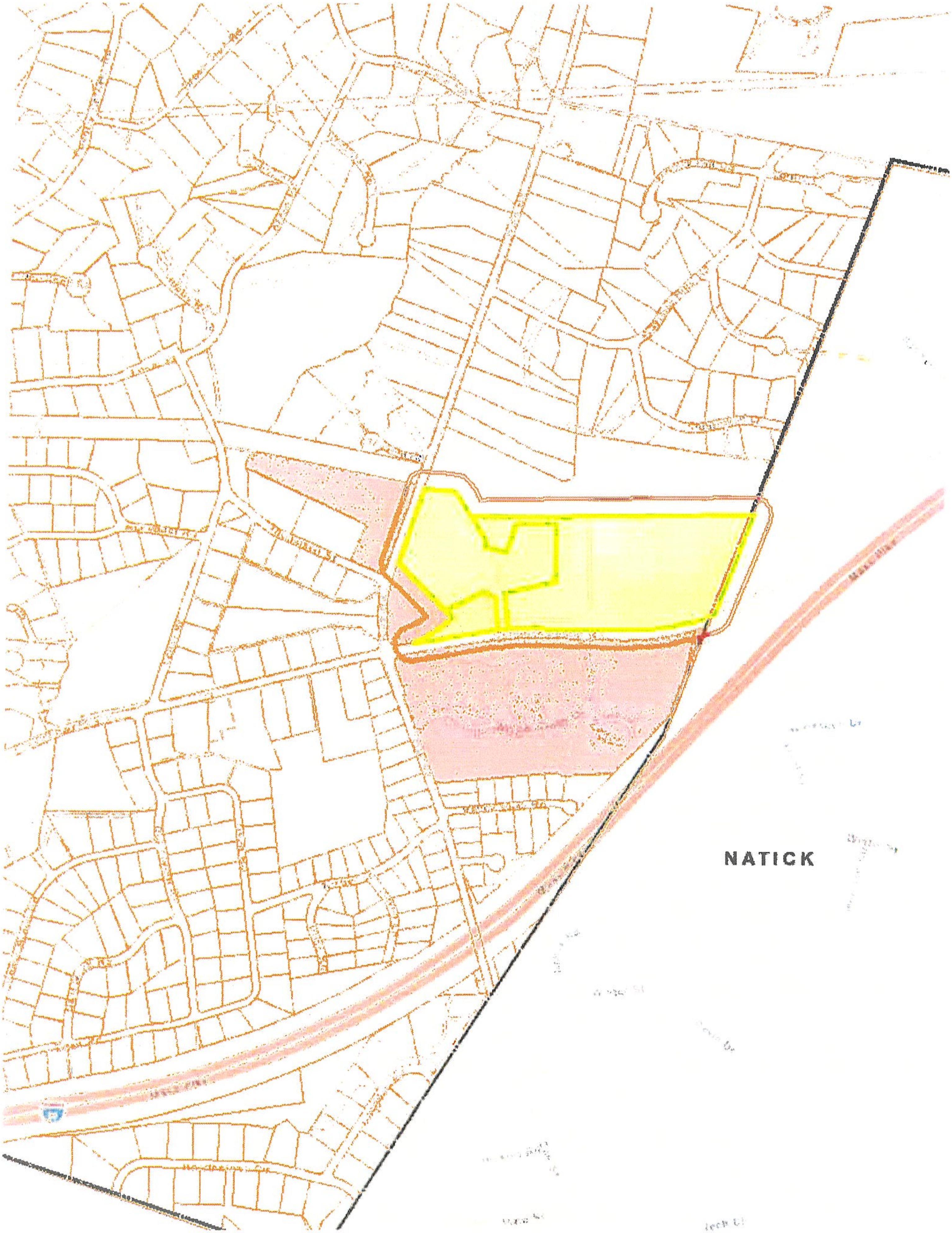
Section V - Notification of Spills and Accidental Discharges

Notwithstanding other requirements of law, as soon as any person responsible for a facility, activity or operation, or responsible for emergency response for a facility, activity or operation has information of any known or suspected release of pollutants or non-stormwater discharges from that facility, activity, or operation which are resulting or may result in illicit discharges or pollutants discharging into stormwater, the Town of Londmeadow stormwater treatment system, State Waters, or Waters of the U.S., said person shall take all necessary steps to ensure the discovery, containment, and cleanup of such release so as to minimize the effects of the discharge. In the event of such a release of hazardous materials, said person shall immediately notify emergency response agencies of the occurrence via emergency dispatch services. In the event of a release of non-hazardous materials, said person shall notify the Town of Wayland Department Public Works in person or by phone no later than the next business day, including the nature, quantity and time of occurrence of the discharge. Notifications in person or by phone shall be confirmed by written notice, via certified mail return receipt requested addressed to the Town of Wayland Department of Public Works within three (3) business days of the initial notice. If the discharge of prohibited materials emanates from a commercial or industrial establishment, the owner or operator of such establishment shall also retain an on-site written record of the discharge and the actions taken to prevent its recurrence. Such records shall be retained for at least three years.

IN WITNESS WHEREOF the parties hereto have executed copies of this Agreement on the ______ day of ____________________, ______.

____
Town of Wayland

APPENDIX D:
Project Maps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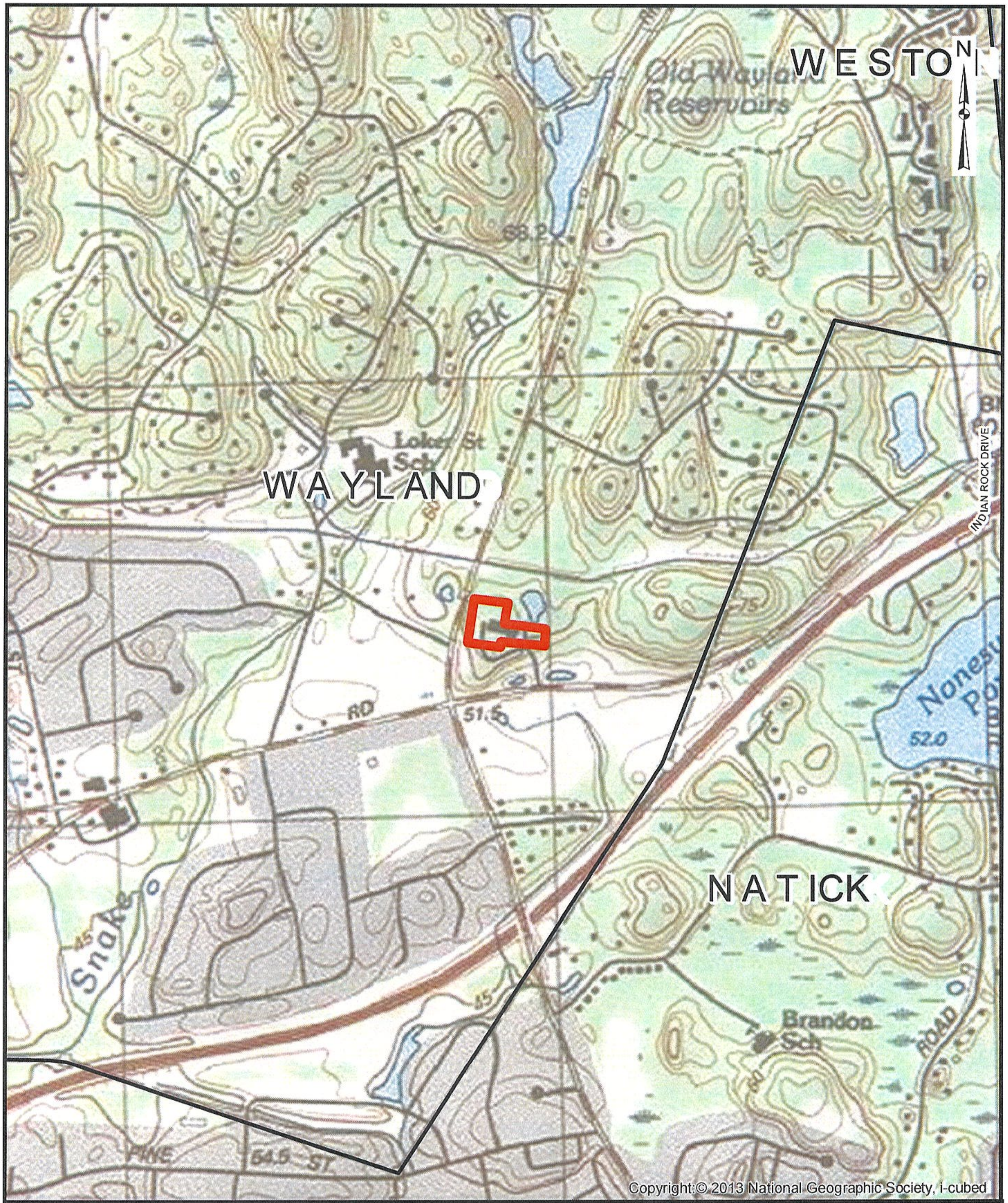


FIGURE 1
Loker Conservation & Recreation Area
Wayland, Massachusetts

Locus Map

Work Area

600 0 600
Scale In Feet

Weston & Sampson

Path: \\wse03.local\WSE\Projects\MA\Wayland MA\Wayland High School Athletic Facilities\GIS\Loker Field\Figure 1 - Locus.mxd User: GasparA Saved: 7/5/2018 1:25:35 PM Opened: 7/5/2018 1:26:15 PM

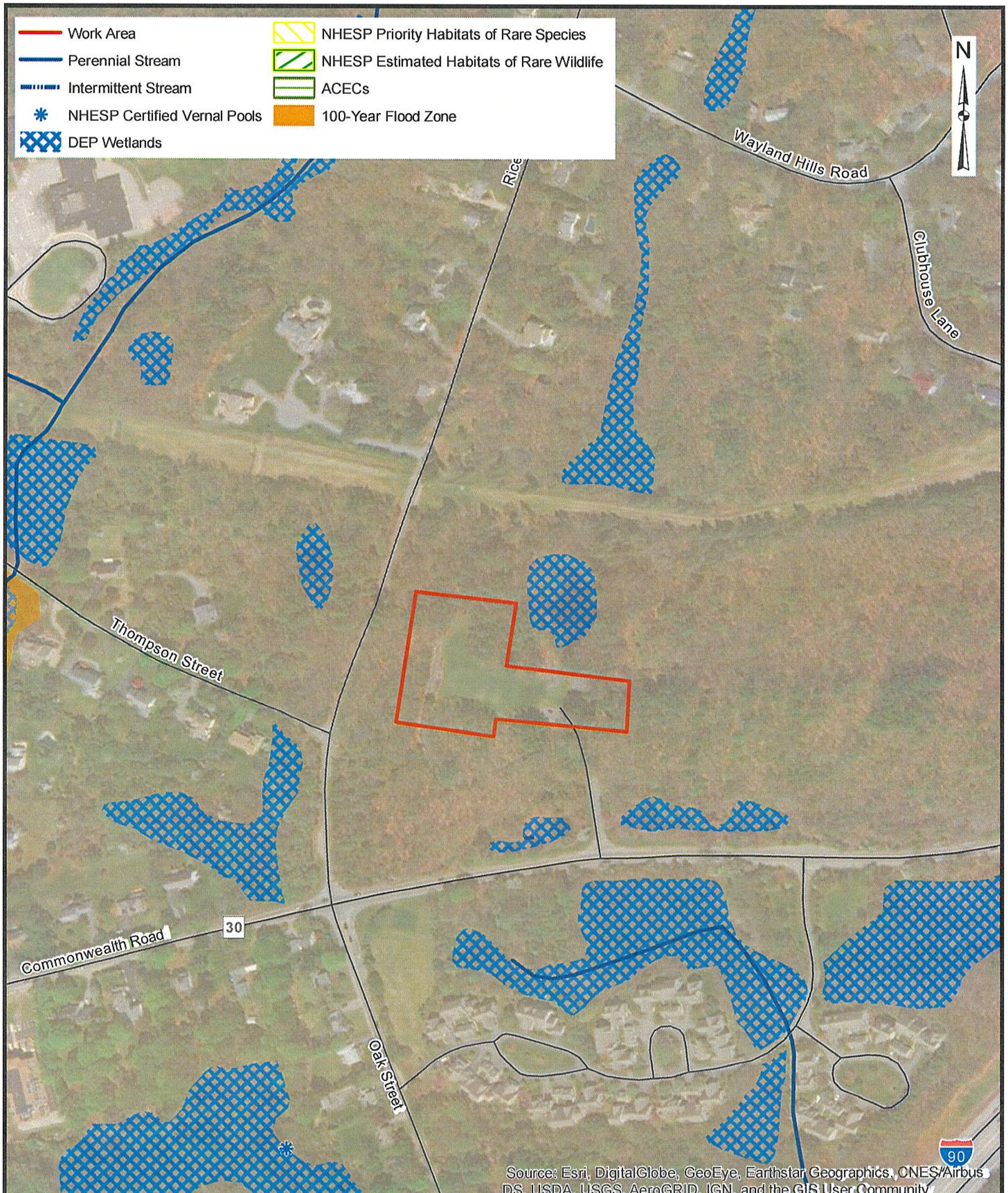


FIGURE 2
Loker Conservation & Recreation Area
Wayland, Massachusetts

ENVIRONMENTAL RECEPTORS

200 0 200

Scale In Feet

Weston & Sampson

Path: \\wse03.local\WSE\Projects\MA\Wayland MA\Wayland High School Athletic Facilities\GIS\Loker Field\Figure 2 - Env Receptor.mxd User: GasparA Saved: 7/5/2018 1:22:03 PM Opened: 7/5/2018 3:07:37 PM

National Flood Hazard Layer FIRMette

FEMA

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 / 17.5 Cross Sections with 1% Annual Chance Water Surface Elevation
- 8 Coastal Transect
- 513 Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

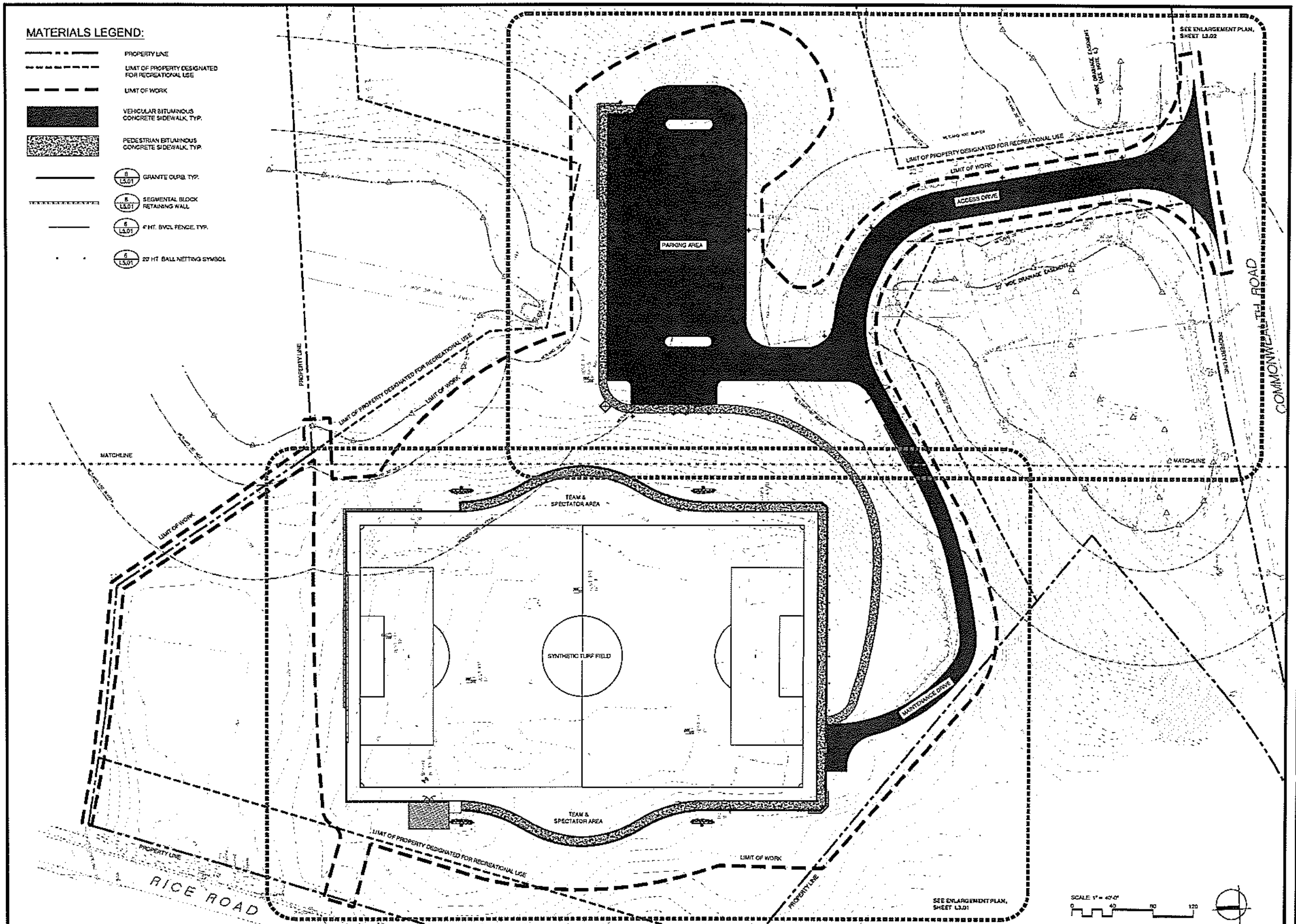
N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 7/6/2018 at 12:41:29 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.



Project:

IMPROVEMENTS TO LOKER CONSERVATION AND RECREATION AREA

410 COMMONWEALTH RD, WAYLAND, MA 01778

Weston & Sampson

85 Devonshire Street, 3rd Floor, Boston, MA 02109
617.412.4480 800.SAMPSON
www.westonandsampson.com

Consultants:

Revisions:

No.	Date	Description

Seal:

Issued For:

PERMITTING SET
- NOT FOR CONSTRUCTION -

Scale: AS SHOWN

Date: JULY 19, 2018
Drawn By: CCC, DYF
Reviewed By: BMK
Approved By: ERB
W&S Project No: 2180076
W&S File No:

Drawing Title:

OVERALL MATERIALS PLAN

Sheet Number:

L3.00

APPENDIX E:
Contract Specifications

SECTION 01562

DUST CONTROL

PART 1 - GENERAL

1.01 DESCRIPTION:

This section of the specification covers the control of dust via calcium chloride and water, complete.

PART 2 - PRODUCTS

2.01 CALCIUM CHLORIDE:

A. Calcium chloride shall conform to the requirements of AASHTO-M 144, Type I or Type II and Specification for Calcium Chloride, ASTM D98. The calcium chloride shall be packaged in moisture proof bags or in airtight drums with the manufacturer, name of product, net weight, and percentage of calcium chloride guaranteed by the manufacturer legibly marked on each container.

B. Calcium chloride failing to meet the requirements of the aforementioned specifications or that which has become caked or sticky in shipment, may be rejected by the Engineer.

2.02 WATER:

A. Water shall not be brackish and shall be free from oil, acid, and injurious alkali or vegetable matter.

PART 3 - EXECUTION

3.01 APPLICATION:

A. Calcium chloride shall be applied when ordered by the Engineer and only in areas which will not be adversely affected by the application. See Section 01570, ENVIRONMENTAL PROTECTION.

B. Calcium chloride shall be uniformly applied at the rate of 1-1/2 pounds per square yard or at any other rate as required by the Engineer. Application shall be by means of a mechanical spreader, or other approved methods. The number and frequency of applications shall be determined by the Engineer.

C. Water may be sprinkler applied with equipment including a tank with gauge-equipped pressure pump and a nozzle-equipped spray bar.

D. Water shall be dispersed through the nozzle under a minimum pressure of 20 pounds per square inch, gauge pressure.

END OF SECTION

Document1291

SECTION 01570

ENVIRONMENTAL PROTECTION

PART 1 – GENERAL

1.01 DESCRIPTION:

A. The work covered by this section of the specifications consists of furnishing all labor, materials, tools and equipment and performing all work required for the prevention of environmental pollution during and as a result of construction operations under this contract.

B. The requirements set forth in this section of the specifications apply to construction in and adjacent to wetlands, unless otherwise specifically stated.

C. All work under this Contract shall be in accordance with the Conservation Commissions' Orders of Conditions as well as any conditional requirements applied.

D. Prior to commencement of work, the Contractor shall meet with representatives of the Engineer to develop mutual understandings relative to compliance of the environmental protection program.

1.02 SUBMITTALS:

A. The Contractor shall submit for approval six sets of details and literature fully describing environmental protection methods to be employed in carrying out construction activities within 100 feet of wetlands or across areas designated as wetlands.

PART 2 - PRODUCTS

2.01 STRAW BALES:

A. Straw bales shall consist of certified seed free stems of agricultural grain and cereal crops and shall be free of grasses and legumes. Standard bales shall be 14-inches high, 18- inches wide and 36- to 40-inches long tied with polypropylene twine and weigh within 5 percent of 7 lbs. per cubic ft.

2.02 CATCH BASIN PROTECTION:

A. To trap sediment and to prevent sediment from clogging drainage systems, catch basin protection in the form of a siltation sack (Siltsack as manufactured by ACF Environmental, Inc. or approved equal) shall be provided as approved by the Engineer.

2.03 COMPOST FILTER TUBES:

A. Silt socks shall be a tubular filter sock of mesh fabric. The fabric will have openings of between 1/8" to ¼" diameter. The mesh material will either photo degrade within one year or be made of nylon with a life expectancy of 24 months. The sock shall be filled with a mix of composted leaf mulch, bark mulch and wood chips that have been composted for at least one year. The sock will have a minimum diameter of 12-inches.

PART 3- EXECUTION

3.01 NOTIFICATION AND STOPPAGE OF WORK:

A. The Engineer will notify the Contractor in writing of any non-compliance with the provisions of the Order of Conditions. The Contractor shall, after receipt of such notice, immediately take corrective action. Such notice, when delivered to the Contractor or his authorized representative at the site of the work, shall be deemed sufficient for the purpose. If the Contractor fails to act promptly, the Owner may order stoppage of all or part of the work through the Engineer until satisfactory corrective action has been taken. No claim for an extension of time or for excess costs or damage incurred by the Contractor as a result of time lost due to any stop work orders shall be made unless it was later determined that the Contractor was in compliance.

3.02 AREA OF CONSTRUCTION ACTIVITY:

A. Insofar as possible, the Contractor shall confine his construction activities to those areas defined by the plans and specifications. All land resources within the project boundaries and outside the limits of permanent work performed under this contract shall be preserved in their present condition or be restored to a condition after completion of construction at least equal to that which existed prior to work under this contract.

3.03 PROTECTION OF WATER RESOURCES:

A. The Contractor shall not pollute streams, lakes or reservoirs with fuels, oils, bitumens, calcium chloride, acids or other harmful materials. It is the Contractor's responsibility to comply with all applicable Federal, State, County and Municipal laws regarding pollution of rivers and streams.

B. Special measures should be taken to insure against spillage of any pollutants into public waters.

3.04 CONSTRUCTION IN AREAS DESIGNATED AS WETLANDS ON THE DRAWINGS:

A. Insofar as possible, the Contractor shall make every effort to minimize disturbance within areas designated as wetlands or within 100-feet of wetland resource areas.

B. The Contractor shall perform his work in such a way that these areas are left in the condition existing prior to construction.

3.05 PROTECTING AND MINIMIZING EXPOSED AREAS:

A. The Contractor shall limit the area of land which is exposed and free from vegetation during construction. In areas where the period of exposure will be greater than two (2) months, temporary vegetation, mulching or other protective measures shall be provided as specified.

B. The Contractor shall take account of the conditions of the soil where temporary cover crop will be used to insure that materials used for temporary vegetation are adaptive to the sediment control. Materials to be used for temporary vegetation shall be approved by the Engineer.

3.06 LOCATION OF STORAGE AREAS:

A. The location of the Contractor's storage areas for equipment and/or materials shall be upon cleared portions of the job site or areas to be cleared as a part of this project, and shall require written approval of the Engineer. Plans showing storage facilities for equipment and materials shall be submitted for approval of the Engineer.

B. No excavated materials or materials used in backfill operations shall be deposited within a minimum distance of one hundred (100) feet of any watercourse or any drainage facility. Adequate measures for erosion and sediment control such as the placement of straw wattles around the downstream perimeter of stockpiles shall be employed to protect any downstream areas from siltation.

C. There shall be no storage of equipment or materials in areas designated as wetlands.

D. The Engineer may designate a particular area or areas where the Contractor may store materials used in his operations.

3.07 PROTECTION OF LANDSCAPE:

A. The Contractor shall not deface, injure, or destroy trees or shrubs nor remove or cut them without written authority from the Owner. No ropes, cables, or guys shall be fastened to or attached to any existing nearby trees for anchorages unless specifically authorized by the Engineer. Excavating machinery and cranes shall be of suitable type and be operated with care to prevent injury to trees which are not to be removed, particularly overhanging branches and limbs. The Contractor shall, in any event, be responsible for any damage resulting from such use.

B. Branches, limbs, and roots shall not be cut except by permission of the Engineer. All cutting shall be smoothly and neatly done without splitting or crushing. When there is unavoidable injury to branches, limbs and trunks of trees, the injured portions shall be neatly trimmed and covered with an application of grafting wax or tree healing paint as directed.

C. Where, in the opinion of the Engineer, trees may possibly be defaced, bruised, injured, or otherwise damaged by the Contractor's equipment or by his blasting or other operations, the Engineer may require the Contractor to adequately protect such trees by placing boards, planks, poles or fencing around them. Any trees or landscape feature scarred or damaged by the Contractor's equipment or operations shall be restored as nearly as possible to its original condition at the expense of the Contractor. The Engineer will decide what method of restoration shall be used, and whether damaged trees shall be treated and healed or removed and disposed of.

D. Cultivated hedges, shrubs, and plants which could be injured by the Contractor's operations shall be protected by suitable means or shall be dug up, balled and temporarily replanted and maintained. After construction operations have been substantially completed, they shall be replanted in their original positions and cared for until growth is re-established. If cultivated hedges, shrubs, and plants are injured to such a degree as to affect their growth or diminish their beauty or usefulness, they shall be replaced by items of a kind and quality at least equal to that existing at the start of the work.

3.08 CLEARING AND GRUBBING:

A. The Contractor shall clear and grub only on the Owner's land or the Owner's easements, and only the area required for construction operations, as approved by the Engineer.

3.09 DISCHARGE OF DEWATERING OPERATIONS:

A. Any water that is pumped and discharged from the trench and/or excavation as part of the Contractor's water handling shall be filtered by an approved method prior to its discharge into a receiving water or drainage system.

B. Under no circumstances shall the Contractor discharge water to the areas designated as wetlands. When constructing in a wetlands area, the Contractor shall discharge water from dewatering operations directly to the nearest drainage system, stream, or waterway after filtering by an approved method.

C. The pumped water shall be filtered through filter fabric and baled straw, a vegetative filter strip or a vegetated channel to trap sediment occurring as a result of the construction operations. The vegetated channel shall be constructed such that the discharge flow rate shall not exceed a velocity of more than 1 foot per second. Accumulated sediment shall be cleared from the channel periodically.

3.10 DUST CONTROL:

A. During the progress of the work, the Contractor shall conduct his operations and maintain the area of his activities, including sweeping and sprinkling of streets as necessary, to minimize creation and dispersion of dust. If the Engineer decides it is necessary to use calcium chloride for more effective dust control, the Contractor shall furnish and spread the material, as directed.

B. Calcium Chloride shall not be used for dust control within a drainage basin or in the vicinity of any source of potable water.

3.11 BALED STRAW:

A. To trap sediment during any dewatering process, baled straw shall be used where shown on the drawings. Care shall be taken to keep the bales from breaking apart. All deposited sediment shall be removed periodically. Straw bales shall not be placed within a waterway during construction.

3.12 CATCH BASIN PROTECTION:

A. Catch basin protection shall be used for every catch basin, shown on the plans or as required by the Engineer, to trap sediment and prevent it from clogging drainage systems and entering wetlands. Siltation sacks shall be securely installed under the catch basin grate. Care shall be taken to keep the siltation sacks from breaking apart or clogging. All deposited sediment shall be removed periodically and at times prior to predicted precipitation to allow free drainage flow. Prior to working in areas where catch basins are to be protected, each catch basin sump shall be cleaned of all debris and protected. The contractor shall properly dispose of all debris at no additional cost to the Owner.

3.13 COMPOST FILTER TUBES:

A. The silt socks will be staked in the ground using wooden stakes driven at 4-foot intervals. The wooden stakes will be placed at a minimum depth of 24-inches into the ground.

END OF SECTION

SECTION 01740

CLEANING UP

PART 1 - GENERAL

1.01 DESCRIPTION:

The Contractor must employ at all times during the progress of its work adequate cleanup measures and safety precautions to prevent injuries to persons or damage to property. The Contractor shall immediately, upon request by the Engineer provide adequate material, equipment and labor to cleanup and make safe any and all areas deemed necessary by the Engineer.

PART 2 - PRODUCTS

Not applicable

PART 3 - EXECUTION

3.01 DAILY CLEANUP:

A. The Contractor shall clean up, at least daily, all refuse, rubbish, scrap and surplus material, debris and unneeded construction equipment resulting from the construction operations and sweep the area. The site of the work and the adjacent areas affected thereby shall at all times present a neat, orderly and workmanlike appearance.

B. Upon written notification by the Engineer, the Contractor shall within 24 hours clean up those areas, which in the Engineer's opinion are in violation of this section and the above referenced sections of the specifications.

C. If in the opinion of the Engineer, the referenced areas are not satisfactorily cleaned up, all other work on the project shall stop until the cleanup is satisfactory.

3.02 MATERIAL OR DEBRIS IN DRAINAGE FACILITIES:

A. Where material or debris has washed or flowed into or has been placed in existing watercourses, ditches, gutters, drains, pipes, structures, such material or debris shall be entirely removed and satisfactorily disposed of during progress of the work, and the ditches, channels, drains, pipes, structures, and work shall, upon completion of the work, be left in a clean and neat condition.

3.03 REMOVAL OF TEMPORARY BUILDINGS, STRUCTURES AND EQUIPMENT:

A. On or before completion of the work, the Contractor shall, unless otherwise specifically required or permitted in writing, tear down and remove all temporary buildings and structures it built; shall remove all temporary works, tools and machinery or other construction equipment it furnished; shall remove all rubbish from any grounds which it has occupied; shall remove silt fences and hay bales used for trapping sediment; and shall leave the roads and all parts of the property and adjacent property affected by its operations in a neat and satisfactory condition.

3.04 RESTORATION OF DAMAGED PROPERTY:

A. The Contractor shall restore or replace, when and as required, any property damaged by its work, equipment or employees, to a condition at least equal to that existing immediately prior to the beginning of operations. To this end the Contractor shall do as required all necessary highway or driveway, walk and landscaping work. Materials, equipment, and methods for such restoration shall be as approved by the Engineer.

3.05 FINAL CLEANUP:

A. Before acceptance by the Owner, the Contractor shall perform a final cleanup to bring the construction site to its original or specified condition. This cleanup shall include removing all trash and debris off of the premises. Before acceptance, the Engineer shall approve the condition of the site.

END OF SECTION

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SECTION 02677

WETLANDS PROTECTION AND REPLICATION

PART 1 - GENERAL

1.01 WORK INCLUDED:

This section consists of providing all plants, labor, equipment, materials, tools, and required professional services in connection with the protection, replication, and provision of specific mitigation measures to minimize and compensate for impacts to existing wetland areas.

1.02 RELATED WORK:

A. Section 01570, ENVIRONMENTAL PROTECTION

B. Section 02930, TREES, PLANTS, AND GROUND COVERS

1.03 QUALITY ASSURANCE:

A. This Contract requires construction adjacent to environmentally sensitive resource areas including flood plains and wetlands. The Wetlands Protection Act ("Act") G.L. Chapter 131 Sec. 40 governs work in these areas and the Contractor shall be required to comply with this and all other applicable Federal, State and local statutes, regulations, and ordinances, and with the Order of Conditions issued by the Conservation Commission.

B. The Contract Drawings show the extent of the Bordering Vegetated Wetlands (BVW) and Buffer Zone (BZ). Work within the BVW or BZ shall also comply with the requirements of this section.

PART 2 - PRODUCTS

2.01 BACKFILL:

Loam and Organic Mixture - This section describes the specification for preparing a loam and organic mixture to be used as suitable backfill within the wetlands restoration and enhancement areas.

1. Loam shall be a natural, fertile, friable soil, typical of productive soils in the vicinity. Loam shall be free of admixture of subsoil and foreign matter or objects (gravel, roots, debris) larger than 2-inches in diameter.

2. Loam shall be uncontaminated and free of toxic substances or any materials harmful to plant growth, regeneration or reproduction. The pH of the loam shall range between 6.0 and 8.0.

3. Peat (if used) shall be supplied from an authorized peat supplier or nursery. Peat shall have an organic content ranging from 75 to 100%. Peat shall be uncontaminated and free of toxic substances or any materials harmful to plant growth, regeneration or reproduction.

4. The loam and organic mixture shall be mixed onsite to achieve a 5% organic content. This will be determined through laboratory analysis or organic content by the loss of weight by ignition of oven-dried samples. Test samples shall be oven-dried to a constant weight at a temperature of 230 degrees F. The final pH of the loam-peat mixture shall range from 5.8 to 8.0.

2.02 FERTILIZER:

Fertilizer shall be 10-6-8 controlled release, commercial grade granular free flowing, and uniform in composition and shall conform to applicable state and federal regulations. Fertilizer shall be delivered in manufacturer's standard container printed within manufacturer's name, material, weight, and guaranteed analysis.

2.03 MOISTURE ENHANCER:

A suitable moisture enhancer containing at least 99% Copolymer Acrylamide Acrylate shall be obtained and used for each planted shrub and sapling. This moisture enhancer shall be SuperSorb-C, TerraSorb or approved equal.

2.04 MULCH:

A. Hay Mulch - Hay mulch shall consist of mowed and properly cured grass, clover and other acceptable plants. Hay mulch shall be free of weeds, twigs, debris or other deleterious material.

B. Straw Mulch - Straw mulch shall consist of stalks or stems of grain after threshing.

C. Wood Fiber Mulch - Wood fiber mulch shall consist of wood fiber produced from clean, whole, uncooked wood, formed into resilient bundles having a high degree of internal friction and shall be dry when delivered to the project.

2.05 PROPAGULES:

A. The wetlands restoration and enhancement areas shall be vegetated with indigenous wetlands shrubs, saplings, and emergent species. Individual species to be planted are indicated on the final design plans.

B. Propagules shall be nursery or plantation stock and shall be supplied from a bonded source. Nursery stock shall conform to the requirements and recommendations of American National Standards Institute (ANSI) Z60.1.

C. Plants, propagules or cultivars other than those listed in this section will not be accepted unless specifically approved by the wetlands restoration specialist and accepted by the U.S. Environmental Protection Agency.

D. Propagules shall be dug and prepared for shipment in a manner that will not cause significant damage to branches, roots, shape and future growth and development after planting.

E. Balled and burlapped plants shall have ball sizes and ratios conforming to ANSI Z60.1. Plants shall be balled with firm, natural balls of soil. Balled and burlapped plants shall be wrapped firmly with burlap, strong cloth, or plastic and tied.

F. Planting stock shall be well-branched and well-formed, sound, vigorous, healthy, and free from disease, sun-scald, windburn, abrasion and harmful insect eggs and shall have healthy normal and unbroken root systems.

G. Plants shall have been grown under climactic conditions similar to those in the vicinity of the site. Plants budding into leaf or having soft growth shall be sprayed with an antidesiccant at the nursery prior to delivery.

H. Sapling minimum and maximum heights are as follows: a minimum of 3 feet and a maximum of 5 feet.

I. Shrub minimum and maximum heights are as follows: a minimum of 18-inches and a maximum of 36-inches.

J. Emergent propagules shall be rootstock.

2.06 HYDROSEED:

A. Hydroseed shall be supplied by an authorized hydroseed contractor. The Hydroseed mixture shall include annual grasses and seed stock from *Juncus spp.* and *Carex spp.* The wetlands restoration specialist shall approve the final hydroseed mixture.

2.07 WATER:

Water shall not contain elements toxic to plant life.

PART 3 - EXECUTION

3.01 GENERAL:

A. Every effort shall be made to use existing wetland species. At the discretion of the Engineer, the Contractor may, at his option, dig up, store and maintain existing wetland species trees, shrubs and plants from the excavation area for use in the replication area. Trees shall be a minimum of 1-inch caliper and shrubs shall be a minimum of 24-inches in spread or height. All plants shall be vigorous and well formed specimens.

B. All plant materials dug for this purpose shall be dug by hand, hydraulic tree spade specifically designed for this purpose or other suitable equipment of sufficient size to remove an adequate rootball.

C. American Association of Nurserymen, Inc., American Standard for Nursery Stock (latest edition) for each species. For hand dug plants, a suitable burlap or other wrap or container shall be provided to keep the rootball intact.

D. All plants dug for reuse shall be immediately moved to a protected storage area approved by the Engineer. Plants shall be set plumb on grade or in prepared holes and guyed as necessary. The area or holes shall be backfilled with suitable topsoil to cover rootballs entirely and mulched to prevent erosion. All stored vegetation shall be maintained in a damp condition by regular watering. Contractor shall utilize all cultural measures necessary for survival of collected plants.

E. When work has been completed, stockpiled plants shall be replanted in prepared pits in locations in the replication area designated on the Contract Drawings. Planting, backfilling, fertilizing, staking, mulching, watering and all other cultural methods, including season for planting, maintenance and warranties shall be as per Section 02930.

F. Costs for digging, moving, storage, maintenance and transplanting shall be considered part of the wetland replication item.

G. In order to protect the wetlands from siltation caused by excavation in the replication area and by roadway construction, a silt fence and a continuous line of staked hay bales shall be placed as detailed in the Contract Drawings. Hay bales and silt fence are specified in Section 01570.

H. The organic, top layer of wetlands soils (generally, the top 12-inches) contains the rootstock and seeds for many wetland plant species. As excavation in the wetlands areas commences, the Contractor shall separate the top 12-inch layer of wetland soils (topsoil) within the delineated wetland areas (flagged wetlands) from other soil types and stockpile the wetland soils within an upland area adjacent to the replication area. At no time will stockpiling of excavated soils within wetland areas be allowed. The wetland soil shall be carefully maintained in a wet condition by adequate watering and shall be protected by installing a siltation fence around the entire stockpiled area. Stockpiles shall be completely covered with a filter fabric and whenever possible, located in the shade.

I. Suitable soil which is excavated, not including the top layer referred to in the paragraph above, shall be carefully removed for use as subgrade material beneath wetland topsoil and if it is not immediately used, shall be stored in a designated stockpile area, to be reused. All soils to be reused shall be carefully stockpiled and protected with appropriate drainage and erosion control.

J. Once the replication area has been excavated, backfilling of the excavation with wetland soil can occur. Prior to the spreading of the wetland soil, the subsoil within the replication area shall be inspected and approved by the Engineer. The elevation and slope of the backfilled subgrade are critical elements in assuring proper replacement of wetlands soils and the function of the wetland. When backfilled with the soil discussed in the paragraph above, elevation and slopes of backfilled areas shall be consistent with the Contract Drawings minus 1-foot to allow for replacement of wetlands (BVW) soils.

3.02 WETLANDS (BVW) SOILS:

A. Wetlands topsoil shall be deposited to a minimum depth of twelve (12) inches. Wetlands topsoil shall be deposited so as to minimize travel and subsequent compression of the underlying material and the replaced wetland topsoil. In the event that the Contractor fails to remove and stockpile sufficient wetlands topsoil to cover the replication area, or in the event sufficient wetlands topsoil is not present, the Contractor shall provide, at no additional cost to the Owner, replacement wetlands topsoil. Replacement wetlands topsoil, if required, shall be provided by a licensed nursery and shall be similar in composition, texture, fertility, and as described in Section 2.01 BACKFILL. The final grading of the replacement wetlands topsoil shall be completed so as to result in no discontinuities in elevation upon removal of any siltation barrier or erosion control materials.

B. Upon completion of final grading, the surface of the new wetlands topsoil shall be shallowly harrowed (depth 3-inches), prior to planting.

C. Upon completion of grading, a final condition survey of the wetlands restoration and enhancement areas shall be performed by a licensed surveyor. Elevations shall be checked in numerous random locations, and shall be within 0.1 feet of the final planned surface elevation. Areas that do not meet the 0.1 foot criteria shall be regraded.

3.03 PLANTING SCHEDULE:

A. Spring planting of saplings and shrubs shall occur between 30 April and 15 June. Fall planting shall occur as dormant planting between 15 September and 30 October for saplings, and 15 September and 15 November for shrubs. If special conditions warrant a variance from the above planting schedules or conditions, and if in concurrence with the wetlands restoration specialist, the above dates can be modified only if recommended by the nursery and if all warranties still apply.

B. Planting and hydroseeding shall not occur when the ground is frozen, snow covered or in an unsuitable condition for planting.

C. All saplings, shrubs and emergent propagules shall be planted in the wetlands restoration and enhancement areas in accordance with a planting plan and schedule as indicated on the Final Plans. All saplings and shrub mixtures (within the wetlands restoration and enhancement areas) shall be planted randomly as indicated on the Final Plans. Sapling and shrub mixtures shall be planted randomly under the direction of the wetlands restoration specialist, with all planting locations no closer than 10 feet on center. Saplings and shrubs shall not be planted within ponds or standing water areas. No machinery or vehicles shall be allowed within the existing adjacent wetlands. Soil disturbances shall be kept to the minimum necessary to accommodate planting. Any extra soil (from pits) shall be removed from the wetland.

D. All balled and burlapped and container grown plants shall be handled and moved only by the root ball or container.

E. Pits for planting shall be dug to produce vertical sides and flat bottoms. The depth of pits shall be 6-inches deeper than the root ball. The diameter of the pits shall allow a minimum distance between the ball and the sides of the hole of 6-inches for shrubs and 10-inches for saplings. The bottom 4-inches of the pit shall be loosened with a shovel prior to planting.

F. Saplings and shrubs shall be set plumb and manually held in position until sufficient soil has been firmly placed around roots or ball. Saplings and shrubs shall be set at the same depth at which they were grown in the nursery or container.

G. Balled and burlapped stock shall be backfilled with soil to approximately half the depth of the ball and watered. Burlap and tying materials shall be carefully removed or folded back at the recommendation of the nursery. Plastic wrap shall be completely removed before placement of backfill. The remainder of backfill shall be tamped and watered.

H. Emergent plantings shall be planted by hand in random locations under the direction of the wetlands restoration specialist in locations designated by the Final Plans. Plantings shall be planted no closer than 2 feet on center.

I. Guying and staking of saplings shall only be required on taller individuals (5 feet), if recommended by the nursery.

3.04 HYDROSEEDING:

Hydroseeding shall accomplish seeding, fertilizing and mulching. Hydroseeded areas shall be seeded at a rate of 400 pounds per acre. Hydroseed application shall be conducted between 15 April and 15 June or 15 September to 30 October, or as recommended by the hydroseed contractor.

3.05 FERTILIZER APPLICATION:

Saplings and trees shall be fertilized at a rate of 0.25 pound of fertilizer per plant, or as recommended by the nursery. Fertilizer shall be worked 2- to 3-inches into the soil.

3.06 MOISTURE ENHANCER:

The moisture enhancer specified in Section 2.03 of this specification shall be applied to each planted shrub and sapling at a rate of 8 ounces per propagule and shall be broadcast around the root ball 3- to 4-inches below the surface.

3.07 MULCH:

Saplings and shrubs shall be mulched to a depth of 2-inches around the base of the pit, at the discretion of the wetlands restoration specialist.

3.08 WATERING:

All saplings and shrubs shall be watered by flooding the backfilled hole within the same working day of planting. Additional soil shall be added around each plant as required to compensate for settling.

3.09 PROTECTION:

Upon completion of construction activities within the wetlands restoration and enhancement areas, barricades or snow fencing shall be erected along upland areas adjacent to the wetland to prevent unauthorized access.

3.10 REPLANTING OF WETLANDS VEGETATION IN THE REPLICATION AREA:

A. In all wetlands, replication of the disturbed areas shall require replanting with indigenous wetland species. The Contractor shall have the option of digging, storing, and replanting existing trees, shrubs and groundcover and respreading stockpiled wetlands soil from the reservoir excavation area or, alternatively, providing and planting new wetland species at no additional cost to the Owner. The intent of this Section is to insure that at least 75 percent of the surface area of all disturbed wetlands is reestablished with indigenous wetland plant species within two growing seasons of their planting in accordance with the Massachusetts DEP Wetlands Protection Act Regulations. The growing season for wetlands revegetation areas shall be April 15 to October 15. Attention is called to the fact that wetlands to be replicated within the project site have been identified as shrub-scrub or shrub-sapling swamps. The wetland planting zones are schematically shown on the plans. Purple Loosestrife and Phragmites species shall not be planted in any wetland. If after 180 growing season days it is evident in the opinion of the Engineer that it is unlikely that the 75 percent reestablishment requirement will be achieved, the Contractor shall supplement the plantings as necessary to achieve the required coverage at no additional cost to the Owner. If at the end of two growing seasons, 75 percent reestablishment has not been achieved, the Contractor shall provide and plant additional new plant material to achieve 75 percent reestablishment at no additional cost to the Owner.

B. Wetland species are divided into planting groups (designated below) according to their moisture requirements during the growing season. Plantings are done at specified elevations based on the assumed mean water table. (These elevations to be adjusted by the Engineer based on the mean water table as determined during one growing season April 15 to October 15).

C. Wetland plantings shall be performed as designated on the Contract plans.

D. On average, for each 100 square feet of replication area, provide and plant a total of 2 shrubs, and for each 625 square feet of replication area to be revegetated, provide and plant one tree. Shrubs and trees will be spaced according to the Contract Plans.

E. New trees and shrubs shall be balled and burlapped or container grown Nursery Stock.

F. New trees shall be 1- to 1-1/2-inch caliper minimum. All plants selected for replanting shall be of the size specified on the Contract Drawings.

G. New shrubs shall be 24-inches in spread, minimum.

H. For each 100 square feet of replication area to be revegetated with replacement soil, provide and plant a total of 45 plants. New plants shall be a minimum size of 1-3/4-inch peat potted nursery stock, dormant rhizome, dormant tuber, dormant bulb, or bare root plant, as appropriate for the species and planting season. Plants shall be spaced according to Contract Plans.

I. All planting shall be supervised by a licensed nurseryman, qualified to do this work. At least four weeks prior to any wetland planting, the Contractor shall submit details of proposed planting methods, plant layout, and personnel qualifications for approval by the Engineer.

J. Wetland planting materials, operations, maintenance, inspection, and preliminary acceptance shall be as specified in Section 02930. Warranty and final inspection of all wetland plantings shall be a minimum of one year from the date of preliminary acceptance.

K. Maintenance shall be provided until final acceptance. Final acceptance shall be obtained as stipulated in the attached Order of Conditions.

3.11 EROSION CONTROL SEEDING FOR WETLANDS:

A. After wetland soil is respread, no further preparation for seeding is required or allowed. No fertilizer, limestone, superphosphate or other amendment shall be added to wetland soils. Seed mixture and application rates for this work shall follow the contract plans.

B. A wetland seed mixture containing a wide variety of seeds native to New England and which do not include any invasive plant species prohibited in the latest edition of the "Performance Guidelines and Supplemental Information on the Checklist for Review of Mitigation Plan", published by the U.S. Army Corps of Engineers New England Division. Application rates shall be one pound per 5000 square feet when used in an understory seeding and two pounds per 5000 square feet when used in a wet meadow seeding.

C. Where required by the Engineer, for reasons of excessive soil moisture, the wetland seed mixture shall be modified by the addition of an approved portion by weight of Winter Rye seed to provide soil stabilization cover in the fall.

3.12 WORK IN THE BUFFER ZONE (BZ):

A. When any work occurs in the Buffer Zone (BZ) within 100 feet of bordering vegetated wetlands (BVW), certain measures, as indicated on the Contract Drawings, shall be taken to protect the integrity of the wetlands.

B. A siltation barrier consisting of a continuous row of staked hay bales and a silt fence shall be placed between the BVW and the work area to prevent soil materials from entering the BVW from the BZ as shown on the Contract Drawings. This siltation barrier shall be inspected and maintained on a daily basis. Hay bales and silt fence are specified in Section 01570.

C. In general, storage of equipment or materials in BVW or BZ areas shall not be permitted. Storage of oil products or the repairing of vehicles and/or maintenance operations shall not be permitted in the BVW or BZ areas. Should the Engineer deem that the Contractor's activities are unnecessarily detrimental to the wetlands, the Engineer reserves the right to order the Contractor to immediately cease all activities on-site until the situation is resolved to the satisfaction of the Engineer.

END OF SECTION

Document1262

APPENDIX F:
Abutters List / Notice to Abutters

Notification to Abutters
Under the Massachusetts Wetlands Protection Act

In accordance with the second paragraph of Massachusetts General Laws Chapter 131, Section 40, you are hereby notified of the following:

A. The name of the **Applicant** is Town of Wayland

B. The Applicant has filed a Notice of Intent with the Wayland Conservation Commission for permission to remove, fill, dredge, or alter an Area Subject to Protection (Wetland Resource Area and/or Buffer Zone) Under the Massachusetts Wetlands Protection Act (General Laws Chapter 131, Section 40).

C. The **address** of the lot where the activity is proposed: 412 Commonwealth Road, Wayland, MA 01788 Map: 49 Lot: 064B

D. The **proposed activity** is: Development of a public multi-purpose atheltic playing field at the parcel designated for recreation with associated lighting, access parking and trail heads.

D. A **Public Hearing** regarding this Notice of Intent will be held on:
☐ Thursday, March 19, 2020 at 7:00 p.m. at Town Building. (41 Cochituate Road, Wayland, MA 01778)
☐ Information regarding the date, time, and place of the public hearing may be obtained from the applicant or the Wayland Conservation Commission (check website).

E. Copies of the Notice of Intent may be examined at **THE WAYLAND CONSERVATION COMMISSION OFFICE** at Wayland Town Building between the hours of 8:00 a.m. - 7:00 p.m. on Mondays, 8:00 a.m. - 4:00 p.m. Tuesday – Thursday, and 8:00 a.m. -12:30 p.m. on Fridays. For more information, call: 508-358-6339

F. Copies of the Notice of Intent may be obtained from either:
☐ The Applicant, or the Applicant's representative Town of Wayland-Recreation Department, by calling this telephone number: (508) 358-3660 between the hours of 8:00am - 4:00pm on the following days of the week: Monday through Thursday.

Note: Public Hearing Notice, including its date, time, and place, will be published at least 5 days in advance in the **Wayland Town Crier or MetroWest Daily News** (at the applicant's expense).

Note: You also may contact the Department of Environmental Protection (DEP) for more information about this application or the Wetlands Protection Act. To contact DEP (205B Lowell Street, Wilmington, MA 01887), call (978) 694-3200

Since you are receiving this notice, you may have wetland or riverfront resource areas on your property.
Therefore, construction, cutting, clearing, or grading may require a permit. For clarification or for more information, call the Conservation office 508-358-3669 or visit our web site:
http://www.wayland.ma.us/Pages/WaylandMA_Conservation/index

Town of Wayland
Assessing Department
41 COCHITUATE ROAD
WAYLAND MASSACHUSETTS 01778
www.wayland.ma.us TEL. 508-358-3788

OFFICE STAFF
Ellen M. Brideau, MAA, Director of Assessing
Don Clarke, MAA, Assistant Assessor
Jessica Marchant, MAA, Administrative Assessor
Savitri Ramgoolam, Department Assistant

BOARD OF ASSESSORS
Susan M. Rufo, Chair
Jayson Brodie, Vice Chair
Zachariah L. Ventress

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WAYLAND BOARD OF ASSESSORS

Certification of Abutters

Date of request 3/3/2020

Please plan your submission accordingly. The Assessors' office has 10 business days to certify an abutters list Per MGL Ch. 66, S.10

Address to be certified 412 Commonwealth Rd Parcel ID 49/064B (Map/Lot)

Owner's Name (PLEASE PRINT) TOW

Owner's Mailing Address 41 Cochituate Rd Wayland MA 01778

Name of Applicant (PLEASE PRINT) K. BRENNA Telephone: 6864

41 Cochituate Rd Wayland MA 01778
Mailing Address of Applicant City/Town State Zip

Signature of Applicant [signature]

Reason for List (check one) ☑ Conservation ☐ Health ☐ Planning ☐ Zoning

****Please check with the Board/Commission for their guidelines regarding the number of feet required for notification. Each Board/Commission has its own regulations for their abutters listing. There's no fee for certification, however the list/s of abutters must be provided by the person or company requesting certification. Please submit by mail, in person or fax to 508 358 0061.**

For use by Assessors

This is to certify that at the time of the last assessment for taxation made by the Town of Wayland, the names and addresses are the assessed owners to these parcels.

Certified By: Matt [signature] Date: 3-3-2020

CC: ☑ Conservation ☐ Health ☐ Planning ☐ Zoning ☑ RECREATION ☐ ADMINISTRATION

Abuttersrequestform.doc

47

100 foot Abutters List Report

Wayland, MA
March 03, 2020

Subject Property:

Parcel Number	CAMA Number	Property Address	Mailing Address
49-064B	49-064B	412 COMMONWEALTH RD	TOWN OF WAYLAND 41 COCHITUATE RD WAYLAND, MA 01778

Abutters:

Parcel Number	CAMA Number	Property Address	Mailing Address
48-093	48-093	26 RICE RD	RICE ROAD DEVELOPMENT, LLC 275 PLEASANT ST WATERTOWN, MA 02472
48-098	48-098	396 COMMONWEALTH RD	TOWN OF WAYLAND CONSERVATION 41 COCHITUATE ROAD WAYLAND, MA 01778
53-00WB	53-025A	100 WILLOWBROOK DR	SKOLNICK NANCY F TRUSTEE NANCY SKOLNICK TRUST U/D/T 100 WILLOWBROOK DR WAYLAND, MA 01778
53-00WB	53-025B	101 WILLOWBROOK DR	FISHMAN MARJORIE 101 WILLOWBROOK DR WAYLAND, MA 01778
53-00WB	53-025C	102 WILLOWBROOK DR	FERDINAND JENNIFER 102 WILLOW BROOK DR WAYLAND, MA 01778
53-00WB	53-026A	103 WILLOWBROOK DR	FANGER STEPHANIE 103 WILLOW BROOK DR WAYLAND, MA 01778
53-00WB	53-026B	104 WILLOWBROOK DR	DIAZ SYLVIA C 104 WILLOW BROOK DR WAYLAND, MA 01778
53-00WB	53-026C	105 WILLOWBROOK DR	TORRES JUAN C PO BOX 7814 PONCE, PR 00732
53-00WB	53-026D	106 WILLOWBROOK DR	FILIPE LEONOR M HINCKLEY LOUIS E T/E 106 WILLOWBROOK DR WAYLAND, MA 01778
53-00WB	53-027A	107 WILLOWBROOK DR	KALOUST KIMBERLY KALOUST FIORELLA T/E 107 WILLOWBROOK DR WAYLAND, MA 01778

100 foot Abutters List Report

Wayland, MA
March 03, 2020

Parcel Number	CAMA Number	Property Address	Mailing Address
53-00WB	53-027B	108 WILLOWBROOK DR	CLIFFORD REBECCA J 108 WILLOWBROOK DR WAYLAND, MA 01778
53-00WB	53-027C	109 WILLOWBROOK DR	GUMATAY ROMAN F II GUMATAY BRENDA J 109 WILLOW BROOK DR WAYLAND, MA 01778
53-00WB	53-027D	110 WILLOWBROOK DR	WEISMAN LAURENCE & ONEILL MARY F TRUSTEE ONEILL WEISMAN FAMILY TRUST 110 WILLOW BROOK DR WAYLAND, MA 01778
53-00WB	53-028A	111 WILLOWBROOK DR	CHUANG SHIH-MIN 111 WILLOWBROOK DR WAYLAND, MA 01778
53-00WB	53-028B	112 WILLOWBROOK DR	NEWBERG MARLENE D 112 WILLOW BROOK DR WAYLAND, MA 01778
53-00WB	53-029A	200 WILLOWBROOK DR	FRANKLIN CAROL 200 WILLOW BROOK DR WAYLAND, MA 01778
53-00WB	53-029B	201 WILLOWBROOK DR	HATCH THEODORE F JR TRUSTEE THEODORE F HATCH JR TRUST 201 WILLOWBROOK DR WAYLAND, MA 01778
53-00WB	53-029C	202 WILLOWBROOK DR	PAYNE BURTON S JR PAYNE FELICIA F T/E 202 WILLOW BROOK DR WAYLAND, MA 01778
53-00WB	53-029D	203 WILLOWBROOK DR	SAX CAROL A CHUBOY & SAX JOHN TRUSTEES CAROL ANN CHUBOY SAX TRUST 203 WILLOW BROOK DR WAYLAND, MA 01778
53-00WB	53-030A	204 WILLOWBROOK DR	MENACHEM MARSHALL MENACHEM MARJORIE H T/E 204 WILLOWBROOK DR WAYLAND, MA 01778
53-00WB	53-030B	205 WILLOWBROOK DR	RUGGIERE LISA A 205 WILLOWBROOK DR WAYLAND, MA 01778
53-00WB	53-030C	206 WILLOWBROOK DR	SLEEPER MARTIN E 206 WILLOWBROOK DR WAYLAND, MA 01778

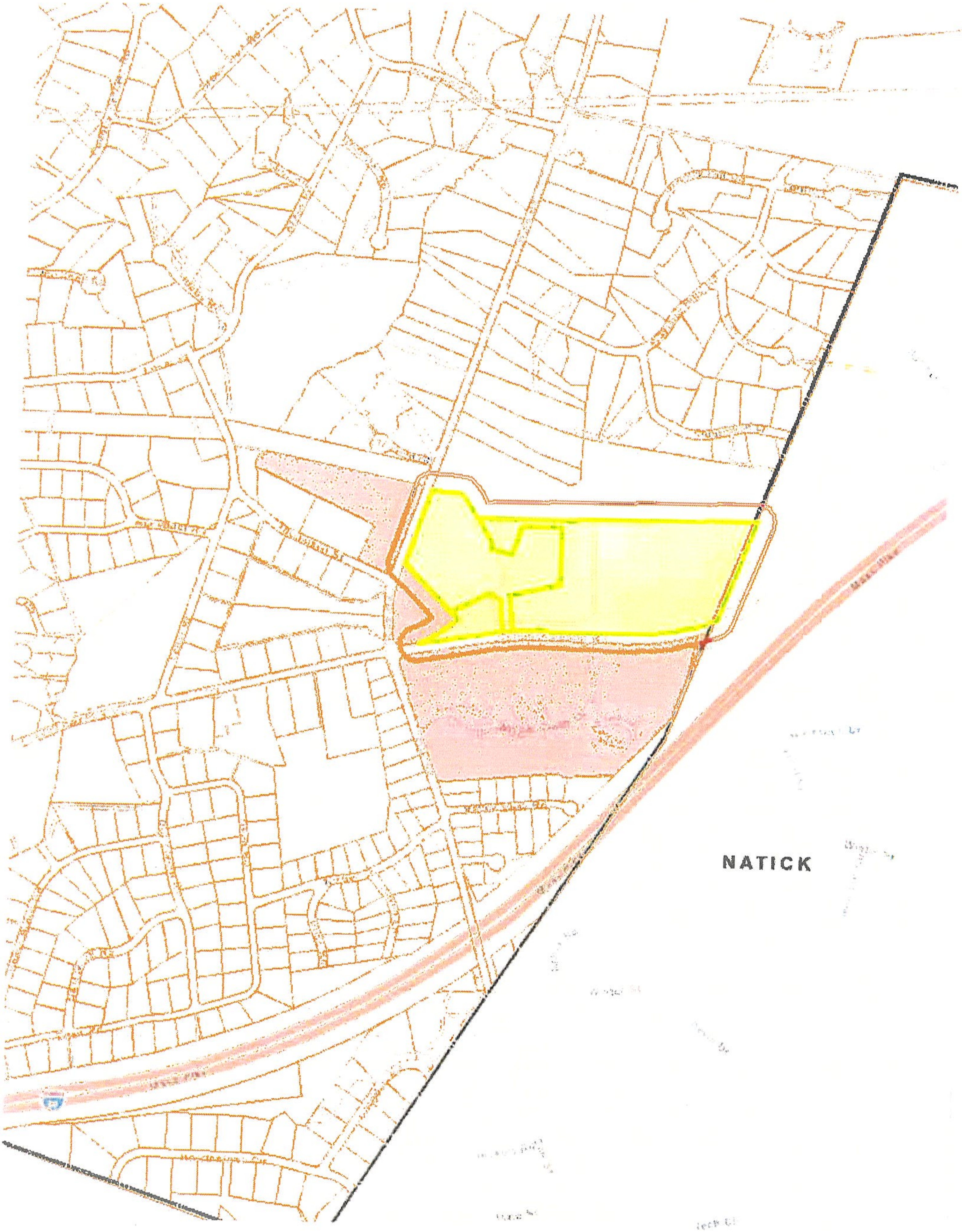
100 foot Abutters List Report

Wayland, MA
March 03, 2020

Parcel Number:	53-00WB	Mailing Address:	UVEGES GEORGE UVEGES V RENEE
CAMA Number:	53-030D		207 WILLOWBROOK DR
Property Address:	207 WILLOWBROOK DR		WAYLAND, MA 01778
Parcel Number:	53-00WB	Mailing Address:	MARSHALL DAVID F MARSHALL PATRICIA A
CAMA Number:	53-031A		208 WILLOWBROOK DR
Property Address:	208 WILLOWBROOK DR		WAYLAND, MA 01778
Parcel Number:	53-00WB	Mailing Address:	DEANGELIS STEVEN L MAHONEY KERRY L
CAMA Number:	53-031B		209 WILLOWBROOK DR
Property Address:	209 WILLOWBROOK DR		WAYLAND, MA 01778
Parcel Number:	53-00WB	Mailing Address:	GIBBONS JOSEPH N WYNNE STEVEN M
CAMA Number:	53-031C		210 WILLOWBROOK DR
Property Address:	210 WILLOWBROOK DR		WAYLAND, MA 01778
Parcel Number:	53-00WB	Mailing Address:	KHROMOVA SVETLANA
CAMA Number:	53-031D		211 WILLOWBROOK DR
Property Address:	211 WILLOWBROOK DR		WAYLAND, MA 01778
Parcel Number:	53-00WB	Mailing Address:	SYLVETSKY AMY GOODMAN
CAMA Number:	53-032A		212 WILLOWBROOK DR
Property Address:	212 WILLOWBROOK DR		WAYLAND, MA 01778
Parcel Number:	53-00WB	Mailing Address:	JENKINS-CRITIDES JENNIFER
CAMA Number:	53-032B		213 WILLOWBROOK DR
Property Address:	213 WILLOWBROOK DR		WAYLAND, MA 01778
Parcel Number:	53-00WB	Mailing Address:	COHEN ALAN B COHEN HELAINE H T/E
CAMA Number:	53-032C		214 WILLOWBROOK DR
Property Address:	214 WILLOWBROOK DR		WAYLAND, MA 01778
Parcel Number:	53-00WB	Mailing Address:	COHEN HOWARD A
CAMA Number:	53-033A		300 WILLOWBROOK DR
Property Address:	300 WILLOWBROOK DR		WAYLAND, MA 01778
Parcel Number:	53-00WB	Mailing Address:	FILIPE URANIA M TRUSTEE THE URANIA M FILIPE LIVING TRUST
CAMA Number:	53-033B		301 WILLOWBROOK DR
Property Address:	301 WILLOWBROOK DR		WAYLAND, MA 01778
Parcel Number:	53-00WB	Mailing Address:	TIERNEY JOSEPH W JR LANGLEY CHRISTINE T/E
CAMA Number:	53-034A		302 WILLOWBROOK DR
Property Address:	302 WILLOWBROOK DR		WAYLAND, MA 01778
Parcel Number:	53-00WB	Mailing Address:	DEITCHMAN SHEILA R
CAMA Number:	53-034B		303 WILLOWBROOK DR
Property Address:	303 WILLOWBROOK DR		WAYLAND, MA 01778

Parcel Number: 53-00WB CAMA Number: 53-034C Property Address: 304 WILLOWBROOK DR	Mailing Address: GLENN DAVID T GLENN KIM M T/E 304 WILLOWBROOK DR WAYLAND, MA 01778
Parcel Number: 53-00WB CAMA Number: 53-034D Property Address: 305 WILLOWBROOK DR	Mailing Address: ~~GHATTAS RAMY~~ ROBERT E. KELLIHER, JR. 305 WILLOWBROOK DR WAYLAND, MA 01778
Parcel Number: 53-00WB CAMA Number: 53-035A Property Address: 306 WILLOWBROOK DR	Mailing Address: SAVEL BARBARA A 306 WILLOWBROOK DR WAYLAND, MA 01778
Parcel Number: 53-00WB CAMA Number: 53-035B Property Address: 307 WILLOWBROOK DR	Mailing Address: SALVUCCI PAUL SALVUCCI JUDITH A T/E 307 WILLOWBROOK DR WAYLAND, MA 01778
Parcel Number: 53-00WB CAMA Number: 53-035C Property Address: 308 WILLOWBROOK DR	Mailing Address: HSIE CHANG-ER 308 WILLOWBROOK DR WAYLAND, MA 01778
Parcel Number: 53-00WB CAMA Number: 53-035D Property Address: 309 WILLOWBROOK DR	Mailing Address: MEHLMAN ELLEN F MEHLMAN JONATHAN P T/E 309 WILLOWBROOK DR WAYLAND, MA 01778
Parcel Number: 53-00WB CAMA Number: 53-036A Property Address: 310 WILLOWBROOK DR	Mailing Address: SWARTZ JODI L CENTURY BANK & TRUST CO/COMSUMER LENDING 400 MYSTIC AVE MEDFORD, MA 02155
Parcel Number: 53-00WB CAMA Number: 53-036B Property Address: 311 WILLOWBROOK DR	Mailing Address: AGNES EILEEN D 311 WILLOWBROOK DR WAYLAND, MA 01778
Parcel Number: 53-00WB CAMA Number: 53-036C Property Address: 312 WILLOWBROOK DR	Mailing Address: REILLY NORBERTA J & THOMAS J TRUSTEES NORBETTA J. REILLY 1998 REVOCABLE TRUST 312 WILLOWBROOK DR WAYLAND, MA 01778
Parcel Number: 53-00WB CAMA Number: 53-036D Property Address: 313 WILLOWBROOK DR	Mailing Address: ROSSMAN NANCY ROSSMAN RICHARD T/E 313 WILLOWBROOK DR WAYLAND, MA 01778
Parcel Number: 53-00WB CAMA Number: 53-037A Property Address: 314 WILLOWBROOK DR	Mailing Address: LILIENTHAL JANET L 314 WILLOWBROOK DR WAYLAND, MA 01778
Parcel Number: 53-00WB CAMA Number: 53-037B Property Address: 315 WILLOWBROOK DR	Mailing Address: HINDERHOFER KATHRYN M & JOSEPH J TRUSTEE KATHRYN M HINDERHOFER REVOCABLE TRUST 315 WILLOWBROOK DR WAYLAND, MA 01778

MGL
3-3-2020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0 foot Abutters List Report

Wayland, MA

March 04, 2020

Subject Property:

Parcel Number:	49-064B	Mailing Address:	TOWN OF WAYLAND 41 COCHITUATE RD WAYLAND, MA 01778
CAMA Number:	49-064B		
Property Address:	412 COMMONWEALTH RD		

Abutters:

Parcel Number:	48-098	Mailing Address:	TOWN OF WAYLAND CONSERVATION 41 COCHITUATE ROAD WAYLAND, MA 01778
CAMA Number:	48-098		
Property Address:	396 COMMONWEALTH RD		

AGNES EILEEN D
311 WILLOWBROOK DR
WAYLAND, MA 01778

CHUANG SHIH-MIN
111 WILLOWBROOK DR
WAYLAND, MA 01778

CLIFFORD REBECCA J
108 WILLOWBROOK DR
WAYLAND, MA 01778

COHEN ALAN B
COHEN HELAINE H T/E
214 WILLOWBROOK DR
WAYLAND, MA 01778

COHEN HOWARD A
300 WILLOWBROOK DR
WAYLAND, MA 01778

DEANGELIS STEVEN L
MAHONEY KERRY L
209 WILLOWBROOK DR
WAYLAND, MA 01778

DEITCHMAN SHEILA R
303 WILLOWBROOK DR
WAYLAND, MA 01778

DIAZ SYLVIA C
104 WILLOW BROOK DR
WAYLAND, MA 01778

FANGER STEPHANIE
103 WILLOW BROOK DR
WAYLAND, MA 01778

FERDINAND JENNIFER
102 WILLOW BROOK DR
WAYLAND, MA 01778

FILIPE LEONOR M
HINCKLEY LOUIS E T/E
106 WILLOWBROOK DR
WAYLAND, MA 01778

FILIPE URANIA M TRUSTEE
THE URANIA M FILIPE LIVIN
301 WILLOWBROOK DR
WAYLAND, MA 01778

FISHMAN MARJORIE
101 WILLOWBROOK DR
WAYLAND, MA 01778

FRANKLIN CAROL
200 WILLOW BROOK DR
WAYLAND, MA 01778

GHATTAS RAMY
305 WILLOWBROOK DR
WAYLAND, MA 01778

GIBBONS JOSEPH N
WYNNE STEVEN M
210 WILLOWBROOK DR
WAYLAND, MA 01778

GLENN DAVID T
GLENN KIM M T/E
304 WILLOWBROOK DR
WAYLAND, MA 01778

GUMATAY ROMAN F II
GUMATAY BRENDA J
109 WILLOW BROOK DR
WAYLAND, MA 01778

HATCH THEODORE F JR TRUS
THEODORE F HATCH JR TRUST
201 WILLOWBROOK DR
WAYLAND, MA 01778

HINDERHOFER KATHRYN M & J
KATHRYN M HINDERHOFER REV
315 WILLOWBROOK DR
WAYLAND, MA 01778

HSIE CHANG-ER
308 WILLOWBROOK DR
WAYLAND, MA 01778

JENKINS-CRITIDES JENNIFER
213 WILLOWBROOK DR
WAYLAND, MA 01778

KALOUST KIMBERLY
KALOUST FIORELLA T/E
107 WILLOWBROOK DR
WAYLAND, MA 01778

KHROMOVA SVETLANA
211 WILLOWBROOK DR
WAYLAND, MA 01778

LILIENTHAL JANET L
314 WILLOWBROOK DR
WAYLAND, MA 01778

MARSHALL DAVID F
MARSHALL PATRICIA A
208 WILLOWBROOK DR
WAYLAND, MA 01778

MEHLMAN ELLEN F
MEHLMAN JONATHAN P T/E
309 WILLOWBROOK DR
WAYLAND, MA 01778

MENACHEM MARSHALL
MENACHEM MARJORIE H T/E
204 WILLOWBROOK DR
WAYLAND, MA 01778

NEWBERG MARLENE D
112 WILLOW BROOK DR
WAYLAND, MA 01778

PAYNE BURTON S JR
PAYNE FELICIA F T/E
202 WILLOW BROOK DR
WAYLAND, MA 01778

REILLY NORBERTA J & THOMA
NORBETTA J. REILLY 1998 R
312 WILLOWBROOK DR
WAYLAND, MA 01778

RICE ROAD DEVELOPMENT, LL
275 PLEASANT ST
WATERTOWN, MA 02472

ROSSMAN NANCY
ROSSMAN RICHARD T/E
313 WILLOWBROOK DR
WAYLAND, MA 01778

RUGGIERE LISA A
205 WILLOWBROOK DR
WAYLAND, MA 01778

SALVUCCI PAUL
SALVUCCI JUDITH A T/E
307 WILLOWBROOK DR
WAYLAND, MA 01778

SAVEL BARBARA A
306 WILLOWBROOK DR
WAYLAND, MA 01778

SAX CAROL A CHUBOY & SAX
CAROL ANN CHUBOY SAX TRUS
203 WILLOW BROOK DR
WAYLAND, MA 01778

SKOLNICK NANCY F TRUSTEE
NANCY SKOLNICK TRUST U/D/
100 WILLOWBROOK DR
WAYLAND, MA 01778

SLEEPER MARTIN E
206 WILLOWBROOK DR
WAYLAND, MA 01778

SWARTZ JODI L
CENTURY BANK & TRUST CO/C
400 MYSTIC AVE
MEDFORD, MA 02155

SYLVETSKY AMY GOODMAN
212 WILLOWBROOK DR
WAYLAND, MA 01778

TIERNEY JOSEPH W JR
LANGLEY CHRISTINE T/E
302 WILLOWBROOK DR
WAYLAND, MA 01778

TORRES JUAN C
PO BOX 7814
PONCE, PR 00732

TOWN OF WAYLAND
CONSERVATION
41 COCHITUATE ROAD
WAYLAND, MA 01778

UVEGES GEORGE
UVEGES V RENEE
207 WILLOWBROOK DR
WAYLAND, MA 01778

WEISMAN LAURENCE & ONEILL
ONEILL WEISMAN FAMILY TRU
110 WILLOW BROOK DR
WAYLAND, MA 01778

APPENDIX G:
Wetlands Memorandum

5 Centennial Drive, Peabody, MA 01960 (HQ)
Tel: 978.532.1900

MEMORANDUM

TO: Cassidy Chroust

FROM: Mel Higgins, PWS

DATE: April 23, 2018

SUBJECT: Wetland Delineation
Loker Conservation and Recreation Area
Wayland, Massachusetts

On April 13, 2018, the presence of wetland resources was investigated on at the Loker Conservation and Recreation Area, located at 410 Commonwealth Road in Waymouth, MA.

Wetland resource areas including top of bank of three small ponds and top of bank of two intermittent streams were identified and flagged in the field using pink flagging by a Weston & Sampson employee who is trained in the wetland delineation process using the Massachusetts Department of Environmental Protection (MassDEP) manual "*Delineating Bordering Vegetated Wetlands Under the Massachusetts Wetlands Protection Act*" and the US Army Corps of Engineers' *Wetland Delineation Manual*. The location and flag numbering system can be seen on the attached field map.

Site Hydrology

The upgradient-most surface water body is a small pond to the north of the parking spaces, noted as "Pond 3", below. This pond is dammed at its southern extent, near the parking spaces. Water flows over the small stop blocks and through a culvert which runs beneath the parking spaces/access road. Upon exiting the culvert, the water flows in a southerly direction through an intermittent stream and into a small pond named "Pond 1", below. Water from Pond 1 exits to the east, through a culvert below the access road, and outfalls into "Pond 2", mentioned below. There did not appear to be an exit for the surface water at Pond 2.

A further description of these wetland resource areas is presented, below.

Pond 1 (Top of Bank)

The first of three small ponds delineated at the site is located west of the site access road, just north of Commonwealth Road. Flags left in the field indicating top of bank were TOB-A1 through TOB-A15. The top of bank was identified as the first natural break in slope, and often had a near vertical slope. Bordering vegetated wetlands (BVW) were not noted upgradient of the top of bank.

Pond 2 (Top of Bank)

The second of three small ponds delineated at the site is located east of the site access road, just north of Commonwealth Road. Flags left in the field indicating top of bank were TOB-B1 through TOB-B21. The top of bank was identified as the first natural break in slope, and often had a near vertical slope. Bordering vegetated wetlands (BVW) were not noted upgradient of the top of bank.

Pond 3 (Top of Bank)

The third of three small ponds delineated at the site is located north of the parking spaces at the site. Flags left in the field indicating top of bank were TOC-C1 through TOB-C18. The top of bank was identified as the first natural break in slope, and often had a near vertical slope. Bordering vegetated wetlands (BVW) were not noted upgradient of the top of bank.

Intermittent Stream Banks

Two intermittent streams were identified downgradient from Pond 3 which can convey water from Pond 3 to Pond 1. The first intermittent stream originated from the northern access road culvert and flows in a southerly direction until it joins with the Pond 1 bank. At the time of the site visit, water was flowing in this intermittent stream. The eastern edge of the intermittent stream bank was flagged in the field with flags ISB-A1 through ISB-A6. The top of bank was identified as the first natural break in slope, and often had a near vertical slope.

The second intermittent stream also originated from the northern culvert, and flows in a westerly direction, eventually changing course and heading in a southerly direction until it intersects with the northern bank of Pond 1. At the time of this field effort, there was no surface water flowing in this intermittent stream. The northern, and then western, bank of this second intermittent stream was flagged, leaving flags ISB-A1 through ISB-A15 in the field. The top of bank was identified as the first natural break in slope, and often had a near vertical slope.

Attached please find a field map showing the wetland limits flagged in the field with associated wetland flag numbers.

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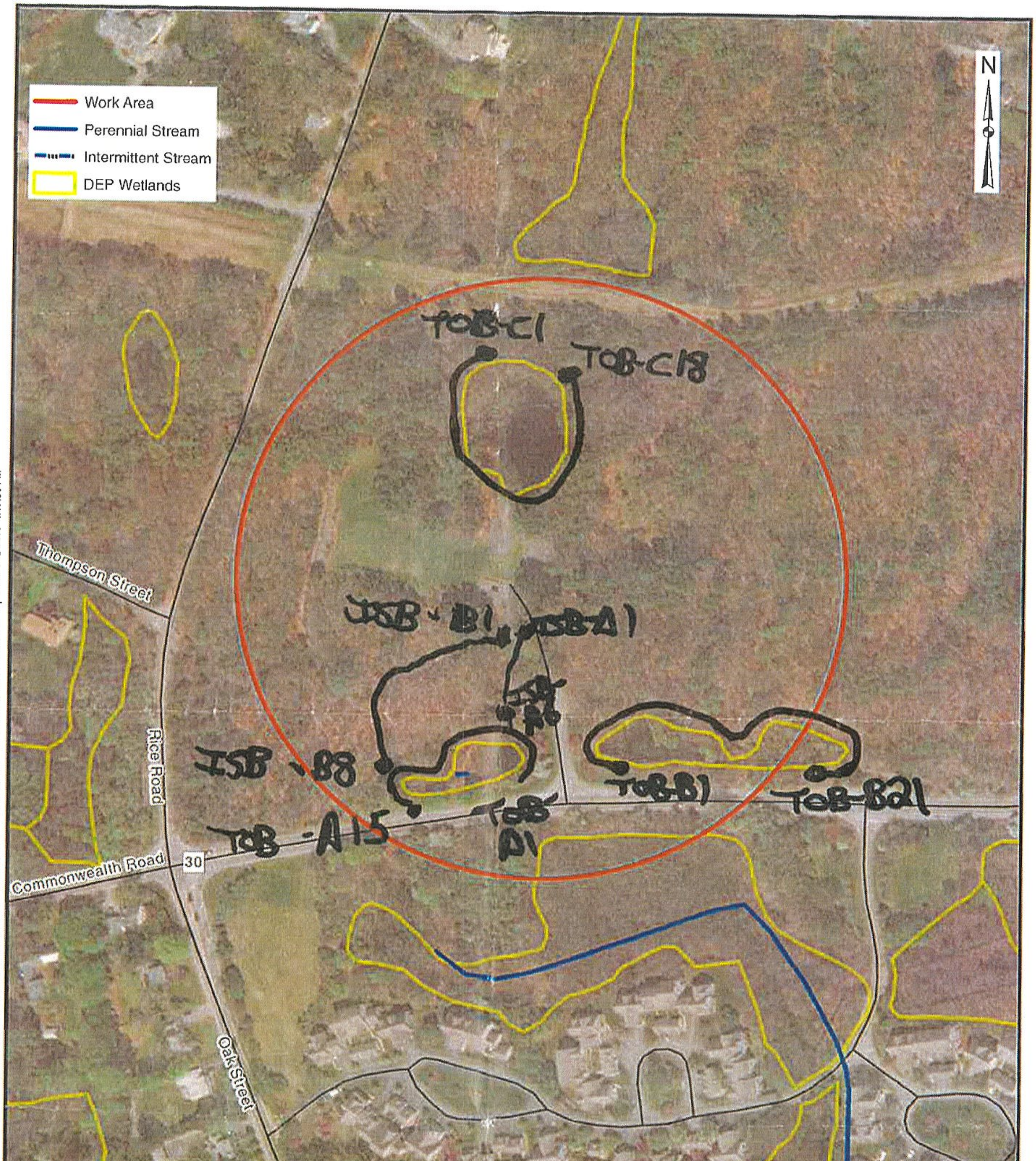

FIGURE 1
Loker Conservation and Recreation Area
Wayland, Massachusetts

WETLANDS FIELD MAP

200 0 200
Scale In Feet

Weston & Sampson

Path: \\wse03.local\WSE\Depts\Water\ERMAP\GIS - Constraints Mapping\Wayland\Loker Park and Rec\wetlands field map Loker.mxd User: higginsm Saved: 4/12/2018 4:15:30 PM Opened: 4/12/2018 4:17:50 PM

APPENDIX H:
Tree Memorandum

1 Winners Circle, Suite 130, Albany, NY 12205
Tel: 518.463.4400

MEMORANDUM

TO: Brandon Kunkle, RLA - Project Manager

FROM: Daniel Biggs, RLA, ISA

DATE: July 17, 2018

SUBJECT: Town of Wayland - Loker Conservation and Recreation Area Tree Assessment

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Per your request, June 19th-22nd, Weston & Sampson staff completed an assessment of the existing forested areas at the Loker Conservation and Recreation Area, per Town of Wayland Chapter 193 Stormwater Management and Land Disturbance by-laws and Town of Wayland Conservation Commission Chapter 194 (D-768) Wetlands and Water Resources by-law. The Loker Conservation and Recreation Area is currently utilized as a passive recreation area with patrons utilizing existing trails which are partly in the recreation area and primarily throughout the greater conservation area lands. The project area currently consists of a mowed grass area on the western portion of the site, areas with remnants of pavement from the site's previous use as a Dow Chemical research facility and is bordered by volunteer species and established woodlands. Three ponds with associated wetlands exist on the northern and southern ends of the site.

Three wooded areas adjacent to wetlands were assessed between the 30' and 100' wetland buffer boundaries. Trees between the edge of wetland and 30' wetland buffer were not assessed because there will be no disturbance within this buffer. Upland area trees within the area of proposed disturbance were also included in this assessment.

The tree inventory and assessment identified species, size (DBH), condition, and rating per the *Guide for Plant Appraisal (9th edition, 2000)* authored by the *Council of Tree & Landscape Appraisers*, and *Tree Species Rating Guide for New England* authored by the *New England Chapter of the International Society of Arboriculture (2nd edition)*. Forest stand limits within the proposed areas of disturbance were approximate, measured with a handheld GPS with an accuracy range of 2'-5' under heavy leaf cover. The inventory was conducted during the summer; therefore, the identification of Oak species should be considered approximate—common identifiers (buds/acorns) were not present. Trees greater than 4" diameter breast height (DBH) were assessed, and trees smaller than 4" DBH were noted but not included as part of this study. An herbaceous species inventory was not conducted.

Existing Forest Composition:

The forest areas within the inventory limits consist of a Laurentian Mixed Forest type, a transitional mixed forest between the continent's two biggest forest types: coniferous boreal forest and the eastern deciduous forest. Much of the forest appears to be in a steady state of succession, and the canopy has gradually transitioned from a conifer-dominated landscape to that of a mixed broadleaf-conifer type. The overstory species mosaic is composed of a mix of deciduous and coniferous trees. Evergreen species predominately consist of Eastern White Pine, Red Pine, and Eastern Red Cedar, which are common pioneer species found after disturbance. These conifers are mixed with broadleaf trees in varying abundance on the site—primarily composed of Oaks (Red, Black), Red Maple, Cherry (less frequent), Hickory, and Beech. The dominant canopy species ranged in size from 4" to 33.9". The understory primarily consisted of Serviceberry, Cherry, Glossy Buckthorn, and Alder. Moderate invasive and shrubby species exist within the study area and are primarily located on the fringe/ edges of the forest where disturbance has occurred. The exception to this rule is the Glossy Buckthorn, which can be found distributed throughout the forest area. A uniform groundcover of herbaceous material was present at the time of the assessment. A complete inventory of trees within the study area can be found in the following documents: Attachment A – Wetland Buffer Areas and Attachment B – Upland Areas.

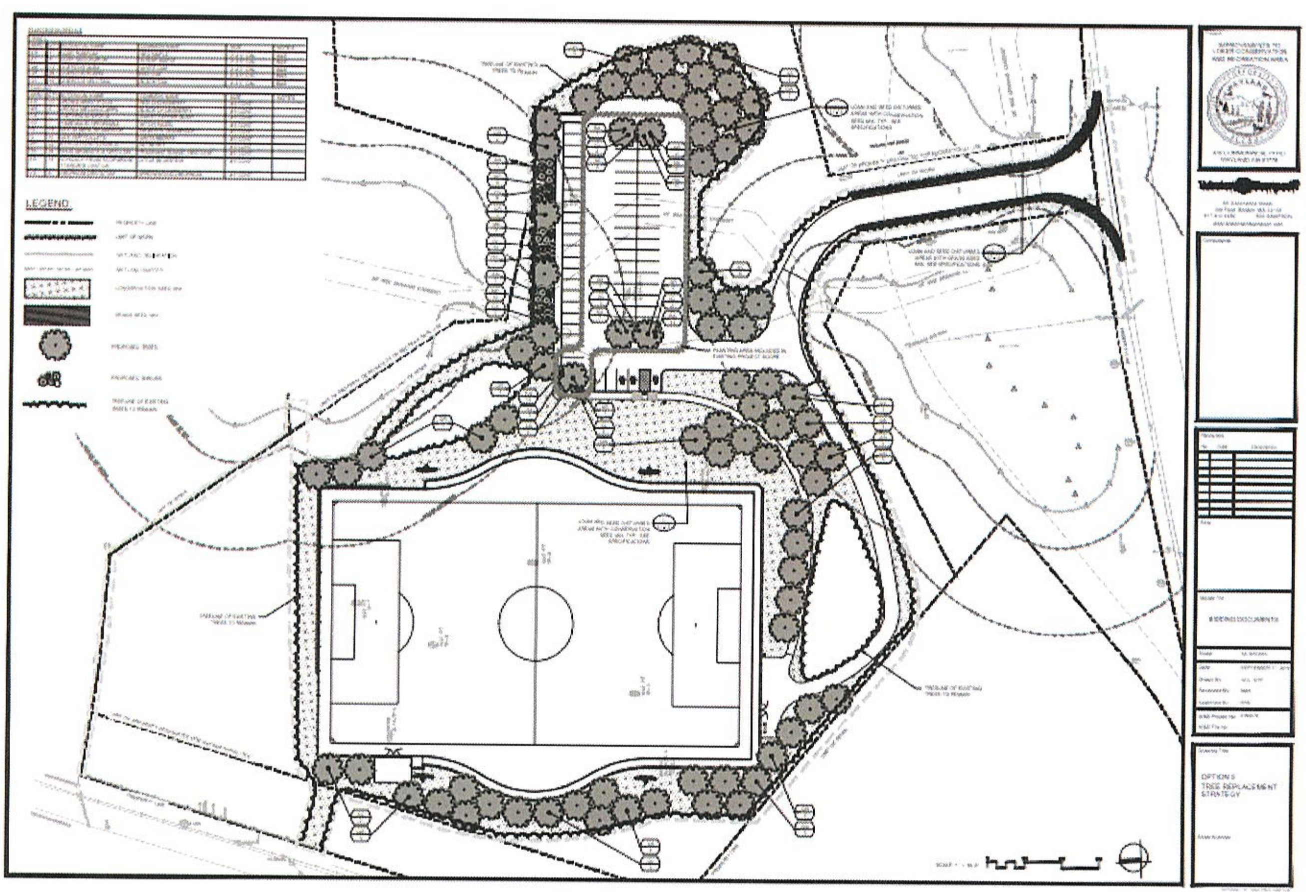
FAQ 5. *How many trees will be cut down?*

Approximately 45 trees in the wetlands area are planned to be removed and require replacement, and an additional 268 in upland areas will be removed. The design includes a replacement planting plan that will replant 221 new trees and shrubs.

	LOKER	POOR CONDITION	XS <6"	SM 6"-12"	MED 12"-24"	LRG 24"+	TOTAL
2	UPLANDS	46	71	122	86	10	335
3	WETLANDS	2	9	15	26	4	56
4		**48**	**80**	**137**	**112**	**14**	**391**

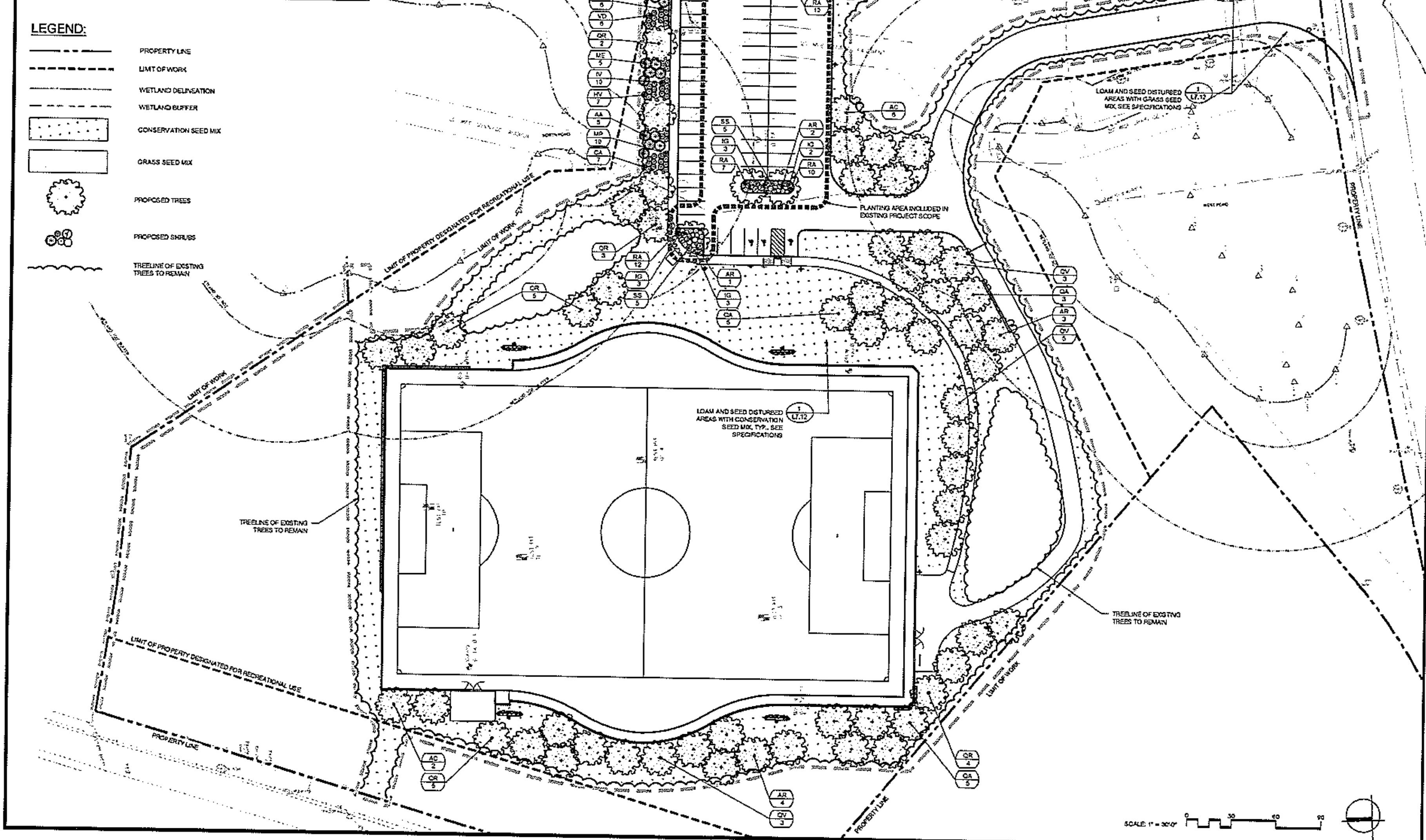
In order to build a field a number of trees will need to be removed. The project requires the removal approximately 45 trees in the wetlands area. These trees are required to be replaced one-for-one by the Conservation permits. An additional 268 trees will be removed from the upland area. The Loker recreation area has sat vacant since 2000, from the aerial view you can see the already cleared areas where the Dow Chemical building once stood, the surrounding area is heavily wooded. To mitigate for the loss of trees at the site, the design includes a proposed tree replacement planting plan that will replant 221 new trees and shrubs. The tree inventory was conducted in the summer of 2018, these counts are considered approximate today.

1. Aerial View Overlay (shows wooded areas, with some developed / paved areas)
2. Proposed Replacement Planting Plan, Option 5



PLANTING SCHEDULE

TREES					
ABRV.	QTY	BOTANICAL NAME	COMMON NAME	SIZE	NOTES
AR	17	ACER RUBRUM	RED MAPLE	2'-2.5" CAL.	B&B
AC	8	ACER SACCHARUM	SUGAR MAPLE	2'-2.5" CAL.	B&B
QA	13	QUERCUS ALBA	WHITE OAK	2'-2.5" CAL.	B&B
QR	26	QUERCUS RUBRA	RED OAK	2'-2.5" CAL.	B&B
QV	16	QUERCUS VELUTINA	BLACK OAK	2'-2.5" CAL.	B&B
SHRUBS					
ABRV.	QTY	BOTANICAL NAME	COMMON NAME	SIZE	NOTES
AA	10	ARONIA ARBUTIFOLIA	RED CHOKEBERRY	#3 CONT.	
ME	5	ARONIA MELANOCARPA	BLACK CHOKEBERRY	#3 CONT.	
CA	7	CLETHRA ALNIFOLIA	SWEET PEPPER BUSH	#3 CONT.	
HV	7	HAMAMELIS VIRGINIANA	WITCH HAZEL	#3 CONT.	
IG	14	ILEX GLABRA 'SHAMROCK'	INKBERRY 'SHAMROCK'	#3 CONT.	
IV	10	ILEX VERTICILLATA	WINTERBERRY	#3 CONT.	
MP	10	MYRICA PENSYLVANICA	BAYBERRY	#3 CONT.	
RA	45	RHUS AROMATICA 'GRO-LOW'	FRAGRANT SUMAC 'GRO-LOW'	#3 CONT.	
SS	18	SCHIZACHYRIUM SCOPARIUM 'STANDING OVATION'	LITTLE BLUESTEM	#3 CONT.	
VD	6	VIBURNUM DENTATUM	ARROWWOOD VIBURNUM	#3 CONT.	



Project:
IMPROVEMENTS TO LOKER CONSERVATION AND RECREATION AREA
410 COMMONWEALTH RD, WAYLAND, MA 01778

Weston & Sampson
55 Devonshire Street, 3rd Floor, Boston, MA 02109
617.412.4480 800.SAMPSON
www.westonandsampson.com

Consultants:

Revisions:		
No.	Date	Description

Seal:

Issued For:
BIDDING DOCUMENTS

Scale:	AS SHOWN
Date:	SEPTEMBER 17, 2018
Drawn By:	CCC, DYF
Reviewed By:	BMK
Approved By:	ERB
W&S Project No:	2180078
W&S File No:	

Drawing Title:
OPTION 5
TREE REPLACEMENT STRATEGY

Sheet Number:

Town of Wayland - Loker Conservation and Recreation Area

Attachment A: Tree Inventory/ Assessment - Wetland Buffer Areas

GENUS	SPECIES	DIAMETER BREAST HEIGHT (DBH) - INCHES	CONDITION	RATING	Replacement Count Per Guidelines
Quercus	velutina	4	good	90-100	1
Quercus	alba	4	good	90-100	1
Acer	rubrum	4.1	good	70-80	1
Quercus	rubra	4.7	good	50-60	1
Acer	rubrum	5.1	good	50-60	1
Fagus	grandifolia	5.6	good	90-100	1
Carya	ovata	6.2	good	70-80	2
Quercus	rubra	6.2	good	90-100	2
Quercus	rubra	6.5	good	90-100	2
Quercus	rubra	6.8	good	90-100	2
Pinus	resinosa	7.8	good	50-60	2
Pinus	resinosa	8.4	good	50-60	2
Pinus	resinosa	8.5	good	50-60	2
Pinus	strobus	9.9	good	80-90	2
Quercus	rubra	10.5	good	90-100	2
Pinus	resinosa	10.7	good	50-60	2
Quercus	rubra	11.7	good	90-100	2
Pinus	strobus	12.1	good	80-90	3
Quercus	rubra	12.3	good	90-100	3
Pinus	strobus	12.6	good	80-90	3
Pinus	resinosa	12.7	good	50-60	3
Pinus	strobus	12.7	good	80-90	3
Quercus	rubra	13.5	good	90-100	3
Pinus	resinosa	16	good	50-60	3
Pinus	resinosa	16	good	80-90	3
Quercus	rubra	16.7	good	90-100	3
Quercus	alba	16.8	good	90-100	3
Pinus	strobus	18.5	good	80-90	5
Pinus	strobus	18.6	good	80-90	5
Pinus	strobus	18.8	good	80-90	5
Pinus	strobus	20.1	good	80-90	5
Pinus	strobus	21	good	80-90	5
Pinus	strobus	24.8	good	80-90	5
Quercus	velutina	25.7	good	90-100	7
Pinus	strobus	30.6	good	80-90	7
Pinus	strobus	33.2	good	80-90	7
Malus	spp.	4.5,3,2	good	60-70	1
Quercus	velutina	4.2	fair	90-100	1
Acer	rubrum	4.5	fair	70-80	1
Quercus	rubra	6.4	fair	90-100	2
Pinus	resinosa	10.9	fair	50-60	2
Pinus	resinosa	11.7	fair	50-60	2
Pinus	strobus	11.9	fair	80-90	2
Pinus	resinosa	13.7	fair	50-60	3
Pinus	resinosa	13.8	fair	50-60	3
Juniperus	virginiana	13.8	fair	60-70	3

Town of Wayland - Loker Conservation and Recreation Area

Attachment A: Tree Inventory/ Assessment - Wetland Buffer Areas

GENUS	SPECIES	DIAMETER BREAST HEIGHT (DBH) - INCHES	CONDITION	RATING	Replacement Count Per Guidelines
Acer	rubrum	14.5	fair	70-80	3
Quercus	rubra	15.1	fair	90-100	3
Pinus	resinosa	15.1	fair	50-60	3
Pinus	resinosa	16	fair	50-60	3
Pinus	resinosa	16.1	fair	50-60	3
Pinus	resinosa	16.3	fair	50-60	3
Quercus	rubra	17.9	fair	90-100	3
Pinus	strobus	21.1	fair	80-90	5
Pinus	resinosa	6.7	poor	50-60	2
Pinus	resinosa	9.7	poor	50-60	2

Total Number of Trees Removed: 56

Total Number of Replacement Trees Per Guidelines: 159

Town of Wayland - Loker Conservation and Recreation Area

Attachment B: Tree Inventory/ Assessment - Wetland Upland Areas

GENUS	SPECIES	DIAMETER BREAST HEIGHT (DBH)-INCHES	CONDITION	RATING	Replacement Count Per Guidelines
Quercus	alba	4	good	90-100	1
Quercus	velutina	4	good	90-100	1
Pinus	strobus	4.2	good	80-90	1
Quercus	rubra	4.2	good	90-100	1
Acer	rubrum	4.2	good	70-80	1
Quercus	rubra	4.4	good	90-100	1
Pinus	strobus	4.4	good	80-90	1
Quercus	rubra	4.5	good	90-100	1
Quercus	rubra	4.5	good	90-100	1
Acer	platanoides	4.5	good	60-70	1
Quercus	alba	4.6	good	90-100	1
Quercus	alba	4.6	good	90-100	1
Quercus	alba	4.7	good	90-100	1
Quercus	velutina	4.8	good	90-100	1
Quercus	alba	4.8	good	90-100	1
Quercus	rubra	4.9	good	90-100	1
Quercus	alba	4.9	good	90-100	1
Pinus	strobus	4.9	good	80-90	1
Quercus	rubra	5	good	90-100	1
Carya	ovata	5	good	80-90	1
Quercus	rubra	5.1	good	90-100	1
Populus	grandifolia	5.1	good	20-30	1
Quercus	velutina	5.2	good	90-100	1
Pinus	strobus	5.2	good	80-90	1
Acer	rubrum	5.2	good	70-80	1
Quercus	rubra	5.3	good	90-100	1
Quercus	alba	5.3	good	90-100	1
Pinus	strobus	5.3	good	80-90	1
Pinus	strobus	5.4	good	80-90	1
Ulmus	americana	5.4	good	20-30	1
Fraxinus	pensylvanica	5.4	good	70-80	1
Quercus	velutina	5.4	good	90-100	1
Quercus	rubra	5.5	good	90-100	1
Quercus	rubra	5.5	good	90-100	1
Pinus	strobus	5.6	good	80-90	1
Pinus	strobus	5.7	good	80-90	1
Ulmus	americana	5.8	good	20-30	1
Pinus	strobus	5.8	good	80-90	1
Quercus	rubra	6.1	good	90-100	2
Quercus	rubra	6.1	good	90-100	2
Quercus	alba	6.1	good	90-100	2
Quercus	alba	6.2	good	90-100	2
Quercus	rubra	6.3	good	90-100	2
Ulmus	americana	6.4	good	70-80	2
Pinus	strobus	6.4	good	80-90	2
Quercus	velutina	6.4	good	90-100	2

Town of Wayland - Loker Conservation and Recreation Area

Attachment B: Tree Inventory/ Assessment - Wetland Upland Areas

GENUS	SPECIES	DIAMETER BREAST HEIGHT (DBH)-INCHES	CONDITION	RATING	Replacement Count Per Guidelines
Quercus	alba	6.5	good	90-100	2
Quercus	rubra	6.6	good	90-100	2
Quercus	rubra	6.8	good	90-100	2
Pinus	rubra	7.1	good	90-100	2
Quercus	rubra	7.1	good	90-100	2
Quercus	rubra	7.2	good	90-100	2
Pinus	strobus	7.3	good	80-90	2
Quercus	rubra	7.4	good	90-100	2
Carya	ovata	7.5	good	80-90	2
Querucs	rubra	7.5	good	90-100	2
Pinus	strobus	7.5	good	80-90	2
Quercus	alba	7.5	good	90-100	2
Quercus	velutina	7.5	good	90-100	2
Quercus	rubra	7.6	good	90-100	2
Quercus	velutina	7.7	good	90-100	2
Quercus	alba	7.7	good	90-100	2
Quercus	alba	7.7	good	90-100	2
Quercus	velutina	7.8	good	90-100	2
Quercus	rubra	7.9	good	90-100	2
Acer	rubrum	7.9	good	70-80	2
Quercus	rubra	8	good	90-100	2
Quercus	rubra	8.1	good	90-100	2
Quercus	alba	8.2	good	90-100	2
Quercus	rubra	8.4	good	90-100	2
Quercus	rubra	8.4	good	90-100	2
Quercus	rubra	8.5	good	90-100	2
Quercus	rubra	8.5	good	90-100	2
Carya	ovata	8.9	good	80-90	2
Quercus	alba	9	good	90-100	2
Quercus	rubra	9.1	good	90-100	2
Quercus	alba	9.3	good	90-100	2
Pinus	resinosa	9.3	good	50-60	2
Carya	ovata	9.6	good	80-90	2
Quercus	rubra	9.7	good	90-100	2
Quercus	rubra	9.8	good	90-100	2
Quercus	velutina	9.9	good	90-100	2
Pinus	strobus	10.1	good	80-90	2
Quercus	rubra	10.1	good	90-100	2
Quercus	rubra	10.3	good	90-100	2
Quercus	rubra	10.3	good	90-100	2
Quercus	rubra	10.3	good	90-100	2
Quercus	rubra	10.4	good	90-100	2
Quercus	rubra	10.5	good	90-100	2
Pinus	resinosa	10.5	good	50-60	2
Quercus	rubra	10.6	good	90-100	2
Carya	cordiformis	10.8	good	70-80	2

Town of Wayland - Loker Conservation and Recreation Area

Attachment B: Tree Inventory/ Assessment - Wetland Upland Areas

GENUS	SPECIES	DIAMETER BREAST HEIGHT (DBH)-INCHES	CONDITION	RATING	Replacement Count Per Guidelines
Quercus	velutina	10.9	good	90-100	2
Pinus	strobus	11.1	good	80-90	2
Quercus	rubra	11.1	good	90-100	2
Acer	rubrum	11.1	good	70-80	2
Quercus	rubra	11.2	good	90-100	2
Quercus	rubra	11.3	good	90-100	2
Acer	rubrum	11.4	good	70-80	2
Pinus	resinosa	11.8	good	50-60	2
Quercus	rubra	12.1	good	90-100	2
Quercus	rubra	12.2	good	90-100	2
Quercus	velutina	12.6	good	90-100	2
Quercus	rubra	12.9	good	90-100	2
Quercus	rubra	12.9	good	90-100	2
Acer	platanoides	13	good	60-70	2
Quercus	rubra	13	good	90-100	2
Pinus	resinosa	13.1	good	50-60	2
Pinus	strobus	13.4	good	80-90	2
Quercus	velutina	13.5	good	90-100	2
Pinus	strobus	13.6	good	80-90	2
Quercus	velutina	13.6	good	90-100	2
Pinus	strobus	13.9	good	80-90	2
Quercus	rubra	14	good	90-100	2
Quercus	velutina	14.1	good	90-100	2
Pinus	resinosa	14.1	good	50-60	2
Juniperus	virginiana	14.2	good	60-70	2
Quercus	velutina	14.2	good	90-100	2
Pinus	strobus	14.5	good	80-90	2
Pinus	strobus	15.3	good	80-90	2
Quercus	rubra	15.4	good	90-100	2
Quercus	rubra	15.5	good	90-100	2
Acer	rubrum	15.6	good	70-80	2
Pinus	resinosa	16.2	good	50-60	2
Pinus	strobus	16.3	good	80-90	2
Quercus	rubra	16.3	good	90-100	2
Pinus	strobus	16.3	good	80-90	2
Quercus	rubra	16.6	good	90-100	2
Pinus	strobus	16.7	good	80-90	2
Quercus	rubra	17.3	good	90-100	2
Quercus	rubra	17.3	good	90-100	2
Pinus	strobus	17.7	good	80-90	2
Quercus	rubra	17.7	good	90-100	2
Pinus	resinosa	17.7	good	50-60	2
Populus	deltoides	18.1	good	30-40	2
Pinus	strobus	18.1	good	80-90	2
Pinus	strobus	19.1	good	80-90	2
Quercus	rubra	19.3	good	90-100	2

Town of Wayland - Loker Conservation and Recreation Area

Attachment B: Tree Inventory/ Assessment - Wetland Upland Areas

GENUS	SPECIES	DIAMETER BREAST HEIGHT (DBH)-INCHES	CONDITION	RATING	Replacement Count Per Guidelines
Pinus	strobus	19.4	good	80-90	2
Pinus	strobus	19.4	good	80-90	2
Tsuga	canadensis	20.1	good	60-70	2
Pinus	strobus	20.1	good	80-90	2
Pinus	strobus	20.1	good	80-90	2
Quercus	rubra	20.5	good	90-100	2
Pinus	strobus	20.5	good	80-90	2
Pinus	strobus	20.9	good	80-90	2
Quercus	velutina	21.1	good	90-100	2
Pinus	strobus	22	good	80-90	2
Quercus	rubra	22	good	90-100	2
Quercus	velutina	22.8	good	90-100	2
Quercus	rubra	24.2	good	90-101	2
Pinus	strobus	24.5	good	80-90	2
Pinus	strobus	25.9	good	80-90	2
Pinus	strobus	26.6	good	80-90	2
Pinus	strobus	27.5	good	80-90	2
Pinus	strobus	31	good	80-90	2
Pinus	strobus	33.9	good	80-90	2
Pinus	strobus	51	good	80-90	2
Quercus	alba	10.8,11.8	good	90-100	2
Quercus	rubra	11.1,8.1	good	90-100	2
Acer	rubrum	11.1/7/5.2	good	70-80	2
Tsuga	canadensis	11.6,11.2	good	60-70	2
Quercus	rubra	12.1,16.3	good	90-100	2
Quercus	velutina	12/9.5	good	90-100	2
Quercus	rubra	13.4,17.8	good	90-100	2
Populus	grandifolia	4.5/3.7	good	20-30	2
Quercus	rubra	5,7	good	90-100	2
Malus	spp.	5.1,2.6	good	60-70	2
Acer	platanoides	7.3,8	good	60-70	2
Acer	rubrum	7.6,9.5	good	70-80	2
Quercus	rubra	4	fair	90-100	2
Quercus	rubra	4.1	fair	90-100	2
Acer	rubrum	4.2	fair	70-80	2
Malus	spp.	4.2	fair	60-70	2
Pinus	strobus	4.2	fair	80-90	2
Quercus	rubra	4.3	fair	90-100	2
Quercus	rubra	4.3	fair	90-100	2
Quercus	rubra	4.3	fair	90-100	2
Frangulus	alnus	4.3	fair	not listed	2
Quercus	rubra	4.3	fair	90-100	2
Quercus	rubra	4.4	fair	90-100	2
Quercus	rubra	4.5	fair	90-100	2
Quercus	rubra	4.7	fair	90-100	2
Quercus	rubra	4.7	fair	90-100	2

Town of Wayland - Loker Conservation and Recreation Area

Attachment B: Tree Inventory/ Assessment - Wetland Upland Areas

GENUS	SPECIES	DIAMETER BREAST HEIGHT (DBH)-INCHES	CONDITION	RATING	Replacement Count Per Guidelines
Quercus	alba	4.7	fair	90-100	2
Rhamnus	cathartica	4.9	fair	not listed	2
Quercus	rubra	5.1	fair	90-100	2
Quercus	velutina	5.2	fair	90-100	2
Juniperus	virginiana	5.2	fair	60-70	2
Quercus	rubra	5.3	fair	90-100	2
Quercus	rubra	5.6	fair	90-100	2
Quercus	rubra	5.9	fair	90-100	2
Quercus	rubra	6	fair	90-100	2
Juniperus	virginiana	6.1	fair	60-70	2
Quercus	rubra	6.2	fair	90-100	2
Quercus	rubra	6.4	fair	90-100	2
Fraxinus	pensylvanica	6.4	fair	70-80	2
Quercus	rubra	6.4	fair	90-100	2
Juniperus	virginiana	6.4	fair	60-70	2
Pinus	strobus	6.5	fair	80-90	2
Pinus	strobus	7	fair	80-90	2
Quercus	rubra	7.1	fair	90-100	2
Quercus	rubra	7.1	fair	90-100	2
Pinus	resinosa	7.3	fair	50-60	2
Quercus	rubra	7.3	fair	90-100	2
Quercus	rubra	7.5	fair	90-100	2
Quercus	rubra	7.5	fair	90-100	2
Quercus	rubra	7.9	fair	90-100	2
Pinus	resinosa	8	fair	50-60	2
Quercus	rubra	8.2	fair	90-100	2
Pinus	resinosa	8.2	fair	50-60	2
Quercus	alba	8.5	fair	90-100	2
Quercus	rubra	8.6	fair	90-100	2
Juniperus	virginiana	8.6	fair	60-70	2
Juniperus	virginiana	8.7	fair	60-70	2
Quercus	rubra	8.7	fair	90-100	2
Acer	rubrum	8.7	fair	70-80	2
Quercus	rubra	8.8	fair	90-100	2
Quercus	rubra	9.1	fair	90-100	2
Pinus	resinosa	9.2	fair	50-60	2
Quercus	rubra	9.3	fair	90-100	2
Quercus	rubra	9.4	fair	90-100	2
Quercus	rubra	9.5	fair	90-100	2
Juniperus	virginiana	9.6	fair	60-70	2
Pinus	resinosa	9.7	fair	50-60	2
Juniperus	virginiana	9.8	fair	60-70	2
Pinus	resinosa	9.9	fair	50-60	2
Pinus	resinosa	10	fair	50-60	2
Quercus	alba	10.3	fair	90-100	2
Pinus	strobus	10.3	fair	80-90	2

Town of Wayland - Loker Conservation and Recreation Area

Attachment B: Tree Inventory/ Assessment - Wetland Upland Areas

GENUS	SPECIES	DIAMETER BREAST HEIGHT (DBH)-INCHES	CONDITION	RATING	Replacement Count Per Guidelines
Pinus	resinosa	10.5	fair	50-60	2
Quercus	rubra	10.7	fair	90-100	2
Juniperus	virginiana	10.8	fair	60-70	2
Pinus	resinosa	11	fair	50-60	2
Pinus	resinosa	11.1	fair	50-60	2
Pinus	resinosa	11.2	fair	50-60	2
Quercus	rubra	11.4	fair	90-100	2
Pinus	resinosa	11.7	fair	50-60	2
Pinus	resinosa	11.7	fair	50-60	2
Quercus	rubra	12	fair	90-100	3
Pinus	resinosa	12.1	fair	50-60	3
Pinus	resinosa	12.2	fair	50-60	3
Quercus	velutina	12.3	fair	90-100	3
Pinus	resinosa	12.7	fair	50-60	3
Pinus	resinosa	13	fair	50-60	3
Pinus	resinosa	13.1	fair	50-60	3
Pinus	resinosa	13.1	fair	50-60	3
Quercus	rubra	13.2	fair	90-100	3
Pinus	resinosa	13.2	fair	50-60	3
Quercus	rubra	13.3	fair	90-100	3
Pinus	resinosa	14.2	fair	50-60	3
Quercus	rubra	14.7	fair	90-100	3
Quercus	alba	14.9	fair	90-100	3
Quercus	velutina	14.9	fair	90-100	3
Pinus	resinosa	15	fair	50-60	3
Pinus	resinosa	15.3	fair	50-60	3
Quercus	rubra	15.3	fair	90-100	3
Pinus	resinosa	16.2	fair	50-60	3
Pinus	resinosa	16.3	fair	50-60	3
Pinus	resinosa	16.3	fair	50-60	3
Pinus	resinosa	16.8	fair	50-60	3
Pinus	resinosa	16.9	fair	50-60	3
Pinus	resinosa	17.2	fair	50-60	3
Pinus	resinosa	17.4	fair	50-60	3
Ulmus	spp.	17.5	fair	20-30	3
Quercus	rubra	17.9	fair	90-100	3
Quercus	rubra	17.9	fair	90-100	3
Quercus	velutina	18.3	fair	90-100	5
Quercus	rubra	18.5	fair	90-100	5
Pinus	resinosa	20.4	fair	50-60	5
Pinus	resinosa	21.5	fair	50-60	5
Juniperus	virginiana	23.5	fair	60-70	5
Pinus	strobus	28.4	fair	80-90	7
Quercus	rubra	28.4	fair	90-100	7
Quercus	rubra	10.1,4	fair	90-100	2
Juniperus	virginiana	11.1,9.2	fair	60-70	2

Town of Wayland - Loker Conservation and Recreation Area
Attachment B: Tree Inventory/ Assessment - Wetland Upland Areas

GENUS	SPECIES	DIAMETER BREAST HEIGHT (DBH)-INCHES	CONDITION	RATING	Replacement Count Per Guidelines
Pinus	resinosa	11.6,11.7	fair	50-60	2
Quercus	rubra	14.9,15.6	fair	90-100	3
Quer	alba	3.9/4.1	fair	90-100	1
Quercus	rubra	4,3.3,3,3.4	fair	90-100	1
Quercus	rubra	4.4,3.5	fair	90-100	1
Quercus	velutina	4.9,3.3	fair	90-100	1
Juniperus	virginiana	4.9,5.3,6.2,5.9	fair	60-70	2
Juniperus	virginiana	5.8,4,3.3,2.6	fair	60-70	1
Acer	rubra	6,3	fair	90-100	2
Malus	spp.	6.4,5.6,6.7	fair	60-70	2
Juniperus	virginiana	7.5,8.3,7.5	fair	60-70	2
Juniperus	virginiana	9.6,7,13.1	fair	60-70	2
Quercus	rubra	9.8, 5.4	fair	90-100	2
Quercus	rubra	4	poor	90-100	1
Quercus	alba	4	poor	90-100	1
Quercus	rubra	4.2	poor	90-100	1
Quercus	spp.	4.2	poor	90-100	1
Quercus	rubra	4.3	poor	90-100	1
Juniperus	virginiana	5	poor	60-70	1
Quercus	alba	5.1	poor	90-100	1
Malus	spp.	5.1	poor	60-70	1
Juniperus	virginiana	5.5	poor	60-70	1
Quercus	alba	5.7	poor	90-100	1
Pinus	resinosa	6.1	poor	50-60	2
Ulmus	spp.	7.1	poor	20-30	2
Pinus	resinosa	7.3	poor	50-60	2
Juniperus	virginiana	7.4	poor	60-70	2
Pinus	resinosa	8.2	poor	50-60	2
Quercus	rubra	8.5	poor	90-100	2
Prunus	serotina	8.5	poor	40-50	2
Quercus	alba	9	poor	90-100	2
Pinus	resinosa	9.3	poor	50-60	2
Pinus	resinosa	9.4	poor	50-60	2
Juniperus	virginiana	9.6	poor	60-70	2
Pinus	resinosa	9.7	poor	50-60	2
Pinus	strobus	9.8	poor	80-90	2
Pinus	resinosa	10.3	poor	50-60	2
Pinus	resinosa	10.5	poor	50-60	2
Pinus	resinosa	10.5	poor	50-60	2
Pinus	resinosa	10.9	poor	50-60	2
Pinus	resinosa	11.2	poor	50-60	2
Pinus	resinosa	11.2	poor	50-60	2
Pinus	resinosa	11.4	poor	50-60	2
Juniperus	virginiana	12.8	poor	60-70	3
Pinus	resinosa	13.2	poor	50-60	3
Carya	cordiformis	13.4	poor	70-80	3

Town of Wayland - Loker Conservation and Recreation Area

Attachment B: Tree Inventory/ Assessment - Wetland Upland Areas

GENUS	SPECIES	DIAMETER BREAST HEIGHT (DBH)-INCHES	CONDITION	RATING	Replacement Count Per Guidelines
Pinus	resinosa	14	poor	50-60	3
Pinus	resinosa	14.1	poor	50-60	3
Pinus	resinosa	14.2	poor	50-60	3
Pinus	resinosa	15.2	poor	50-60	3
Pinus	resinosa	15.3	poor	50-60	3
Pinus	resinosa	15.5	poor	50-60	3
Pinus	resinosa	18.6	poor	50-60	5
Pinus	resinosa	19.5	poor	50-60	5
Malus	spp.	4.1,3.5,3	poor	60-70	1
Juniperus	virginiana	4.4,5.1	poor	60-70	1
Juniperus	virginiana	5.2,4.1	poor	60-70	1
Prunus	spp.	6.5,3.9,5.5,4.3	poor	40-50	2
Juniperus	virginiana	9.5,5,4.8	poor	60-70	2

Total Number of Trees Removed: 335

Total Number of Replacement Trees Per Guidelines: 683

APPENDIX I:
Design Team Response to Conservation

85 Devonshire Street, 3rd Floor, Boston, MA 02109
Tel: 617.412.4480

Wayland- Loker Conservation and Recreation Area
WSE Project No. 2180076.C.2

August 16, 2018

Wayland Conservation Commission
41 Cochituate Road
Wayland, MA 01778

Re: ***Response to Comments***
Loker Conservation and Recreation Area NOI
Wayland, MA

Dear Members of the Commission:

On August 3, 2018, the Wayland Conservation Commission held a public meeting to discuss the Loker Conservation and Recreation Area Notice of Intent (NOI) submittal. This letter is in response to questions/comments posed by the Conservation Commission and received via email prior to the meeting and received during the meeting itself. Each comment is provided below, with a response.

Comment 1: Commission's plan as discussed at last meeting was to have site visit before considering Loker application. What happened to/when is site visit?

> **Weston & Sampson Response:** The site visit occurred on August 1, 2018.

Comment 2: Why is there only an NOI and Chapter 193 application but no Chapter 194 application? On p. 1 of NOI submittal Weston & Sampson states that what is submitted complies with Wayland requirements? Commission requires a completed/signed c 194 application.

> **Weston & Sampson Response:** The Chapter 194 application has been provided.

Comment 3: At June 23? site visit with Weston and Sampson, Gene said he would stake conservation land closest to field. He also said he would look into previous dumping by Dow in area of expanded parking lot. Will/has this been done?

> **Weston & Sampson Response:** The limits of the field were flagged as they relate to the adjacent Conservation Land prior to the June 23, 2018 site visit. Weston & Sampson also investigated the previous dumping areas by Dow (located outside the work area) and performed an Environmental Assessment Report dated April 4, 2018 which noted there are apparent no conflicts or impacts as it relates to the proposed project.

Comment 4: How does this wetland delineation compare with previous one?

> **Weston & Sampson Response:** Weston & Sampson is not in possession of the previous wetland delineation plans or reports for this site. We are assuming the Conservation Commission will be comparing the wetland delineation boundaries to determine any variations between current delineations and prior delineations completed by others.

Comment 5: Re this wetland delineation should the Commission determine whether the streams are intermittent as stated or perennial? Would the project be affected if the stream(s) are perennial under the bylaw? (If there's a bylaw application there are required procedures under c 194 for the Applicant to rebut the presumption that the stream is perennial.) (page 192 of submittal)

Weston & Sampson Response: The underground culvert system that serves as an outlet from North Pond and daylights in the uphill gradient of South Pond is greater than 200 feet in length. Per 310 CMR 10.58(2) "Where a river runs through a culvert more than 200 feet in length, the riverfront area stops at a perpendicular line at the upstream end of the culvert and resumes at the downstream end." As such, this waterbody within the culvert does not have a 200-foot riverfront area associated with it.

Comment 6: These boring reports are labelled WHS Athletic Facilities as are some of the plans! This needs to be corrected (pages 43-59 of submittal). Loker and the WHS are obviously separate projects.

Weston & Sampson Response: The boring report has been updated to reference the Loker project. An updated report has been provided in Appendix.

Comment 7: Are borings acceptable if done in March?

Weston & Sampson Response: Yes.

Comment 8: What does auger refusal due to possible bedrock (granite) at various depths - starting at 4.8' (TP-4) - mean for groundwater/stormwater? Isn't this why drilling private irrigation well at Loker was contraindicated?

Weston & Sampson Response: Proposed improvements are anticipated to be above the identified auger refusal depths. The stormwater system design below the field and parking area considered and accounted for the refusal depths.

The athletic field has an expansive stormwater collection system located below the field itself with an engineered drainage stone stormwater storage "zone", including perforated lateral flat drains and a perforated perimeter collection pipe system. The purpose of the drainage stone and subsurface drains and pipes is to collect and retain stormwater that infiltrates through the field surface, depending on the size of the storm event prior to infiltrating in a natural manner into the subsurface materials below the field. The lateral drains and collector pipe serve as a controlled "relief valve" to the natural infiltration of the stormwater should the stormwater not be allowed to infiltrate due to refusal. The lateral drains and collector pipes will allow for the water to be collected within the stone drainage area with a controlled release at an adjacent outlet structure.

The proposed stormwater design below the parking area is a chamber system that serves as an underground stormwater retention system. The chamber system will collect and hold the water of a stormwater event while infiltrating into the natural ground surface below. Should the storm event exceed the capacity of the chambers or there be refusal that does not allow for natural infiltration, there is an outlet from the chamber system that will divert the stormwater into a drain manhole and the overall piped stormwater system.

Comment 9: What is "grassed/landscaped areas" (on one plan in blue) cutting through 50' Conservation land from Rice Rd? Also, on permitting plans although plans do not indicate its conservation land. This intrusion onto/through conservation land needs to be clarified.

Weston & Sampson Response: The work identified as grassed/landscaped areas on the plans, particularly within the 50' Conservation Area adjacent to Rice Road represents the ground area to be restored following the removal of the existing asphalt drive. The Permitting Plans identify the Conservation Land 50' Buffer Zone on Sheet L1.00 with the label "LIMITS OF PROPERTY DESIGNATED FOR RECREATIONAL USE".

Comment 10: The "Town" will be responsible for implementing Stormwater O&M (Attachment F) - who specifically? Is it "Municipal Services Department" - DPW? - noted in Attachment H, O&M Plan? Or Ben Keefe, NOI Applicant?

> **Weston & Sampson Response:** The Town of Wayland DPW is responsible for implementing the Stormwater O&M Plan as they maintain the Loker property currently.

Comment 11: "Salt" or calcium chloride for de-icing? (Attachment F)

> **Weston & Sampson Response:** As related to the O&M plan of the paved and parking areas, Weston & Sampson has been made aware that the Town of Wayland DPW currently does not maintain the Loker property in the winter months which includes any time following a snow fall event. Therefore, the expectation is that there will not be a need for "salt" or calcium chloride for de-icing. The anticipated recreational activity schedule aligns with this expectation as no activities will be programmed during winter months typically. Weston & Sampson has updated Attachment F accordingly.

Comment 12: Under what conditions can engineer approve work in undisturbed wetland area (Attachment G, Section 2.1)?

> **Weston & Sampson Response:** No unauthorized work in the wetland resource area will be allowed without specific approval from the Conservation Commission.

Comment 13: Allowing storage of excavated materials within buffer - 50' of wetlands? (Attachment G, Section 2.4)

> **Weston & Sampson Response:** Should it be necessary to store excavated materials between the 30 foot No Disturb Zone (NDZ) and the 100' wetland buffer zone, approved erosion controls methods (i.e. compost filter tubes or approved equal) will be put in place to protect resource areas and all storage areas will be fully restored to conditions called for on the plans.

Comment 14: Daily monitoring SHALL not SHOULD be conducted (Attachment G, Section 2.7).

> **Weston & Sampson Response:** Attachment G, Section 2.7 the word should has been changed to shall.

Comment 15: Regular fueling and service of the equipment SHALL NOT be performed...Repair of equipment SHALL NOT be allowed in any event within 100' of wetlands (Attachment G, Section 2.10).

> **Weston & Sampson Response:** Attachment G, Section 2.7 has been amended to include: "Regular fueling and service of the equipment shall not be performed.

Comment 16: Sediment SHALL be removed pursuant to DEP guidelines not whenever "Engineer deems it necessary" (Attachment G, Section 7).

> **Weston & Sampson Response:** Attachment G, Section 7 has been amended to indicate that "sediment shall be removed pursuant of DEP guidelines".

Comment 17: Is street sweeping (Attachment H, Section 4.1) "monthly" or "primarily in the spring and fall" (page 1 of checklist)?

> **Weston & Sampson Response:** Street sweeping is primarily on a spring and fall season schedule per the Town of Wayland DPW.

Comment 18: Chambers SHALL not SHOULD be inspected every six months (page 3 of checklist)

Weston & Sampson Response: Page 3 of checklist has been amended to reflect the word "SHALL" in lieu of "SHOULD".

Comment 19: Part 3-EXECUTION, Section 3.04, page 01570-2, Contractor SHALL NOT not SHALL MAKE EVERY EFFORT to minimize disturbance... (page 152 of submittal)

Weston & Sampson Response: Part 3-EXECUTION, Section 3.04, page 01570-2 has been amended to include the word "SHALL" minimize disturbance.

Comment 20: Part 3-EXECUTION, Section 3.07, page 01570-3, if damaged trees are removed will they be replaced? (page 153 of submittal)

Weston & Sampson Response: Any tree that is damaged and that is not intended to be removed as part of the construction of the project will be replaced at the contractor's own expense.

Comment 21: How will use of calcium chloride for dust control be restricted in resource areas?

Weston & Sampson Response: Calcium chloride use shall not be allowed for dust control within restricted resource areas.

Comment 22: Part 2, section 2.02 FERTILIZER, page 02677-2, is 10-6-8 fertilizer appropriate near resource areas? (page 159 of submittal)

Weston & Sampson Response: Part 2, Section 2.02 FERTILIZER, Page 02677-2 has been deleted from the O&M manual as the seeding of any "lawn" or grassed areas within the project area will be an approved wetland seed mix and it will therefor be recommended that no fertilizer be used. We have noted that the project area falls within the Charles River Watershed and no fertilizer is applied under current conditions.

Comment 23: Part 3, section 3.03 PLANTING SCHEDULE page 02677-6, there is required tree caliper in replanting schedule NOT saplings (page 163 of submittal). Also 310 F (page 165 of submittal).

Weston & Sampson Response: Any tree replacement or planting shall meet the Town of Wayland Conservation Commission's requirements included within Chapter 193 and Chapter 194. The Town of Wayland Recreation Department is seeking relief on the total number of trees that may be required by the Town bylaws.

Comment 24: Part 3, section 3.06 PLANTING SCHEDULE page 02677-6, what is the "moisture enhancer"? (page 164 of submittal).

Weston & Sampson Response: Moisture enhancer is organic material suitable within planting areas to assist in promoting growth of new plant material. Natural moisture enhancers include organic compost, peat moss, humus and manure.

Comment 25: Attachment A: Inventory -Buffer Area -Pursuant to Commission replacement schedule, tree removal of 24" and greater dbh trees is TBD by Commission (note 1 pinus strobus at 24.8" is in this category in addition to others noted). Are 7 new trees/1 removed tree of this size reasonable as proposed? (pages 9 and 181 of submittal).

Weston & Sampson Response: The quantity of 7 new trees is an assumption made by Weston & Sampson for any tree over 24-inches in diameter as the previous quantity required for the tree caliper less than 24" DBH is 5 new trees. This topic is open for discussion.

Comment 26: How was (inconsistent) proposed replacement of trees in Attachment B: Inventory-Wetland Upland Areas arrived at? (page 183-190 of submittal).

Weston & Sampson Response: Weston & Sampson, using the Town's guidelines for tree replacement and quality as determined by our certified arborist, followed similar guidelines and assumptions as described above in Comment 25. This topic is open for discussion and final decision by the Wayland Conservation Commission.

Comment 27: How high is proposed segmental block retaining wall around portions of field?

Weston & Sampson Response: The segmental block wall varied in height from a flush (0'-0") height to a maximum of two and half feet (2'-6").

Comment 28: How much fill is required for field construction?

Weston & Sampson Response: We anticipate a net cut (export) of material of 449 C.Y and anticipate this volume to remain on site for general infill. This overage is within an acceptable assumption volume as we anticipate having to fill voids from tree removal and the removal of other materials such as ledge or organic materials not suitable for construction purposes below pavements.

We thank you for your consideration of these matters.

Very truly yours,
WESTON & SAMPSON

Brandon Kunkel, RLA
Team Leader

<u>Attachments</u>
Revised Loker Stormwater Report
Revised Specification Section 01570, Environmental Protection

APPENDIX J:
Site Plans

TOWN OF WAYLAND

IMPROVEMENTS TO
LOKER CONSERVATION AND RECREATION AREA

PREPARED BY:

Weston & Sampson
DESIGN STUDIO

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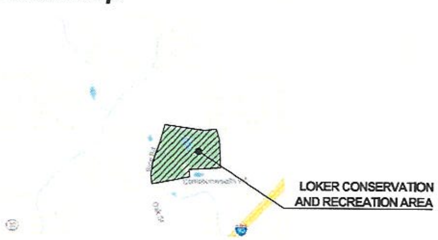
BOSTON, MA 02109
BRANDON KUNKEL
(617) 412-4480

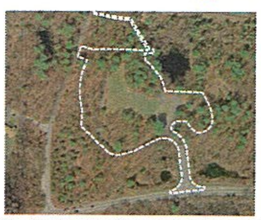
TOWN OF WAYLAND, MASSACHUSETTS

TOWN BUILDING
41 COCHITUATE RD
WAYLAND, MA 01778
BEN KEEFE
PUBLIC BUILDING DIRECTOR
(508) 358-3786

LOKER CONSEVATION AND RECREATION AREA
410 COMMONWEALTH RD, WAYLAND, MA 01778

Locus Map





LOKER CONSERVATION AND RECREATION AREA

SHEET INDEX

ADD ALTERNATE NO. 1

UNDER ADD ALTERNATE NO. 1 THE CONTRACTOR SHALL INSTALL THE SPECIFIED SPORTS LIGHTING POLES, FIXTURES, WIRING AND RELATED APPURTENANCES NEEDED TO HAVE A COMPLETE AND FULLY OPERATIONAL SYSTEM. WORK UNDER THE BASE BID SHALL INCLUDE THE INSTALLATION OF AN "EMPTY" SPORTS LIGHTING SYSTEM TO INCLUDE LIGHT POLE FOOTINGS/FOUNDATIONS, UNDERGROUND CONDUITS, HAND HOLES, PULL STRING AND ALL OTHER ELECTRICAL AND LIGHTING SYSTEM COMPONENTS THROUGHOUT THE PROJECT SITE AS INDICATED ON THE PLANS AND AS SPECIFIED.

ADD ALTERNATE NO. 2

UNDER ADD ALTERNATE NO. 2, THE CONTRACTOR SHALL CONSTRUCT THE DESIGNATED CAST IN PLACE CONCRETE STAIR AND HANDRAILS AS INDICATED ON THE PLANS AND AS SPECIFIED.

BIDDING DOCUMENTS
IFB #19-1054

FEBRUARY 28, 2019

Prepared By

Weston & Sampson

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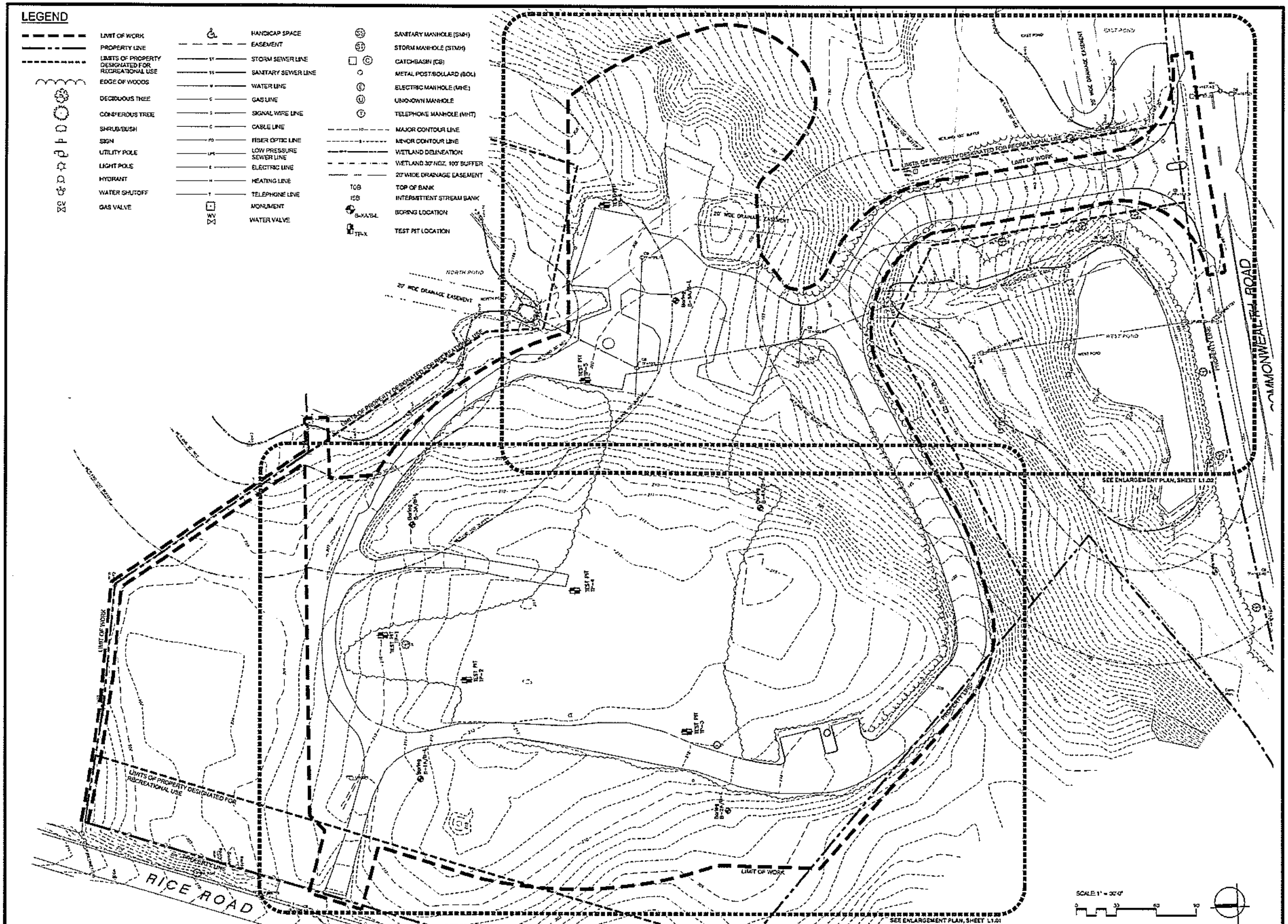

Project:
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410 COMMONWEALTH RD, WAYLAND, MA 01778

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Approved By:	ERB
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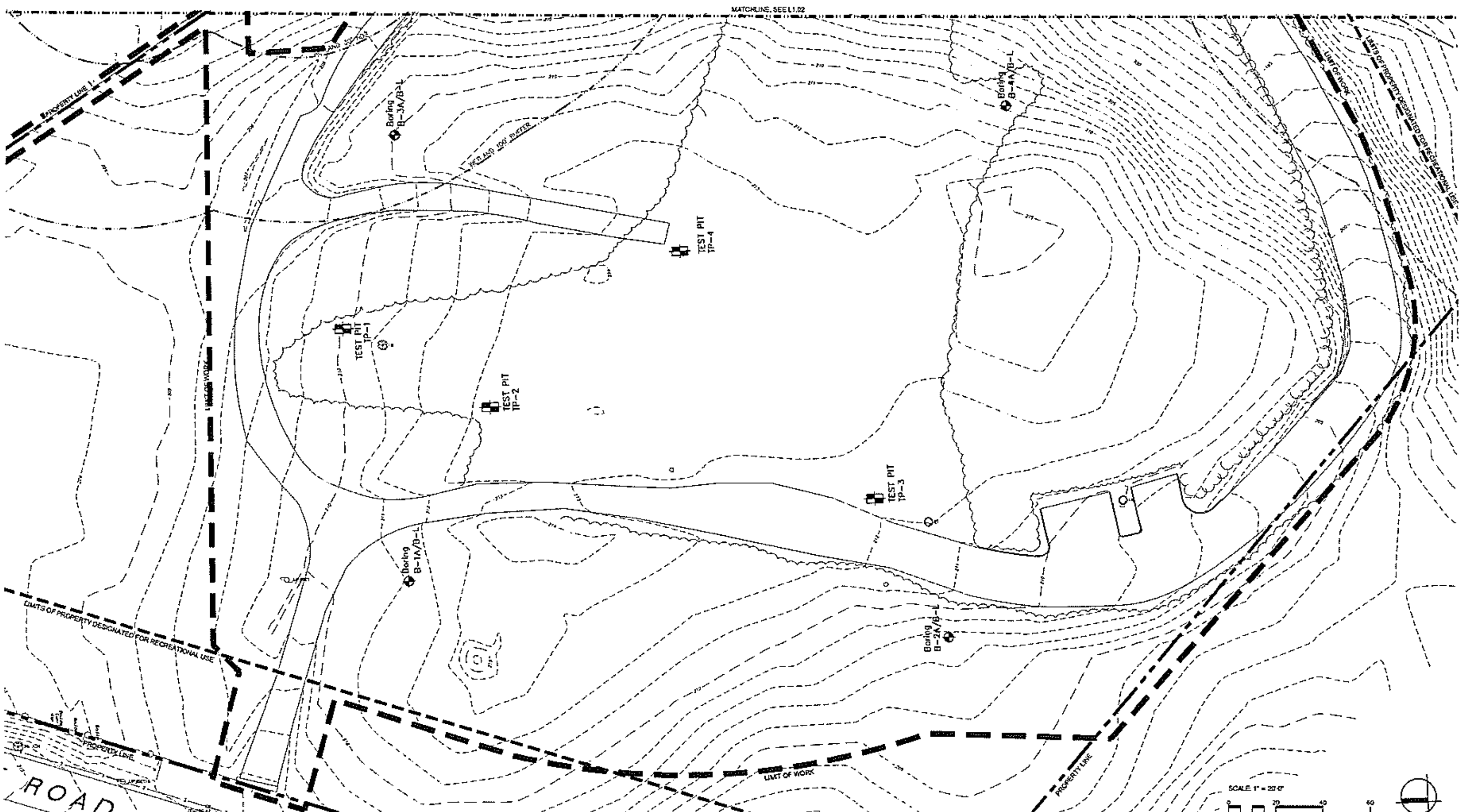
W&S File No:	

Drawing Title:
OVERALL EXISTING CONDITIONS PLAN

Sheet Number:
L1.00

LEGEND

LIMIT OF WORK	GAS VALVE	CABLE LINE	UNKNOWN MANHOLE
PROPERTY LINE	WATER VALVE	FIBER OPTIC LINE	TELEPHONE MANHOLE (MHT)
LIMITS OF PROPERTY DESIGNATED FOR RECREATIONAL USE	MONUMENT	LOW PRESSURE SEWER LINE	MAJOR CONTOUR LINE
EDGE OF WOODS	IRON PIN / IRON ROD	ELECTRIC LINE	MINOR CONTOUR LINE
DECIDUOUS TREE	HANDICAP SPACE	HEATING LINE	WETLAND DELINEATION
CONIFEROUS TREE	EASEMENT	TELEPHONE LINE	WETLAND 30' NDZ, 100' BUFFER
SHRUB/BUSH	STORM SEWER LINE	SANITARY MANHOLE (SMH)	20' WIDE DRAINAGE EASEMENT
SIGN	SANITARY SEWER LINE	STORM MANHOLE (STMH)	BORING LOCATION
UTILITY POLE	WATER LINE	CATCHBASIN (CB)	TEST PIT LOCATION
LIGHT POLE	GAS LINE	METAL POST/BOLLARD (BOL)	TOB TOP OF BANK
HYDRANT	SIGNAL WIRE LINE	ELECTRIC MANHOLE (MHE)	ISB INTERMITTENT STREAM BANK
WATER SHUTOFF			



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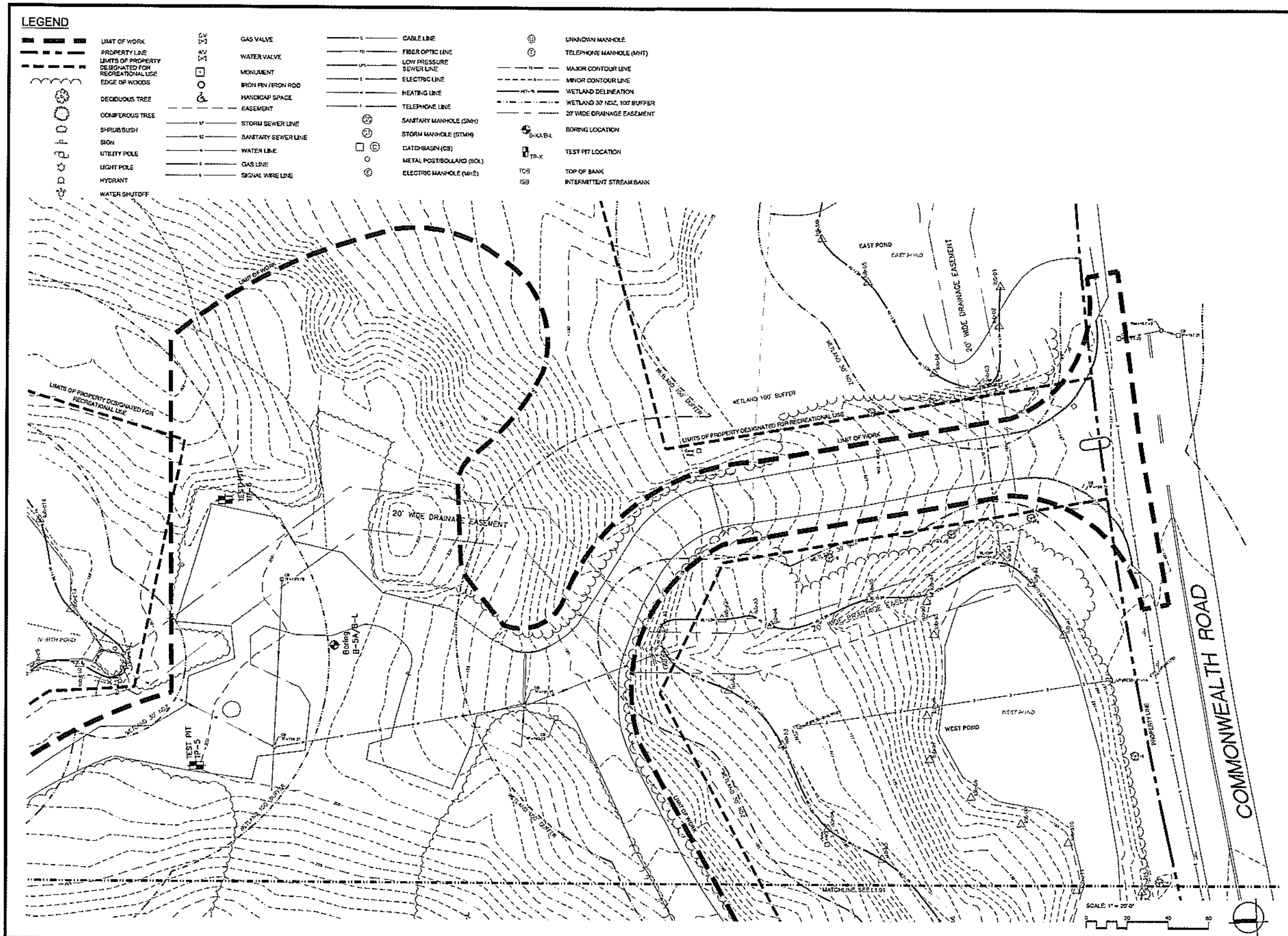

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Approved By: ERB

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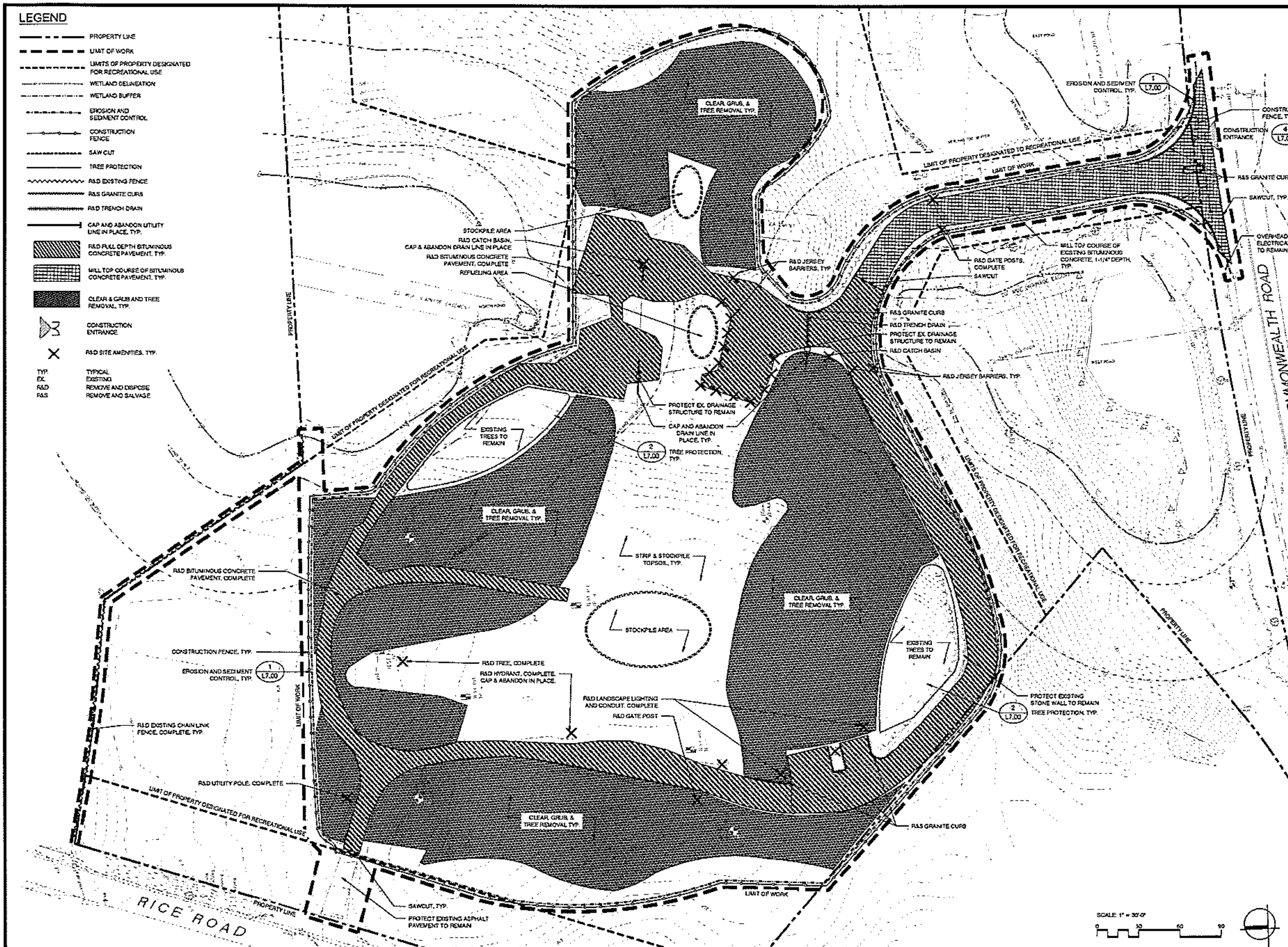

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Drawing Title:
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Sheet Number
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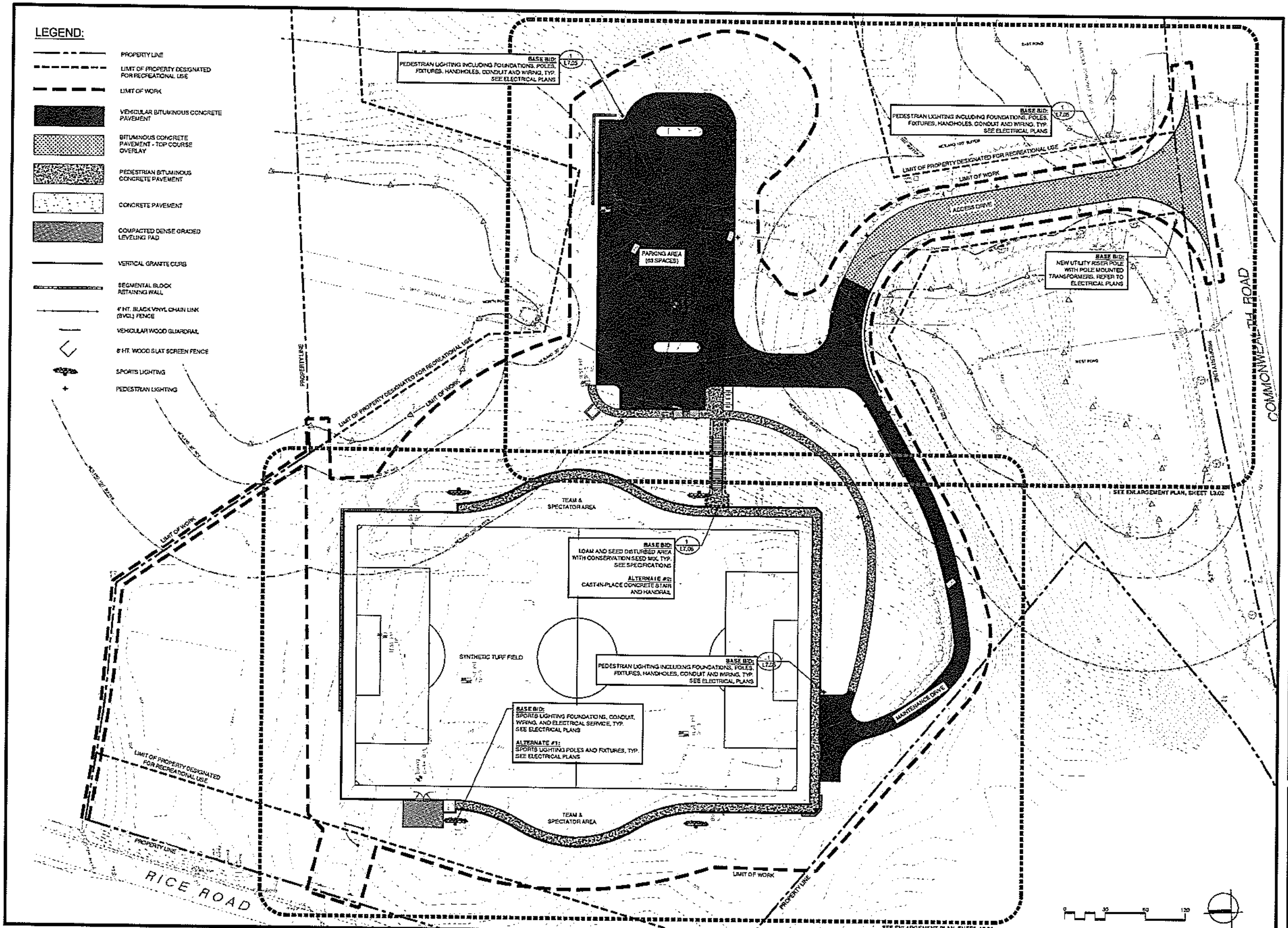

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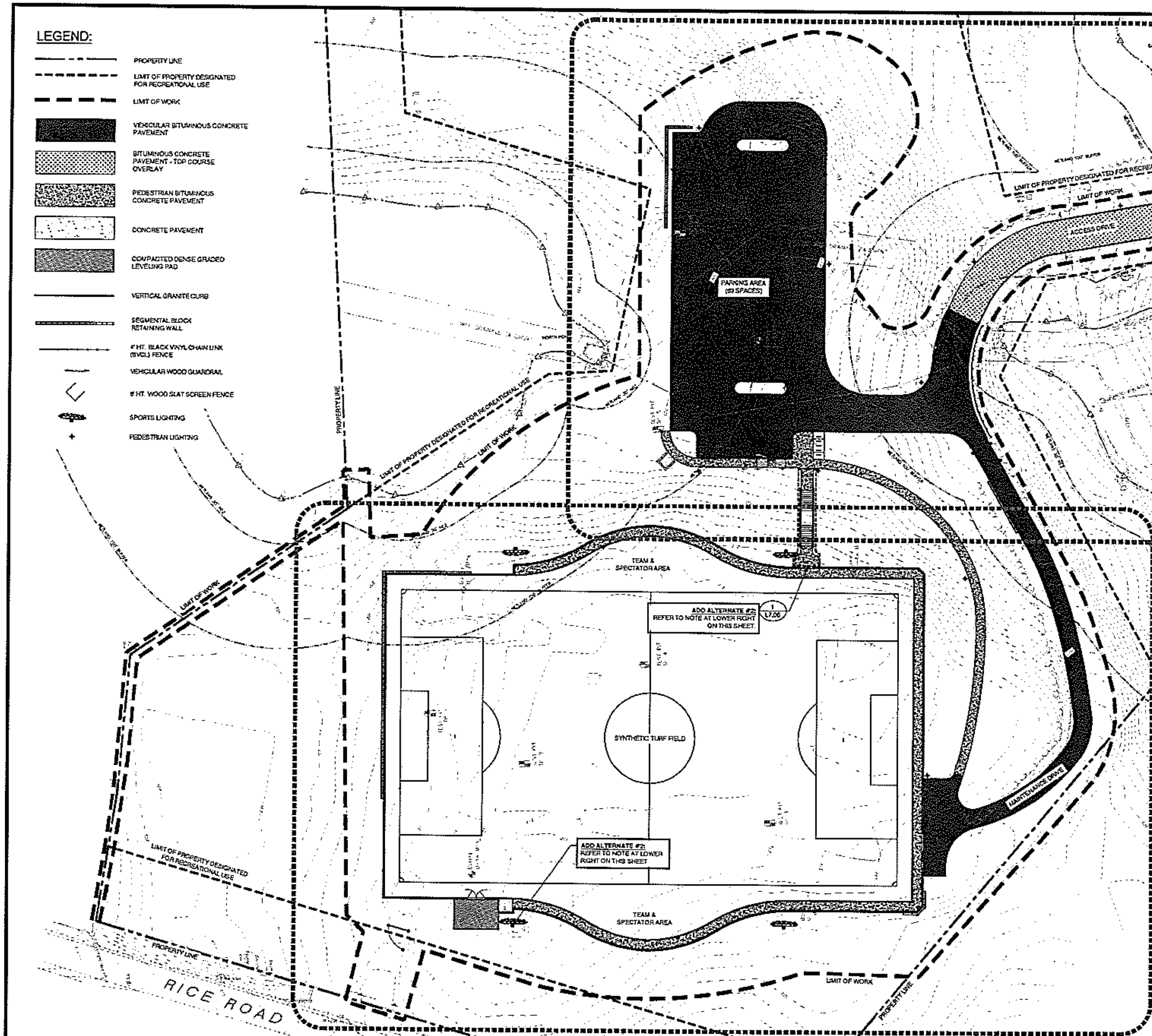

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0 30 60 120

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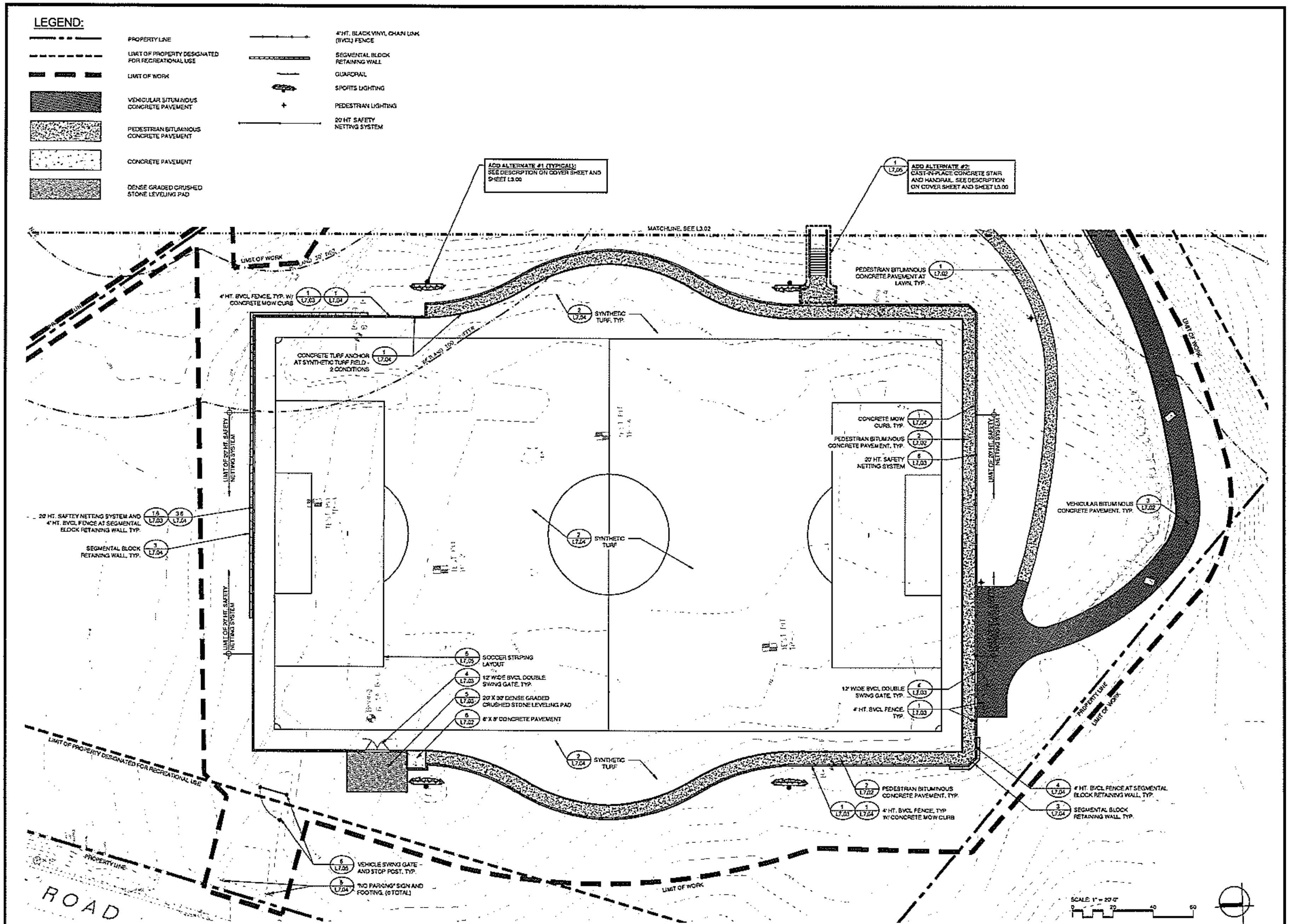

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MATERIALS PLAN ENLARGEMENT

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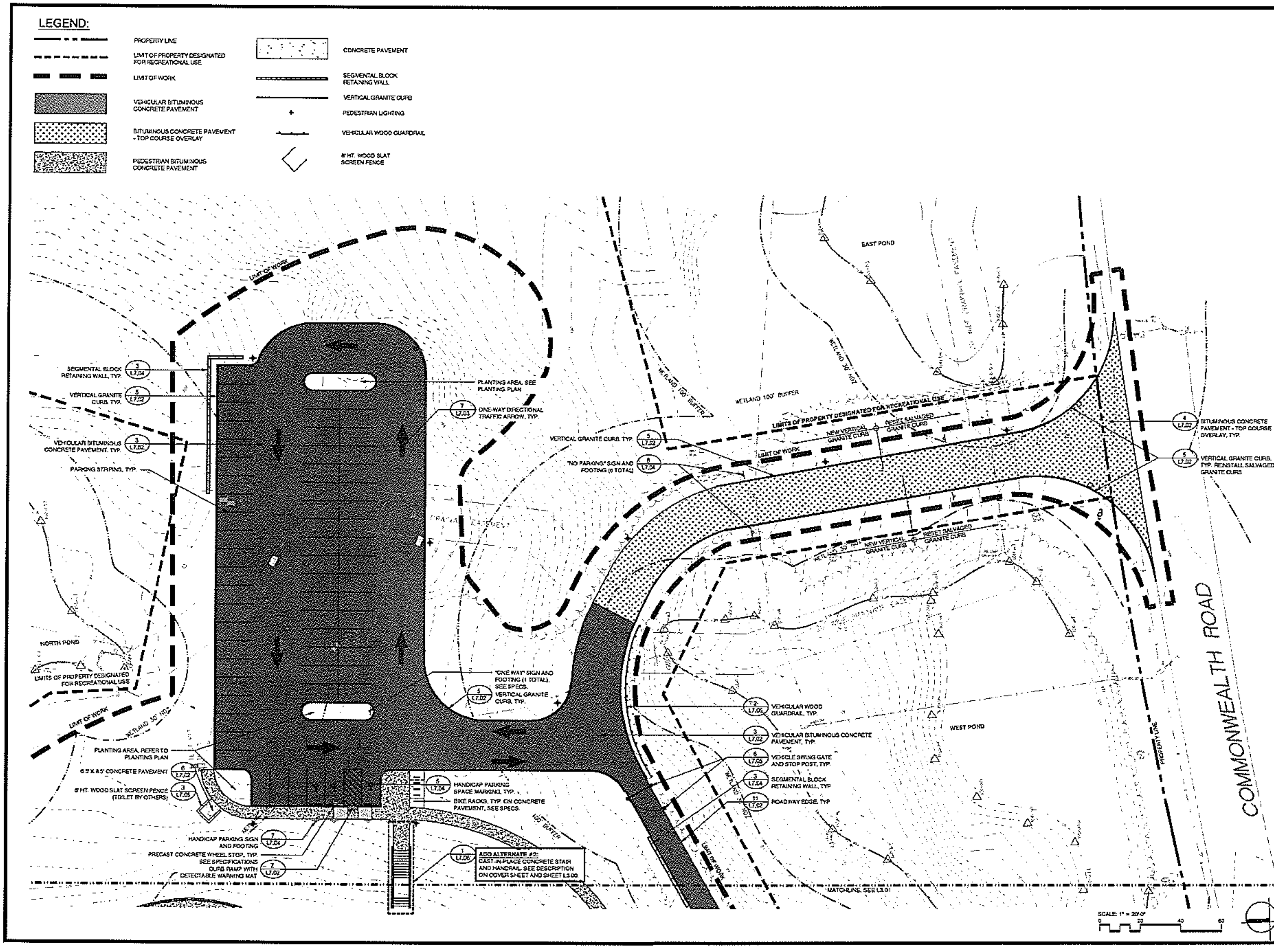

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MATERIALS PLAN ENLARGEMENT

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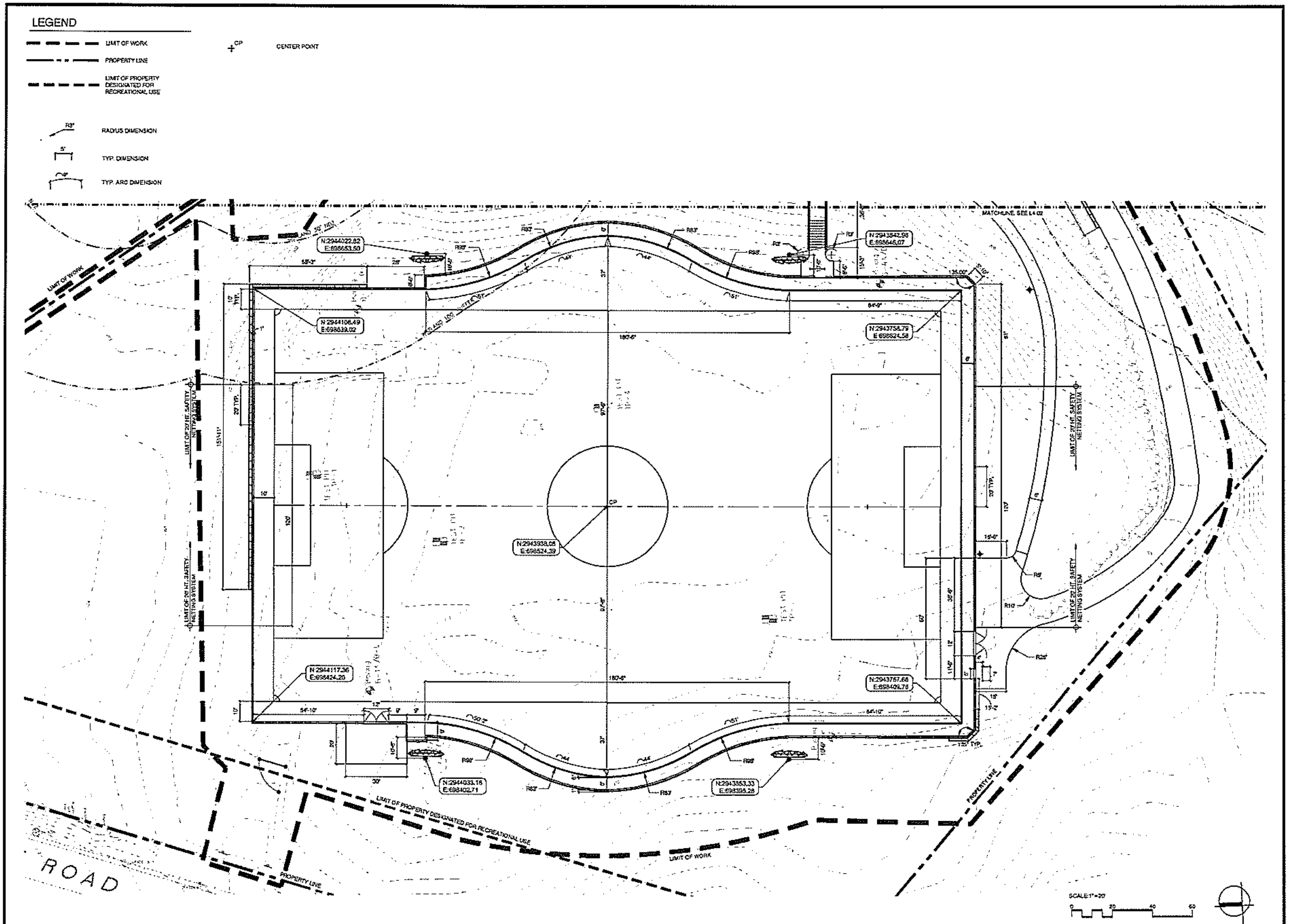

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W&S File No:

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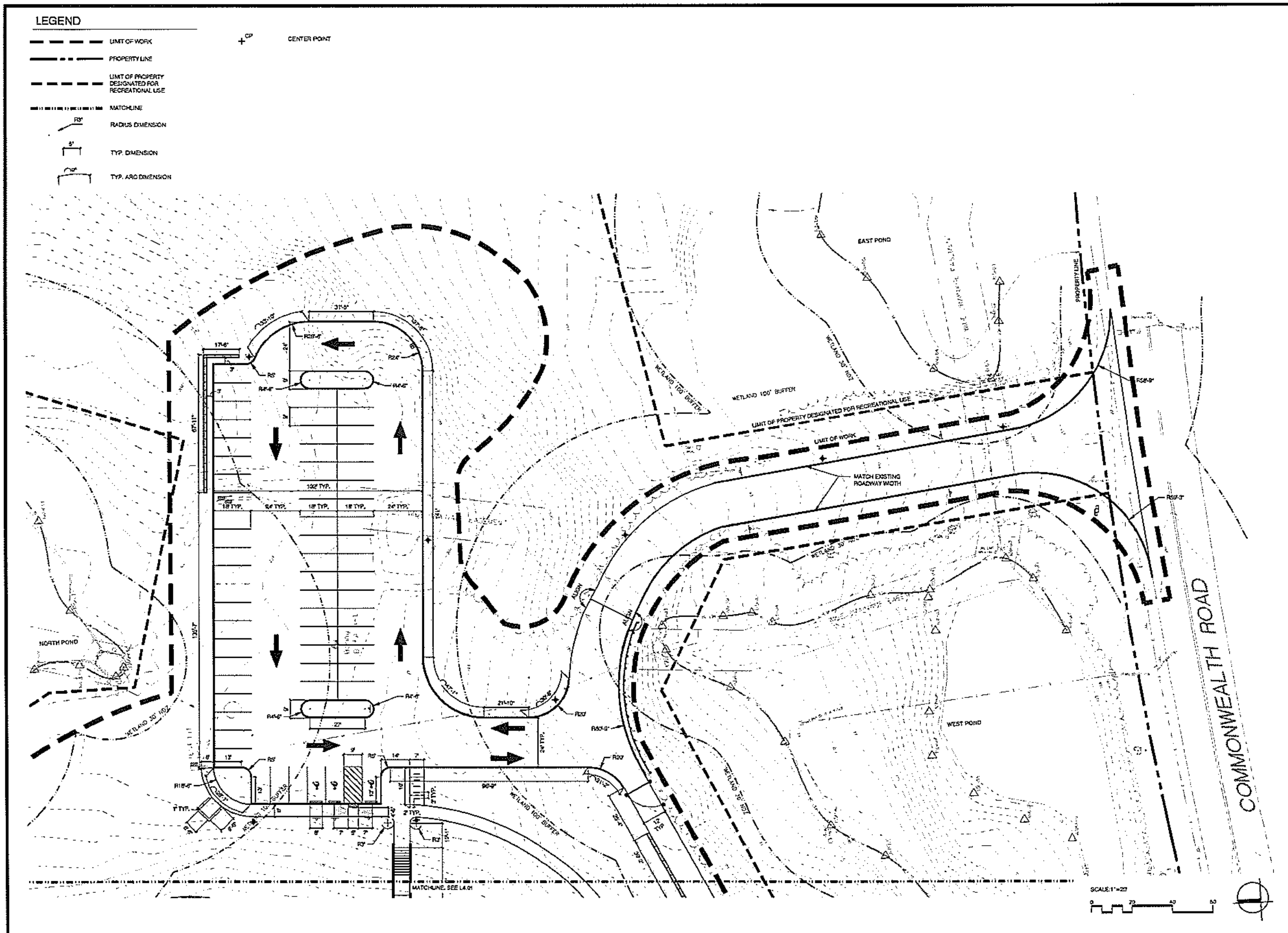

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W&S Project No:	2160076
W&S File No:	

Drawing Title:

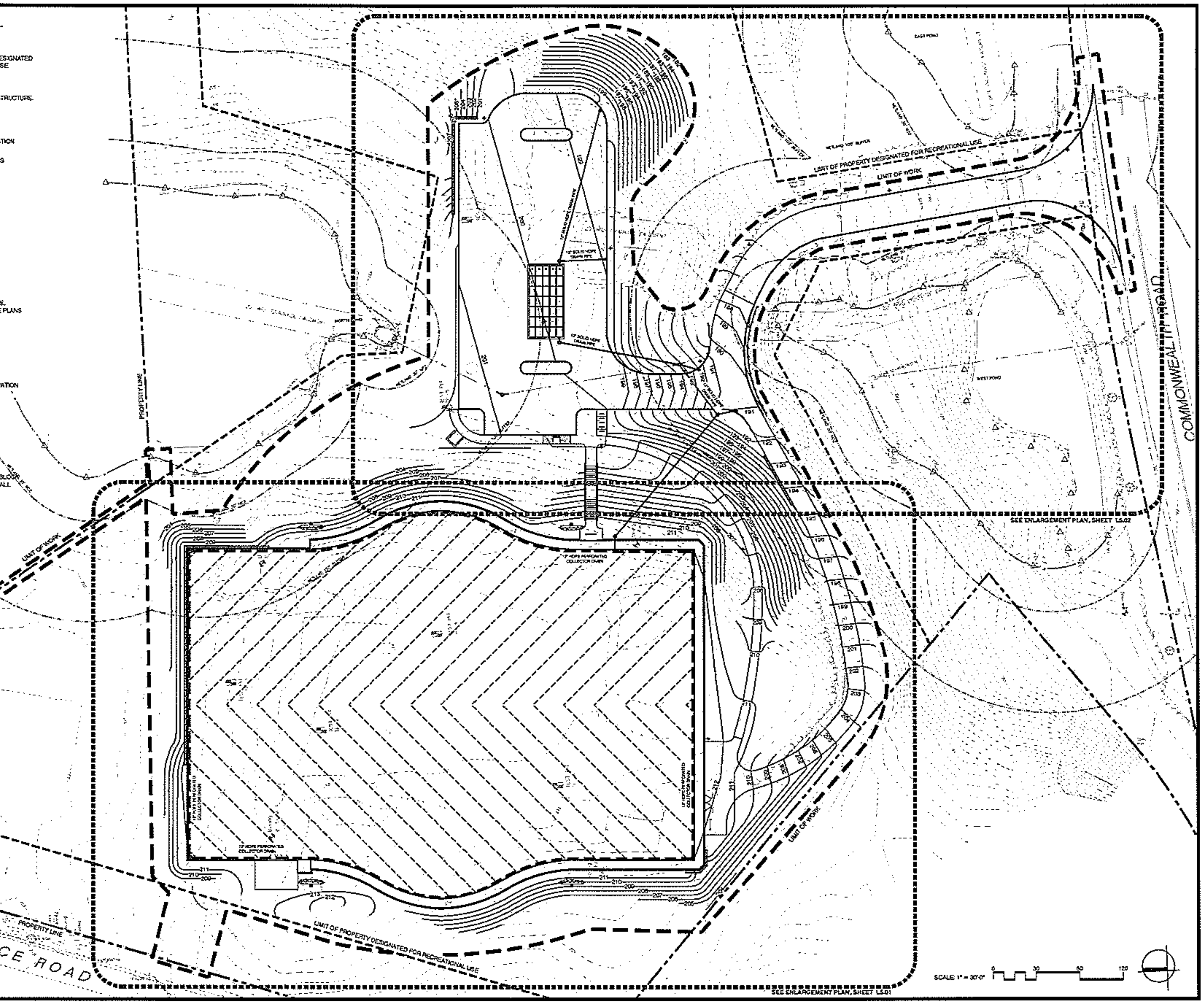
LAYOUT PLANS ENLARGEMENT

Sheet Number:

L4.02

LEGEND

	PROPERTY LINE
	LIMIT OF PROPERTY DESIGNATED FOR RECREATIONAL USE
	LIMIT OF WORK
	EXISTING DRAINAGE STRUCTURE, SEE UTILITIES PLAN
12	EXISTING CONTOURS
21.10	EXISTING SPOT ELEVATION
14 / 15	PROPOSED CONTOURS
1.5%	PROPOSED SLOPE
6.25	PROPOSED SPOT ELEVATION
	CATCH BASIN
	AREA DRAIN
CO	CLEAN OUT
	DRAINAGE MAN HOLE
HDPE SOLID DRAIN PIPE	HDPE SOLID DRAIN PIPE, DIAMETER VARIES, SEE PLANS
FLAT DRAIN	FLAT DRAIN
HDPE PERFORATED COLLECTOR DRAIN	HDPE PERFORATED COLLECTOR DRAIN
2% MAX.	SWALE LINE
FFE	FINISHED FLOOR ELEVATION
HP	HIGH POINT
LP	LOW POINT
TW	TOP OF WALL
BW	BOTTOM OF WALL
TS	TOP OF STEP
BS	BOTTOM OF STEP
4 / L7.04	SEGMENTAL BLOCK RETAINING WALL



Project:
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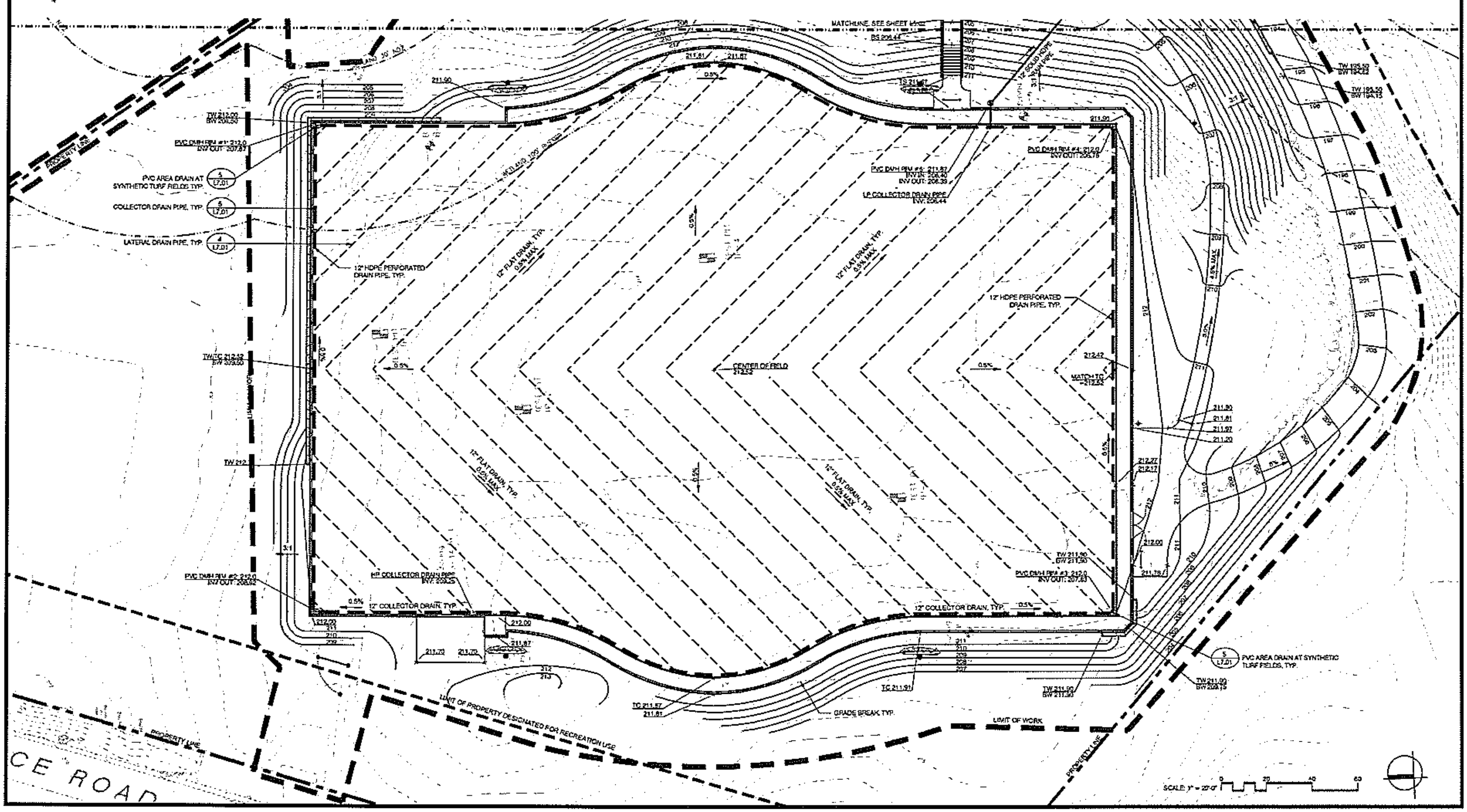
OVERALL GRADING, DRAINAGE & UTILITY PLANS

Sheet Number:
L5.00

LEGEND

	PROPERTY LINE
	LIMIT OF PROPERTY DESIGNATED FOR RECREATIONAL USE
	MATCHLINE
	LIMIT OF WORK
	EXISTING DRAINAGE STRUCTURE SEE UTILITIES PLAN
	EXISTING CONTOURS
	EXISTING SPOT ELEVATION
14	PROPOSED CONTOURS
1.5%	PROPOSED SLOPE
8.25	PROPOSED SPOT ELEVATION
	CATCH BASIN
	PVC AREA DRAIN
	DRAINAGE MAN HOLE
HDPE SOLID DRAIN PIPE	HDPE SOLID DRAIN PIPE, DIAMETER VARIES
2% MAX.	SWALE LINE
FFE	FINISHED FLOOR ELEVATION
HP	HIGH POINT
LP	LOW POINT
TW	TOP OF WALL
BW	BOTTOM OF WALL
TS	TOP OF STEP
BS	BOTTOM OF STEP
	SEGMENTAL BLOCK RETAINING WALL



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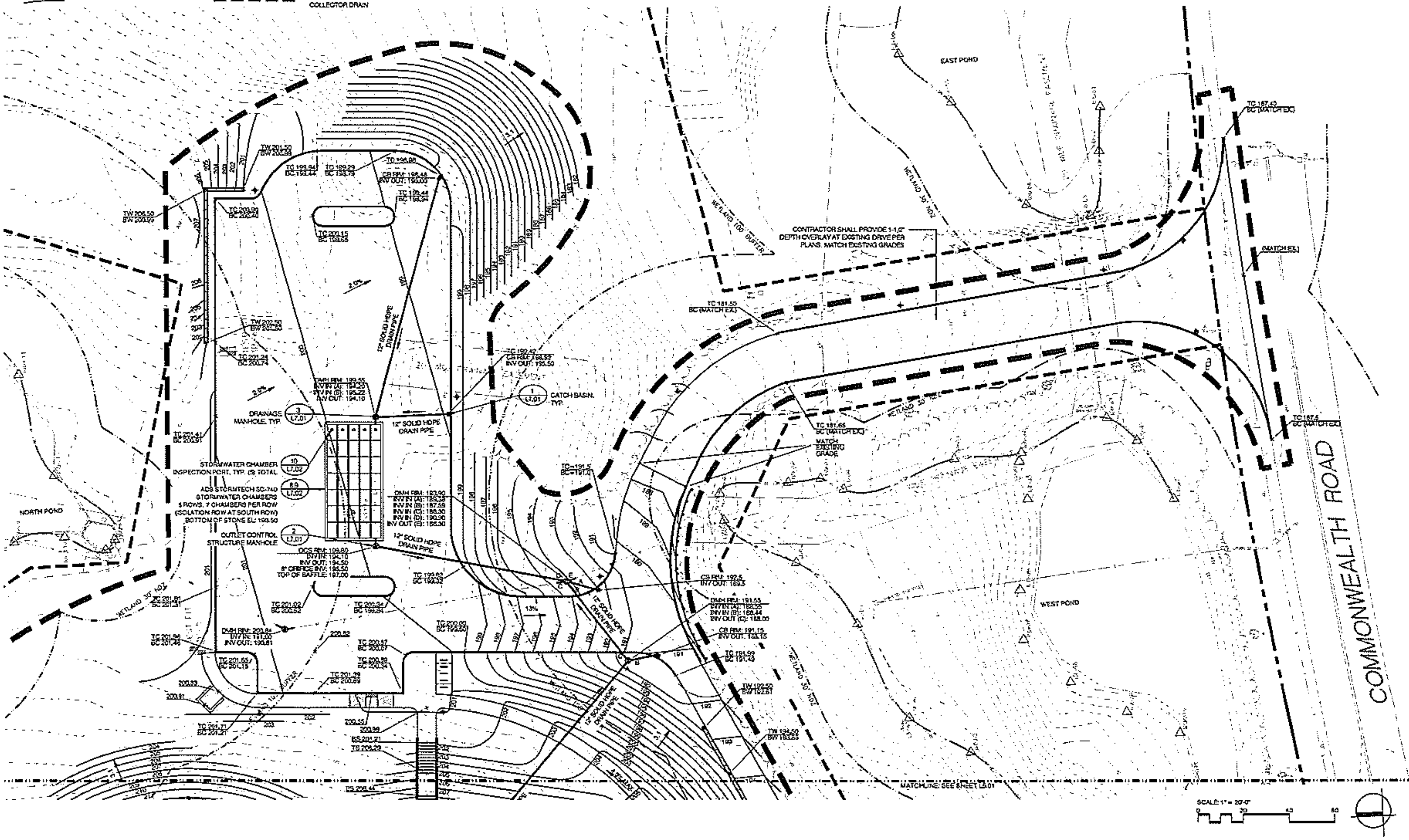
Sheet Number:
L5.01

LEGEND

PROPERTY LINE	2% MAX. SWALE LINE	FFE	FINISHED FLOOR ELEVATION		
LIMIT OF PROPERTY DESIGNATED FOR RECREATIONAL USE	1.5% PROPOSED SLOPE	HP	HIGH POINT		
LIMIT OF WORK	PROPOSED SPOT ELEVATION	LP	LOW POINT		
MATCHLINE	CATCH BASIN	TW	TOP OF WALL		
EXISTING DRAINAGE STRUCTURE, SEE UTILITIES PLAN	PVC AREA DRAIN	BW	BOTTOM OF WALL		
EXISTING CONTOURS	DRAINAGE MAN HOLE	TS	TOP OF STEP		
EXISTING SPOT ELEVATION	HDPE SOLID DRAIN PIPE, DIAMETER VARIES	BS	BOTTOM OF STEP		
PROPOSED CONTOURS	FLAT DRAIN				
	HDPE PERFORATED COLLECTOR DRAIN				



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GRADING, DRAINAGE & UTILITY ENLARGEMENT PLANS

Sheet Number:
L5.02

PLANTING SCHEDULE

TREES					
ABRV.	QTY	BOTANICAL NAME	COMMON NAME	SIZE	NOTES
AR	17	ACER RUBRUM	RED MAPLE	2'-2.5" CAL.	B&B
AC	8	ACER SACCHARUM	SUGAR MAPLE	2'-2.5" CAL.	B&B
QA	13	QUERCUS ALBA	WHITE OAK	2'-2.5" CAL.	B&B
QR	29	QUERCUS RUBRA	RED OAK	2'-2.5" CAL.	B&B
QV	16	QUERCUS VELUTINA	BLACK OAK	2'-2.5" CAL.	B&B
SHRUBS					
ABRV.	QTY	BOTANICAL NAME	COMMON NAME	SIZE	NOTES
AA	10	ARONIA ARBUTIFOLIA	RED CHOKEBERRY	#3 CONT.	
ME	5	ARONIA MELANOCARPA	BLACK CHOKEBERRY	#3 CONT.	
CA	7	CLETHRA ALNIFOLIA	SWEET PEPPER BUSH	#3 CONT.	
HV	7	HAMEMALIS VIRGINIANA	WITCH HAZEL	#3 CONT.	
IG	14	ILEX GLABRA 'SHAMROCK'	INKBERRY 'SHAMROCK'	#3 CONT.	
IV	10	ILEX VERTICILLATA	WINTERBERRY	#3 CONT.	
MP	16	MYRICA PENSYLVANICA	BAYBERRY	#3 CONT.	
RA	46	RHUS AROMATICA 'GRO-LOW'	FRAGRANT SUMAC 'GRO-LOW'	#3 CONT.	
SS	15	SCHIZACHYRIUM SCOPARIUM 'STANDING OVATION'	LITTLE BLUESTEM	#3 CONT.	
VD	6	VIBURNUM DENTATUM	ARROWWOOD VIBURNUM	#3 CONT.	

LEGEND:

PROPERTY LINE

LIMIT OF WORK

WETLAND DELINEATION

WETLAND BUFFER

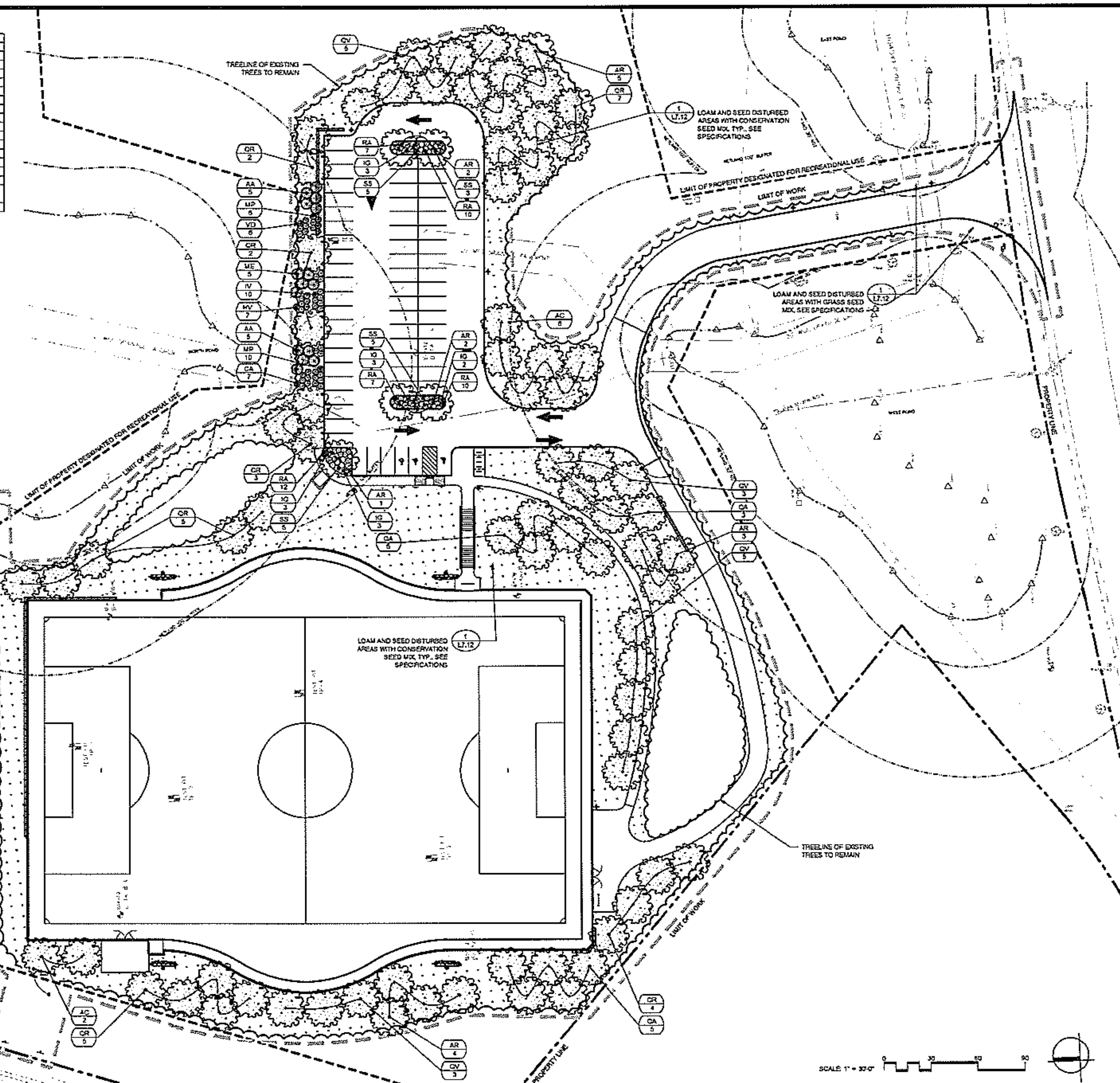
CONSERVATION SEED MIX

GRASS SEED MIX

PROPOSED TREES

PROPOSED SHRUBS

TREELINE OF EXISTING TREES TO REMAIN



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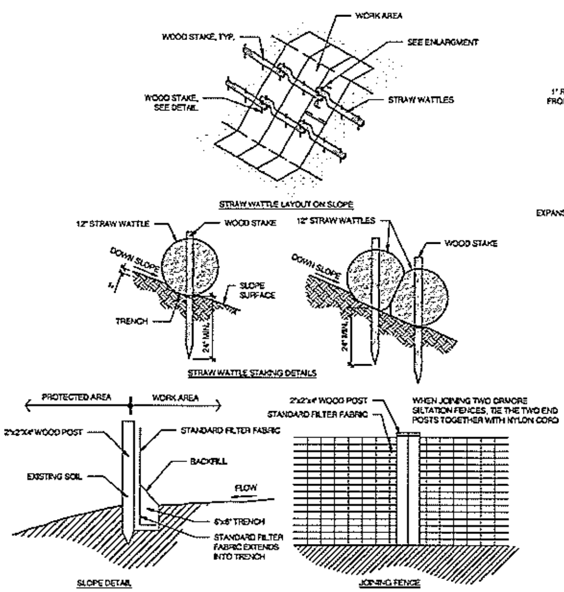
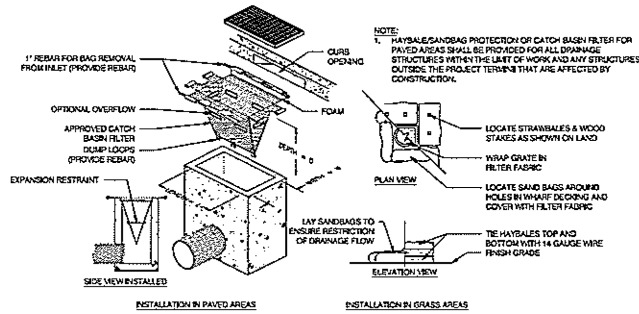
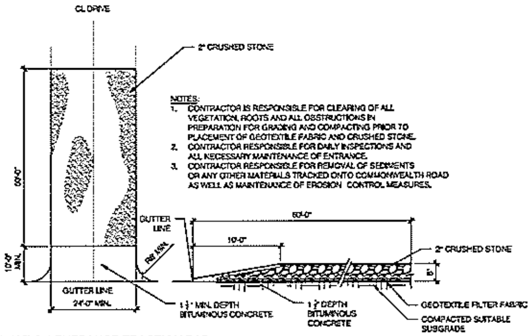


1 EROSION AND SEDIMENT CONTROL
SCALE: NTS



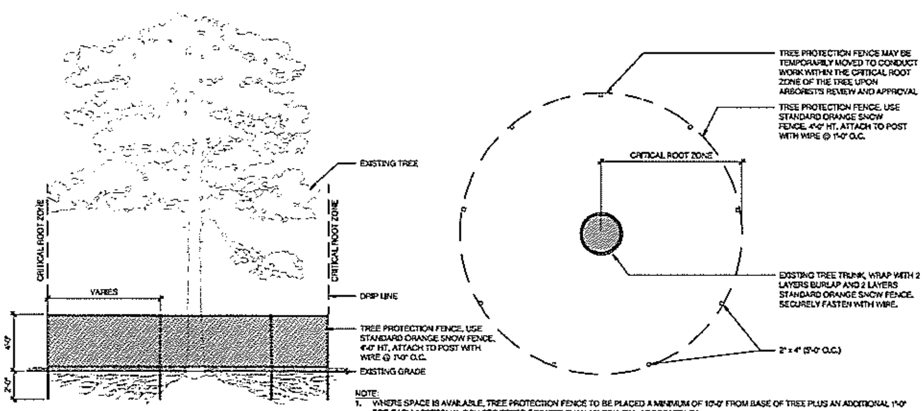
NOTE:
1. HAYBALE/SANDBAG PROTECTION OR CATCH BASIN FILTER FOR PAVED AREAS SHALL BE PROVIDED FOR ALL DRAINAGE STRUCTURES WITHIN THE LIMIT OF WORK AND ANY STRUCTURES OUTSIDE THE PROJECT TERMINI THAT ARE AFFECTED BY CONSTRUCTION.

3 INLET SEDIMENT CONTROL
SCALE: NTS



NOTES:
1. CONTRACTOR IS RESPONSIBLE FOR CLEARING OF ALL VEGETATION, ROOTS AND ALL OBSTRUCTIONS IN PREPARATION FOR GRADING AND COMPACTING PRIOR TO PLACEMENT OF GEOTEXTILE FABRIC AND CRUSHED STONE.
2. CONTRACTOR RESPONSIBLE FOR DAILY INSPECTIONS AND ALL NECESSARY MAINTENANCE OF ENTRANCE.
3. CONTRACTOR RESPONSIBLE FOR REMOVAL OF SEDIMENTS OR ANY OTHER MATERIALS TRACKED ONTO COMMONWEALTH ROAD AS WELL AS MAINTENANCE OF EROSION CONTROL MEASURES.

4 CONSTRUCTION ENTRANCE TRACTION PAD
SCALE: NTS



NOTE:
1. WHERE SPACE IS AVAILABLE, TREE PROTECTION FENCE TO BE PLACED A MINIMUM OF 10'-0" FROM BASE OF TREE PLUS AN ADDITIONAL 1'-0" FOR EACH ADDITIONAL DSH FOR TREES GREATER THAN 10" DSH (DIA. AT BREAST HT.)
2. ALL WORK DONE WITHIN TREE PROTECTION FENCE IS TO BE DONE BY HAND AND LIGHT EQUIPMENT.
3. ROOTS EXPOSED DURING EXCAVATION SHALL BE NEATLY CUT AND COVERED WITH SOIL IMMEDIATELY.
4. FOR TREES THAT OCCUR IN GROUPS PROVIDE TREE PROTECTION FENCE AROUND ENTIRE AREA. SEE PLAN FOR LOCATIONS.
5. MAINTAIN FENCE PROTECTION IN SOUND CONDITION FOR THE DURATION OF CONSTRUCTION.
6. A CERTIFIED ARBORIST SHALL DELINEATE LIMIT OF TREE PROTECTION FENCE AS THEY RELATE TO THE LIMITS OF THE CRITICAL ROOT ZONE.
7. CRITICAL ROOT ZONE TO BE PROTECTED, ALL WORK NECESSARY WITHIN THE CRITICAL ROOT ZONE SHALL BE PERFORMED BY HAND.

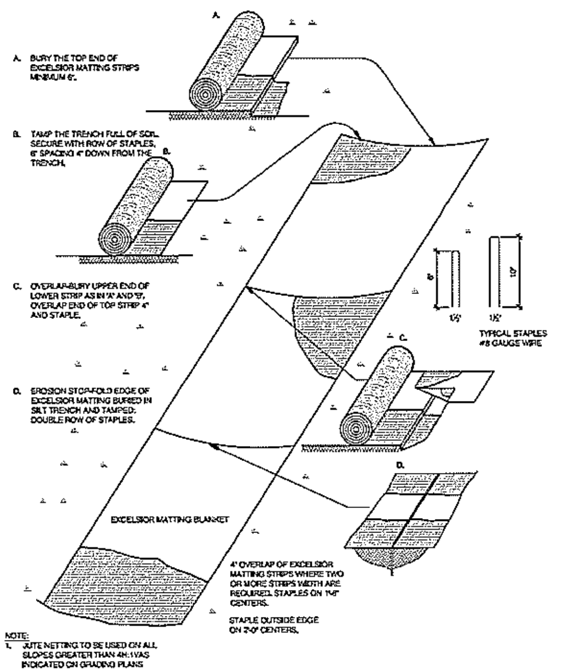
2 TREE PROTECTION
SCALE: NTS

A. BURY THE TOP END OF EXCELSIOR MATTING STRIPS MINIMUM 6".

B. TAMP THE TRENCH FULL OF SOIL. SECURE WITH ROW OF STAPLES, 6" SPACING 4" DOWN FROM THE TRENCH.

C. OVERLAP-BURY UPPER END OF LOWER STRIP AS IN "A" AND "B". OVERLAP END OF TOP STRIP 4" AND STAPLE.

D. EROSION STOP-FOLD EDGE OF EXCELSIOR MATTING BURIED IN SILT TRENCH AND TAMPED. DOUBLE ROW OF STAPLES.



NOTE:
1. JUTE NETTING TO BE USED ON ALL SLOPES GREATER THAN 4H:1V AS INDICATED ON GRADING PLANS

5 EROSION CONTROL BLANKET
SCALE: NTS

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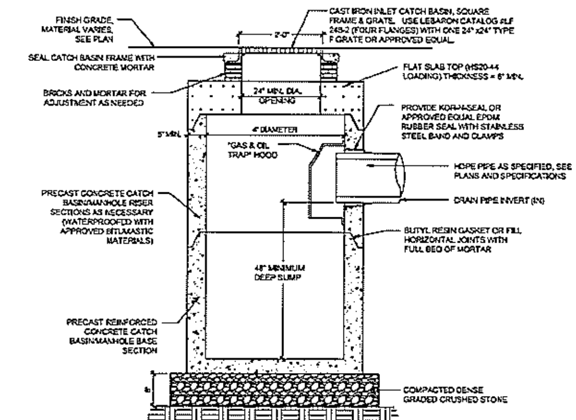
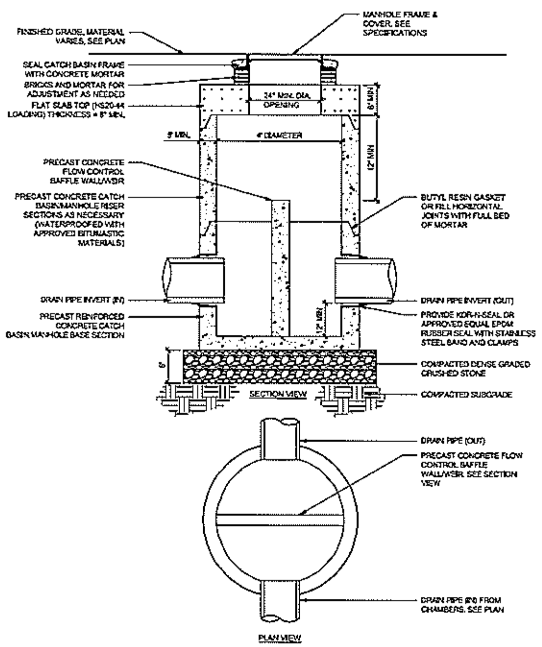
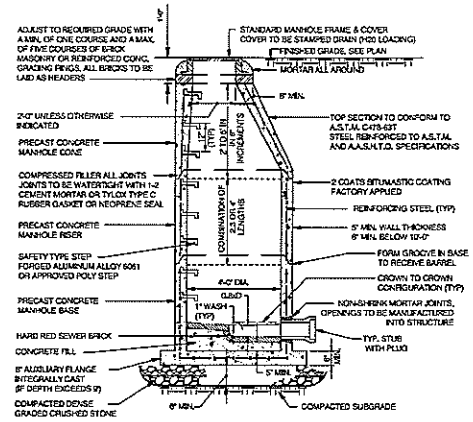


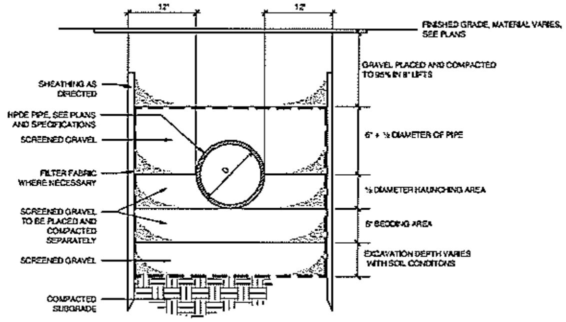
1 CATCH BASIN
SCALE: NTS



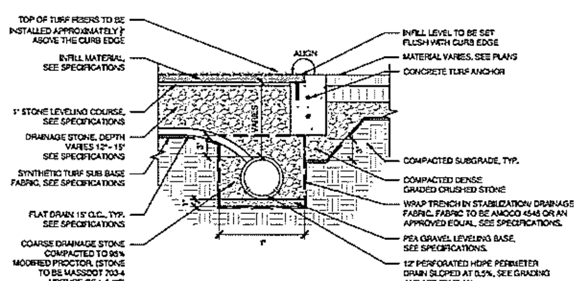
2 OUTLET CONTROL STRUCTURE MANHOLE
SCALE: NTS



3 DRAINAGE MANHOLE
SCALE: NTS

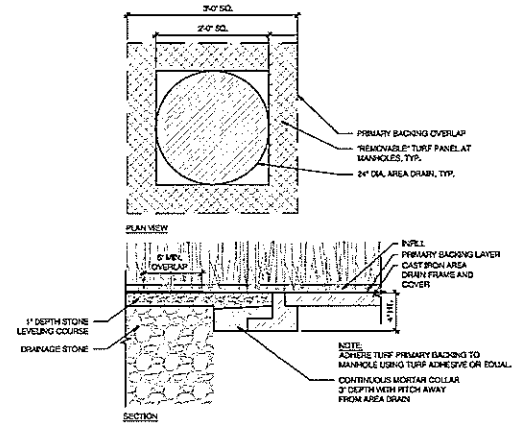


4 DRAINAGE TRENCH
SCALE: NTS

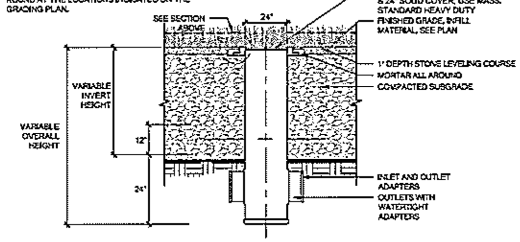


NOTES:
1. FLAT DRAIN TO BE DIRECTLY CONNECTED TO PERIMETER DRAIN. PROVIDE MANUFACTURED FITTINGS TO MAKE THE CONNECTION AS REQUIRED AND APPROVED BY THE OWNERS REPRESENTATIVE.
2. CONCRETE CURB TO BE 4,500 PSI AT 28 DAYS (AIR CONTENT 6% +/- 1%) (COARSE AGGREGATE ASTM C-33 SIZE #57)

5 COLLECTOR DRAIN
SCALE: NTS



NOTES:
1. 24" MIN SUMP IS REQUIRED AT ALL AREA DRAINS WITHIN THE SYNTHETIC TURF FIELD.
2. GRATES AND/OR COVERS SHALL BE 24" ROUND AT THE LOCATIONS INDICATED ON THE GRADING PLAN.



6 PVC DMH AT SYNTHETIC TURF FIELDS
SCALE: NTS

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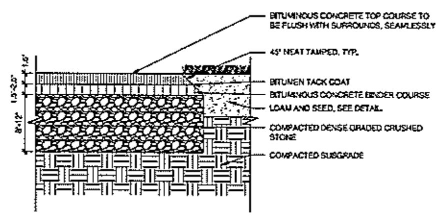
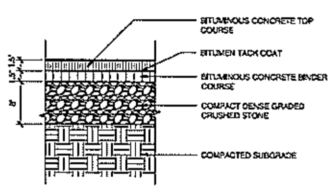
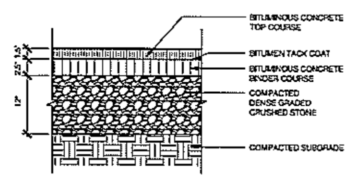


1 BITUMINOUS CONCRETE AT LAWN
SCALE: NTS



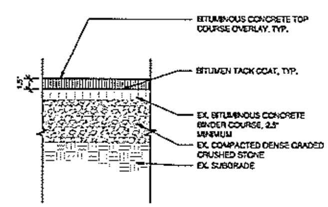
NOTES:
1. CONTRACTOR TO PROVIDE SMOOTH TRANSITION WHERE NEW PAVEMENT ABUTS EXISTING PAVEMENT.

2 PEDESTRIAN BITUMINOUS CONCRETE PAVEMENT
SCALE: NTS



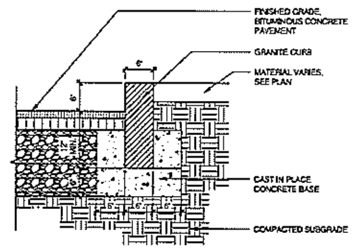
NOTES:
1. CONTRACTOR TO PROVIDE SMOOTH TRANSITION WHERE NEW PAVEMENT ABUTS EXISTING PAVEMENT, TYP.

3 VEHICULAR BITUMINOUS CONCRETE PAVEMENT
SCALE: NTS

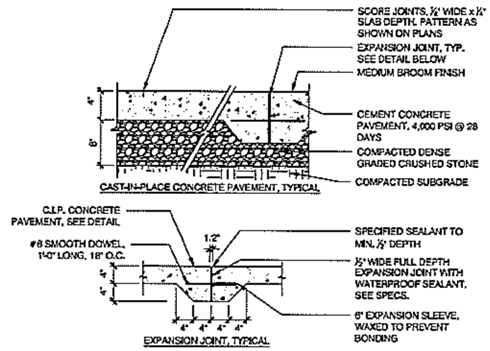


NOTES:
1. CONTRACTOR TO PROVIDE SMOOTH TRANSITION WHERE NEW PAVEMENT ABUTS EXISTING PAVEMENT, TYP.

4 BITUMINOUS CONCRETE PAVEMENT - TOP COURSE OVERLAY
SCALE: NTS



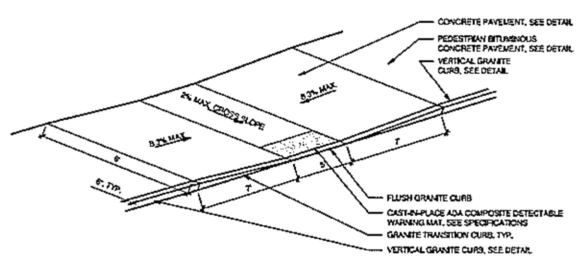
5 VERTICAL GRANITE CURB
SCALE: NTS



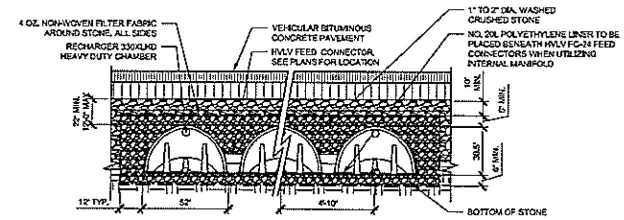
EXPANSION JOINT INSTALLATION NOTES:

1. DOWEL IS TYPICAL AT ALL EXPANSION JOINTS (18" O.C.) WITHIN CONCRETE PAVING AND BETWEEN NEW CONCRETE PAVING AND EXISTING CONCRETE PAVING TO REMAIN.
2. DELETE EXPANSION SLEEVE AND DOWEL WHERE JOINT ABUTS WALL, CURBS, OR OTHER VERTICAL SURFACES, UNLESS OTHERWISE NOTED.
3. EXPANSION JOINTS MAX. 25'-0" O.C. UNLESS SHOWN OTHERWISE.
4. EXPANSIONS JOINTS SHALL BE PLACED WHERE NEW CEMENT CONCRETE PAVEMENT MEETS EXISTING PAVEMENT OR WALLS TO REMAIN.
5. ALL EXPANSION JOINTS SHALL BE SAW CUT.

6 CONCRETE PAVEMENT
SCALE: NTS

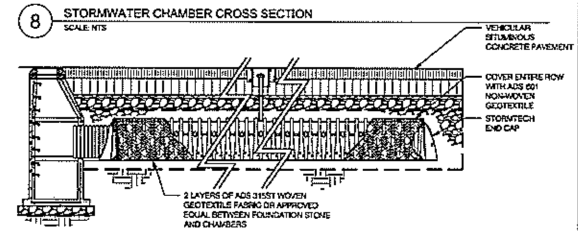


7 CURB RAMP WITH DETECTABLE WARNING MAT
SCALE: NTS

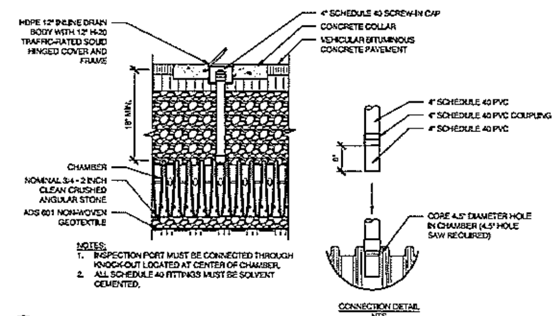


NOTES:
1. STORAGE PROVIDED = SEE PLANS.
2. CHAMBER SHALL BE INSTALLED PER MANUFACTURER'S REQUIREMENTS.
3. USE 330XLHD HEAVY DUTY FOR TRAFFIC AND/OR H-25 APPLICATIONS OR APPROVED EQUAL. SEE SPECIFICATIONS.
4. ALL UNITS SHALL BE MARKED WITH A COLOR STRIPE FORMED INTO THE PART ALONG THE LENGTH OF THE CHAMBER.
5. ALL CHAMBERS MUST BE INSTALLED IN ACCORDANCE WITH ALL APPLICABLE LOCAL, STATE AND FEDERAL REGULATIONS.
6. PROVIDE ONE 6" INSPECTION PORT ON THE END OF EACH ROW PER MANUFACTURER DETAILS.

8 STORMWATER CHAMBER CROSS SECTION
SCALE: NTS

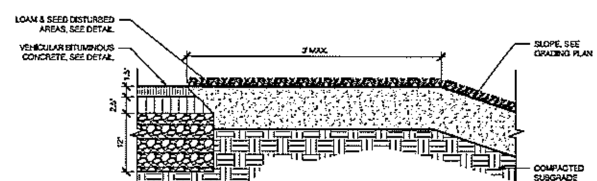


9 STORMWATER CHAMBER ISOLATION ROW
SCALE: NTS



NOTES:
1. INSPECTION PORT MUST BE CONNECTED THROUGH KNOCK-OUT LOCATED AT CENTER OF CHAMBER.
2. ALL SCHEDULE 40 FITTINGS MUST BE SOLVENT CEMENTED.

10 STORMWATER CHAMBER INSPECTION PORT
SCALE: NTS



11 ROADWAY EDGE
SCALE: NTS

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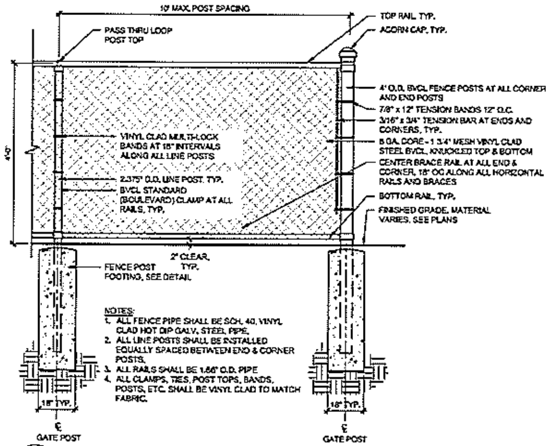
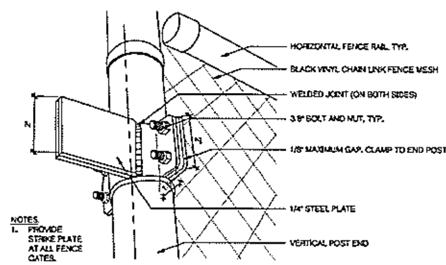
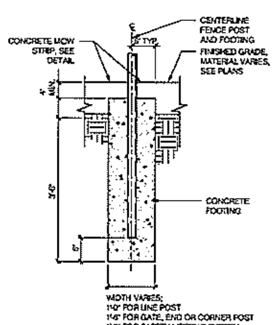


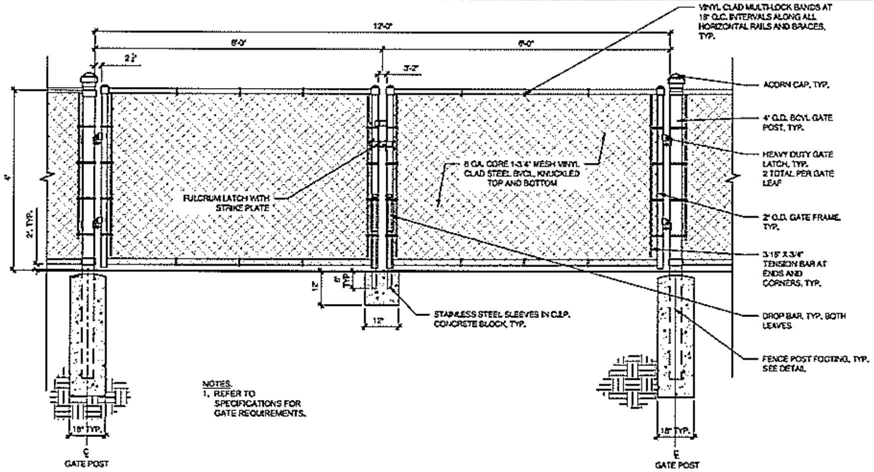
1 4' HT. BLACK VINYL CHAIN LINK (BVCL) FENCE
SCALE: NTS



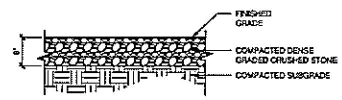
2 STRIKE PLATE
SCALE: NTS



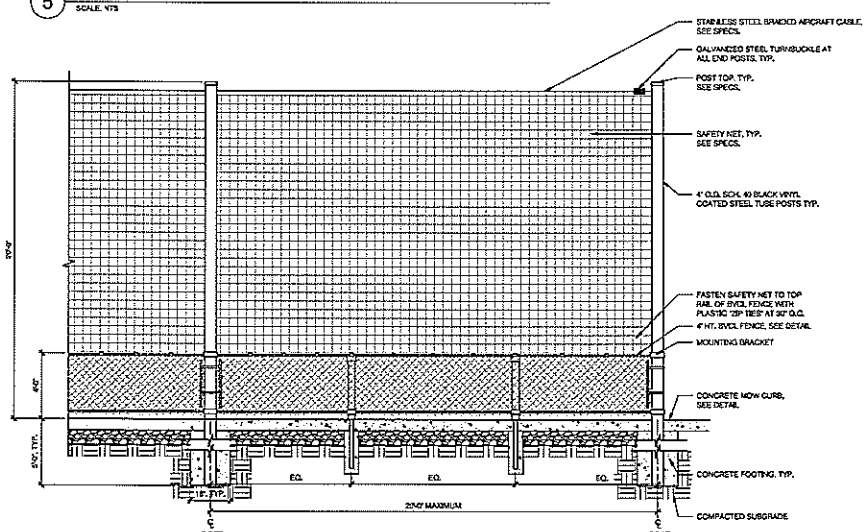
3 FENCE POST FOOTING
SCALE: NTS



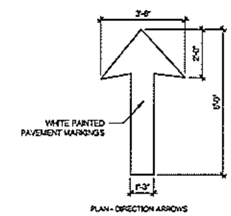
4 12' WIDE BLACK VINYL CHAIN LINK (BVCL) FENCE DOUBLE SWING GATE
SCALE: NTS



5 DENSE GRADED CRUSHED STONE LEVELING PAD
SCALE: NTS



6 20' HT. SAFETY NETTING SYSTEM
SCALE: NTS



7 ONE-WAY DIRECTIONAL TRAFFIC ARROW
SCALE: NTS

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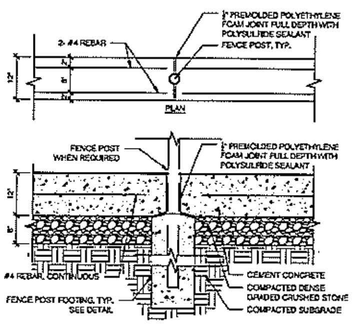
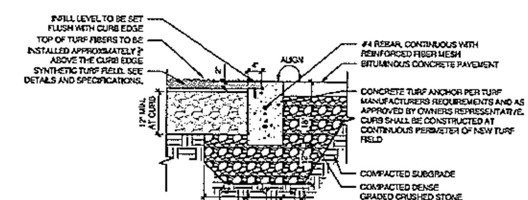


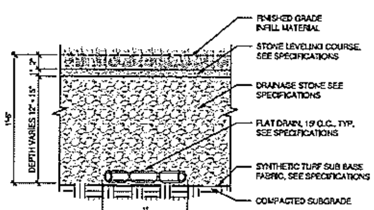
NOTES:
1. MOW CURB CORNERS SHALL BE SQUARE AT ADJACENT SURFACE MATERIAL TO ENSURE SMOOTH INTERFACE BETWEEN MATERIALS.
2. MOW CURB CORNERS ADJACENT TO PLANTING BED OR LAWN AREAS WILL HAVE 3/4" CHAMFER.
3. CONTRACTOR SHALL PROVIDE 1/2" PREMOLDED POLYETHYLENE FOAM EXPANSION JOIN, FULL DEPTH WITH SILICONE SEALANT EVERY 30' O.C. UNLESS OTHERWISE NOTED.

CONCRETE MOW CURB



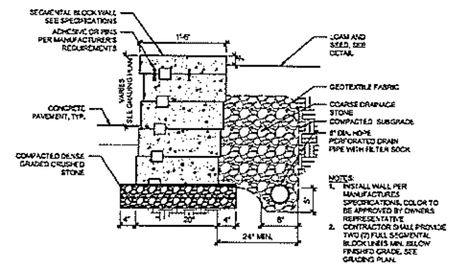
NOTES:
1. CONTRACTOR TO PROVIDE CONTROL JOINTS (PREFORMED OR SAWCUT) 10' O.C. MIN. 1/2" DEEP
2. CONTRACTOR TO PROVIDE EXPANSION JOINTS EVERY 40' O.C.
3. CONCRETE CURB TO BE 4,000 PSI AT 28 DAYS (AIR CONTENT 6% +/- 1%) (COARSE AGGREGATE ASTM C-33 SIZE #57)

1 CONCRETE TURF ANCHOR AT SYNTHETIC TURF FIELD - 2 CONDITIONS
SCALE: NTS



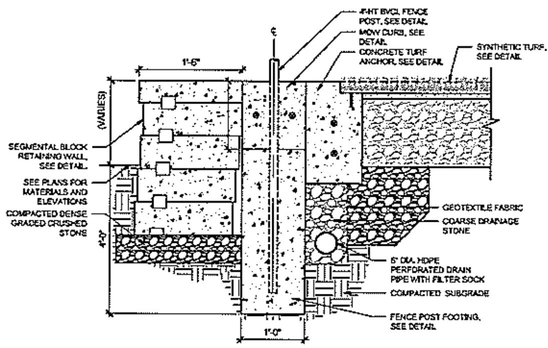
NOTES:
1. SUBGRADE ELEVATIONS TO FOLLOW SAME SLOPE AS FINISHED SURFACE ELEVATIONS WITHIN TURF LIMITS.
2. ABSOLUTELY NO SUBSTITUTIONS SHALL BE ALLOWED FOR BOTH THE STONE LEVELING COURSE AND DRAINAGE STONE WITHOUT A WRITTEN AND SIGNED DOCUMENT DIRECTLY FROM THE TURF MANUFACTURER. DOCUMENT SHALL STATE: THE MATERIAL IS AN ACCEPTABLE MATERIAL TO BE USED DIRECTLY UNDER THEIR TURF FIELD FABRIC AND THAT THE SUBSTITUTION MATERIAL PROVIDES THE SAME CHARACTERISTICS (DRAINAGE, STRUCTURAL INTEGRITY, PLAYABILITY, ETC.) AS THE MATERIALS SPECIFIED. FAILURE TO PROVIDE SUCH A DOCUMENT SHALL BE AT THE RISK AND COST OF THE CONTRACTOR.

2 SYNTHETIC TURF
SCALE: NTS



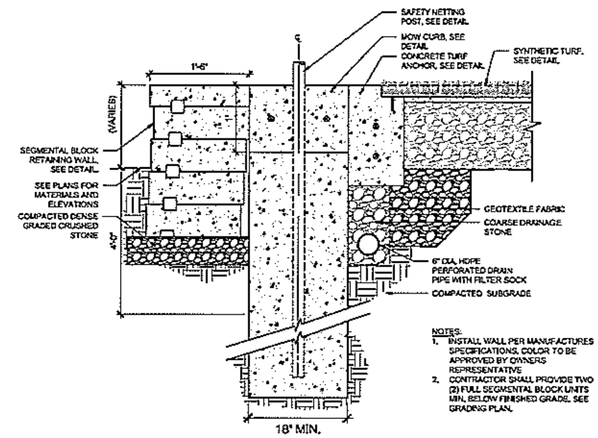
NOTES:
1. INSTALL WALL PER MANUFACTURES SPECIFICATIONS, COLOR TO BE APPROVED BY OWNERS REPRESENTATIVE
2. CONTRACTOR SHALL PROVIDE TWO (2) FULL SEGMENTAL BLOCK UNITS MIN. BELOW FINISHED GRADE, SEE GRADING PLAN.

3 SEGMENTAL BLOCK RETAINING WALL
SCALE: NTS



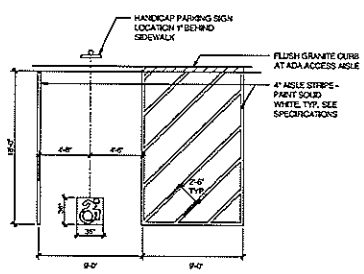
NOTES:
1. INSTALL WALL PER MANUFACTURES SPECIFICATIONS. COLOR TO BE APPROVED BY OWNERS REPRESENTATIVE
2. CONTRACTOR SHALL PROVIDE TWO (2) FULL SEGMENTAL BLOCK UNITS MIN. BELOW FINISHED GRADE. SEE GRADING PLAN.

4 BVCL FENCE POST AT SEGMENTAL BLOCK RETAINING WALL
SCALE: NTS



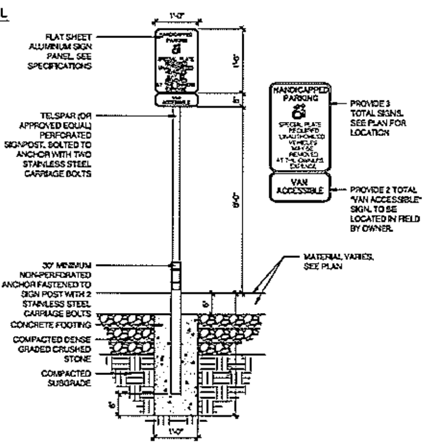
NOTES:
1. INSTALL WALL PER MANUFACTURES SPECIFICATIONS. COLOR TO BE APPROVED BY OWNERS REPRESENTATIVE
2. CONTRACTOR SHALL PROVIDE TWO (2) FULL SEGMENTAL BLOCK UNITS MIN. BELOW FINISHED GRADE. SEE GRADING PLAN.

6 SAFETY NETTING POST AT SEGMENTAL BLOCK RETAINING WALL
SCALE: NTS

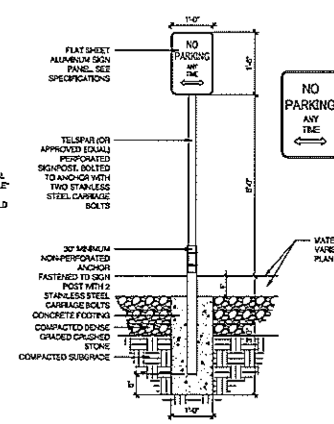


NOTES:
1. SEE SPECIFICATIONS FOR ALL PAVEMENT MARKINGS.
2. UNIVERSAL WHITE PAINTED ADA SYMBOL PLACED IN A BLUE PAINTED FIELD.

5 HANDICAP PARKING SPACE MARKING
SCALE: NTS



7 HANDICAP PARKING SIGN AND FOOTING
SCALE: NTS



8 "NO PARKING" SIGN AND FOOTING
SCALE: NTS

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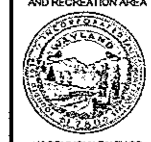

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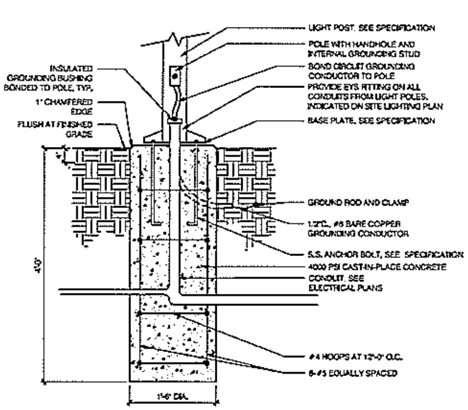
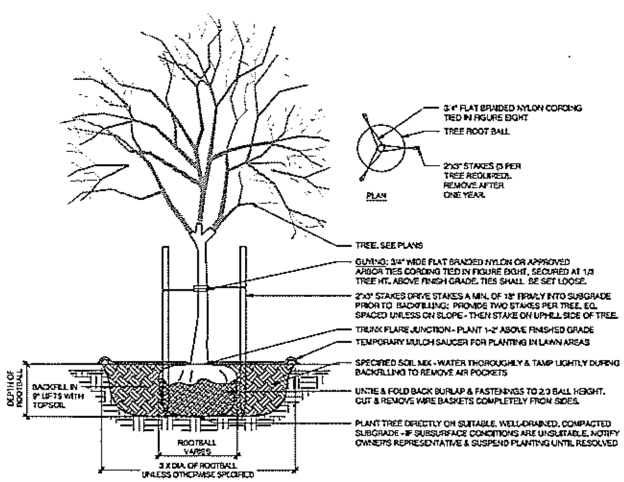


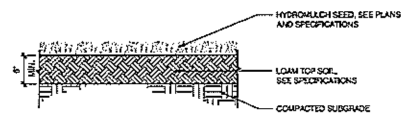
NOTES:

1. ELECTRICAL CONTRACTOR SHALL COORDINATE WITH THE GENERAL CONTRACTOR. ALL EXCAVATION, BACKFILL, & CONCRETE SHALL BE BY GENERAL CONTRACTOR.
2. REFER TO SPECIFICATIONS FOR MATERIALS.

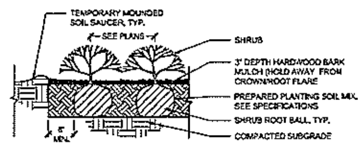
1 BASE BID: PEDESTRIAN LIGHTING AND FOOTING
SCALE: NTS



2 TREE STAKING AND PLANTING
SCALE: NTS

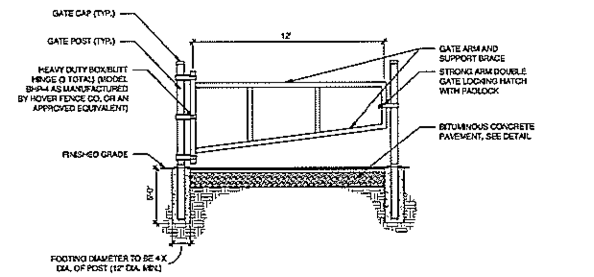


3 LOAM AND SEED
SCALE: NTS



NOTES:
1. ALL MULCH MUST BE DARK IN COLOR. PROVIDE SAMPLE PRIOR TO INSTALLATION TO BE APPROVED BY OWNERS REPRESENTATIVE.

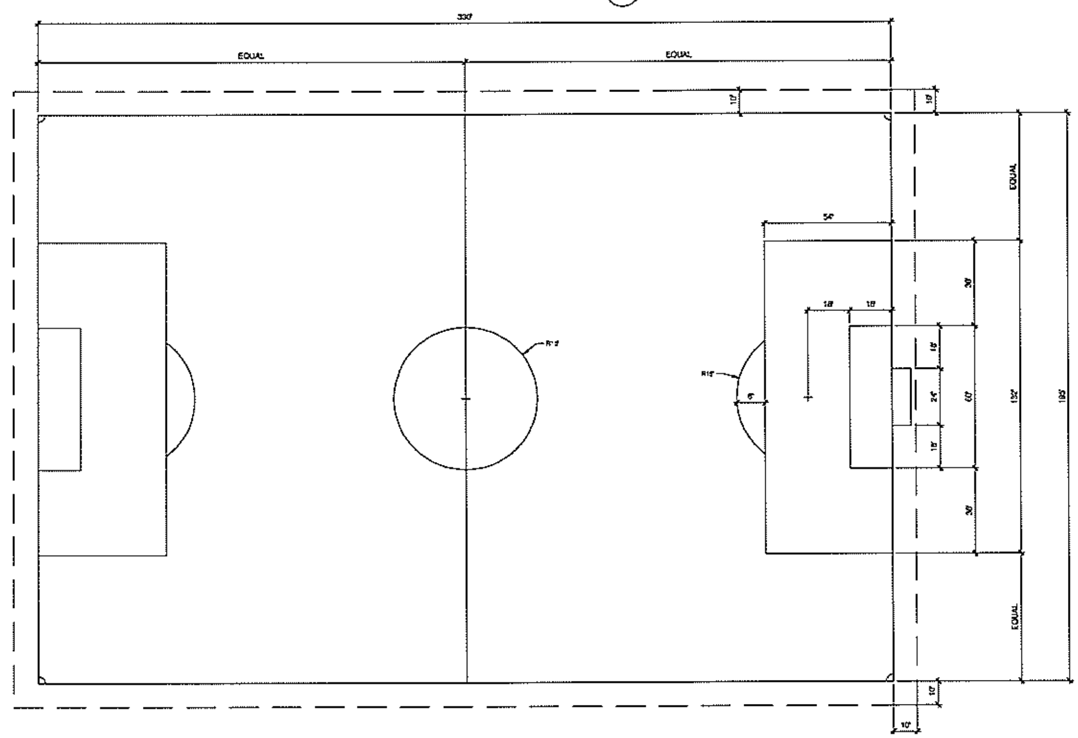
4 SHRUB PLANTING
SCALE: NTS



POSTS:
SCHEDULE 40 GALVANIZED STEEL, SIX (6) INCH DIA.
GATE ARM AND SUPPORT BRACE:
SCHEDULE 40 GALVANIZED STEEL FOUR (4) INCH DIA.
HARDWARE:
HEAVY DUTY GALVANIZED STEEL
CONCRETE FOOTING:
NORMAL WEIGHT CONCRETE AIR ENTRAINED WITH NOT LESS THAN 4,500 PSI COMPRESSIVE STRENGTH (28 DAYS), THREE (3) INCH SLUMP, AND ONE (1) INCH MAXIMUM SIZE AGGREGATE.

NOTES:
1. THE CONTRACTOR SHALL PROVIDE ALL GATE COMPONENTS, HARDWARE, ETC. FOR THE COMPLETE INSTALLATION OF THE NEW GATE, INSTALL IN STRICT COMPLIANCE WITH THE MANUFACTURER'S WRITTEN RECOMMENDATIONS AND SPECIFICATIONS. ALL MATERIALS SHALL BE HEAVY DUTY RATED AND APPROVED BY THE ENGINEER PRIOR TO INSTALLATION. ALL HARDWARE SHALL INSTALLED SO THAT THE GATE IS STRUCTURALLY SOUND AND DOES NOT SAG IN THE OPEN AND/OR CLOSED POSITION. COORDINATE LAYOUT AND LOCATION IN THE FIELD WITH THE ENGINEER PRIOR TO INSTALLATION.

6 VEHICLE SWING GATE
SCALE: NTS



5 SOCCER STRIPING LAYOUT
SCALE: NTS

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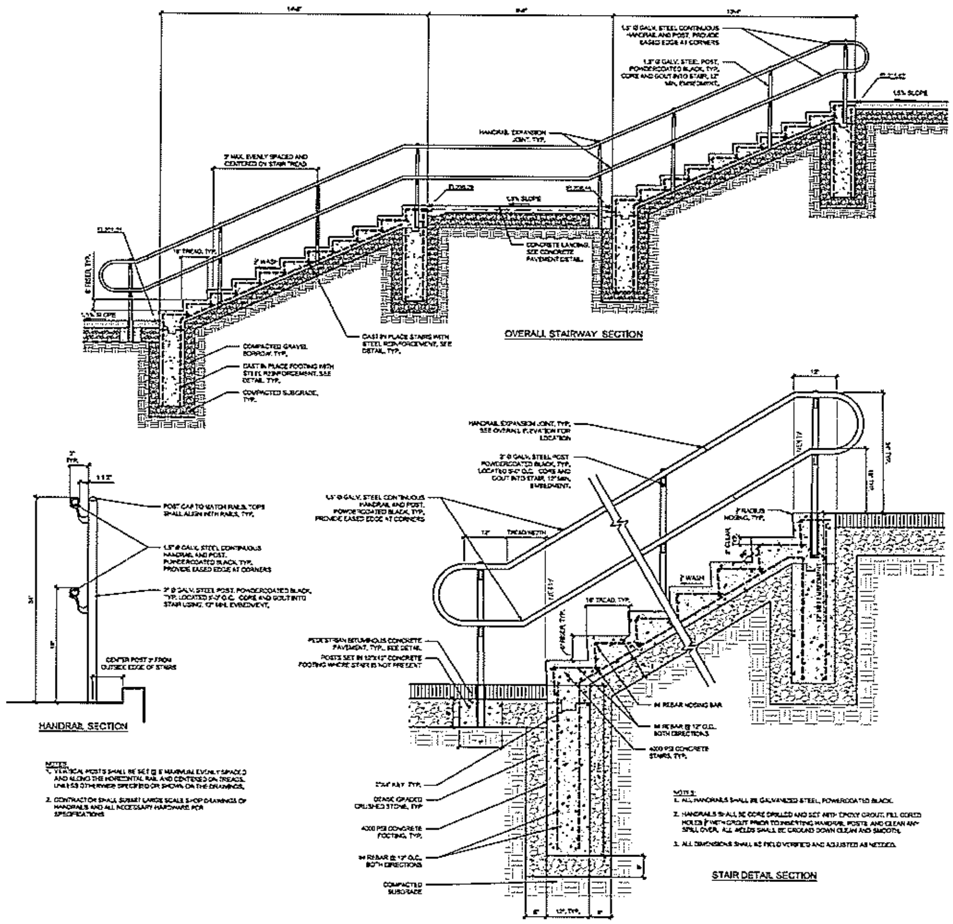
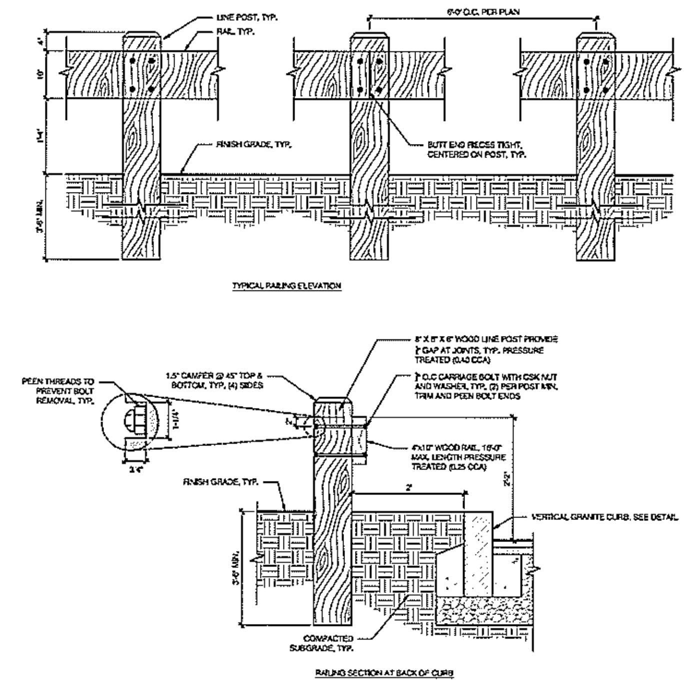


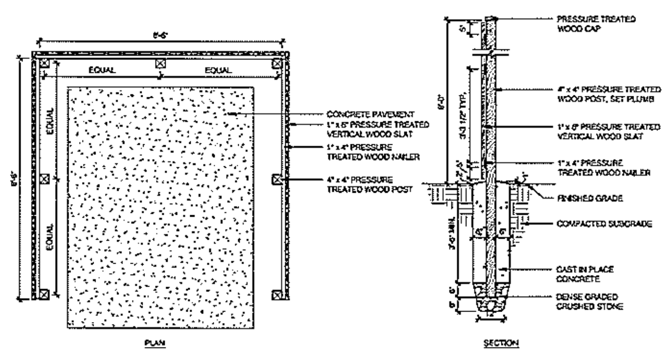
NOTES:
1. VERTICAL POSTS SHALL BE SET @ 8' MAXIMUM EVENLY SPACED AND ALONG THE HORIZONTAL RAIL AND CENTERED ON TREADS, UNLESS OTHERWISE SPECIFIED OR SHOWN ON THE DRAWINGS.
2. CONTRACTOR SHALL SUBMIT LARGE SCALE SHOP DRAWINGS OF HANDRAILS AND ALL ACCESSORY HARDWARE FOR SPECIFICATIONS.

NOTES:
1. ALL HANDRAILS SHALL BE GALVANIZED STEEL, POWDERCOATED BLACK.
2. HANDRAILS SHALL BE CORE DRILLED AND SET WITH EPOXY GROUT. FILL CORED HOLES WITH GROUT PRIOR TO INSERTING HANDRAIL POSTS AND CLEAN ANY SPILL OVER. ALL WELDS SHALL BE GROUND DOWN CLEAN AND SMOOTH.
3. ALL DIMENSIONS SHALL BE FIELD VERIFIED AND ADJUSTED AS NEEDED.

1 CAST IN PLACE CONCRETE STAIRS
SCALE: NTS



2 VEHICULAR WOOD GUARDRAIL
SCALE: NTS



3 WOOD SLAT SCREEN FENCE
SCALE: NTS

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ABBREVIATIONS

AFF	ABOVE FINISHED FLOOR
AC	ALTERNATING CURRENT
A	AMPERE
ATC	AUTOMATIC TEMPERATURE CONTROLS
ATS	AUTOMATIC TRANSFER SWITCH
BKR	BREAKER
C	CONDUIT
CKT	CIRCUIT
CB	CIRCUIT BREAKER
EC	ELECTRICAL CONTRACTOR
EMT	ELECTRIC METALLIC TUBING
EWC	ELECTRIC WATER COOLER
EWH	ELECTRIC WATER HEATER
EF	EXHAUST FAN
FL	FLOOR
FLA	FULL LOAD AMPERE
GC	GENERAL CONTRACTOR
GFI	GROUND FAULT INTERRUPTER
GND	GROUND
HOA	HAND OFF AUTOMATIC
HP	HORSEPOWER
IG	ISOLATED GROUND
JB	JUNCTION BOX
KVA	KILOVOLT AMPERES
KW	KILOWATT
MCB	MAIN CIRCUIT BREAKER
MLO	MAIN LUGS ONLY
MC	MECHANICAL CONTRACTOR
MTD	MOUNTED
MTG	MOUNTING
NMC	NON-METALLIC CONDUIT
NC	NORMALLY CLOSED
NO	NORMALLY OPEN
NA	NOT APPLICABLE
NIC	NOT IN CONTRACT
NTS	NOT TO SCALE
PNL	PANELBOARD
PH	PHASE
PVC	POLYVINYL CHLORIDE CONDUIT
RSC	RIGID GALVANIZED STEEL CONDUIT
SF	SUPPLY FAN
SS	SAFETY SWITCH
TEL	TELEPHONE
TRF	TRANSFORMER
V	VOLTS
W	WATTS OR WIRE
WP	WEATHERPROOF
4WSN	4-WIRE SOLID NEUTRAL

RECEPTACLE ABBREVIATIONS

GFI	GROUND FAULT CIRCUIT INTERUPTER, PERSONAL PROTECTION
WP	WEATHERPROOF RECEPTACLE WITH COVERPLATE LISTED FOR WET LOCATION WITH AN ATTACHMENT PLUG INSERTED.

ELECTRICAL LEGEND

1,3 LP1B	HOMERUN TO PANELBOARD, NUMBER OF TICKS INDICATES NUMBER OF #12 AWG CONDUCTORS CONTAINED IN RACEWAY. TWO (2) #12 AWG SHALL NOT BE INDICATED BY TICKS. NUMERALS 1 AND 3 INDICATE CIRCUITS IN PANELBOARD. RACEWAYS LARGER THAN 1/2" AND CONDUCTORS LARGER THAN #12 AWG SHALL BE INDICATED ON THE DRAWINGS. PROVIDE AN INSULATED GREEN GROUND WIRE IN ALL RACEWAYS MINIMUM SIZE TO BE #12AWG.
	RACEWAY RUN ABOVE GROUND
	RACEWAY RUN UNDERGROUND
	PULL BOX. TYPE AS NOTED ON THE DRAWINGS OR AS REQUIRED BY N.E.C.
	DUPLEX CONVENIENCE OUTLET RATED 20A, 125V, U-SLOT GROUNDED TYPE MOUNTED 18" ABOVE FINISHED FLOOR TO CENTER LINE. ALL OTHER MOUNTING HEIGHTS SHALL BE AS NOTED ADJACENT TO THE SYMBOL. REFER TO RECEPTACLE ABBREVIATIONS FOR SPECIAL PURPOSE RECEPTACLES.
S_a	SINGLE POLE SWITCH (120/277V) MOUNTED 4'-0" ABOVE FINISHED FLOOR. ALL OTHER MOUNTING HEIGHTS SHALL BE AS NOTED ON THE DRAWINGS. "a" SUBSCRIPT DENOTES CIRCUITS CONTROLLED.
T1	SPORTS LIGHT POLE - "T1" INDICATES POLE NUMBER
	PEDESTRIAN LIGHT FIXTURE
PHH	HAND HOLE "PHH" POWER HAND HOLE "CHH" COMMUNICATIONS HAND HOLE

GENERAL NOTES

1. DRAWINGS ARE DIAGRAMMATIC ONLY. THE EXACT LOCATION, MOUNTING HEIGHTS, SIZE OF EQUIPMENT AND ROUTING OF RACEWAYS SHALL BE COORDINATED AND DETERMINED IN THE FIELD.
2. ALL STRAIGHT FEEDER, BRANCH CIRCUIT AND AUXILIARY SYSTEM CONDUIT RUNS SHALL BE PROVIDED WITH SUFFICIENT PULL BOXES TO LIMIT THE MAXIMUM LENGTH OF ANY SINGLE CABLE PULL TO 150 FEET. EXACT SIZES OF PULL BOXES AND LOCATIONS TO BE DETERMINED IN THE FIELD BY THE ELECTRICAL CONTRACTOR.
3. SLEEVES ARE TO BE UTILIZED FOR PASSAGE OF CONDUITS THROUGH FLOORS OR WALLS. CONDUITS AND BOXES ARE TO BE SUPPORTED BY THE USE OF PRESET FASTENERS INSTALLED IN FLOORS, WALLS OR COLUMNS. CONDUITS AND BOXES ARE TO BE INSTALLED CONCEALED IN MASONRY WALLS AND ABOVE HUNG CEILINGS. ALL SLEEVES ARE TO BE SEALED WITH APPROVED FIRE STOPPING SEALANT.
4. WORK SHALL CONFORM TO THE MASSACHUSETTS ELECTRICAL CODE, MASSACHUSETTS BUILDING CODE, NFPA AND REQUIREMENTS OF LOCAL AUTHORITIES HAVING JURISDICTION.
5. THE WORD "CONTRACTOR" AS USED IN THE "ELECTRICAL WORK" SHALL MEAN THE ELECTRICAL SUBCONTRACTOR.
6. CONTRACTOR SHALL PAY FOR ALL PERMITS, INSURANCE AND TESTS, AND SHALL PROVIDE LABOR AND MATERIAL TO COMPLETE THE ELECTRICAL WORK SHOWN.
7. CONTRACTOR SHALL PAY ELECTRIC UTILITY COMPANY BACK CHARGES. UTILITY BACK CHARGES ARE $11,883.
8. THE ELECTRICAL CONTRACTOR SHALL PROVIDE ALL COORDINATION WITH THE UTILITY.
9. EXCEPT AS OTHERWISE NOTED, THE ELECTRICAL WORK SHALL INCLUDE DEMOLITION, PANELBOARDS, CIRCUIT BREAKERS, FEEDERS, WIRING, RACEWAYS, LIGHTING FIXTURES, DEVICES, SAFETY SWITCHES, TRANSFORMERS AND CONNECTION NECESSARY TO OPERATE MOTORS AND OTHER EQUIPMENT.
10. THE CONTRACTOR SHALL PROVIDE ALL TEMPORARY LIGHTING AND POWER AND THE GENERAL CONTRACTOR SHALL PAY ALL ENERGY CHARGES.
11. DURING CONSTRUCTION, THE ELECTRICAL CONTRACTOR SHALL KEEP HIS PORTION OF THE WORK NEAT, CLEAN AND ORDERLY.
12. ALL SYSTEMS SHALL BE TESTED FOR SHORT CIRCUIT AND GROUNDS PRIOR TO ENERGIZING AND ANY DEFECTS SHALL BE CORRECTED.
13. ALL CUTTING AND PATCHING REQUIRED FOR ELECTRICAL WORK SHALL BE INCLUDED AS PART OF THIS SECTION.
14. COMPLETE SHOP DRAWINGS SHALL BE SUBMITTED FOR ELECTRICAL EQUIPMENT. WHERE SPECIFIED ELECTRICAL EQUIPMENT IS SUBSTITUTED, THE ELECTRICAL CONTRACTOR SHALL SUBMIT COMPLETE SPECIFICATIONS ON THE SUBSTITUTE AS WELL AS THE ITEM ORIGINALLY SPECIFIED.
15. MATERIALS SHALL BE SPECIFICATION GRADE AND UL LISTED.
16. WHERE MATERIAL IS CALLED OUT IN THE LEGEND BY MANUFACTURER, TYPE OR CATALOG NUMBER, SUCH DESIGNATIONS ARE TO ESTABLISH STANDARDS OR DESIRED QUALITY. ACCEPTANCE OR REJECTIONS OF PROPOSED SUBSTITUTIONS SHALL BE SUBJECT TO THE APPROVAL OF THE OWNER.
17. WORK SHALL BE COORDINATED WITH THAT OF OTHER TRADES TO ELIMINATE INTERFERENCES.
18. EXACT LOCATIONS OF MECHANICAL EQUIPMENT, DEVICES, ETC. SHALL BE VERIFIED WITH THE GENERAL CONTRACTOR PRIOR TO ROUGHING FOR SAME.
19. ELECTRICAL CONTRACTOR SHALL OBTAIN SHOP DRAWINGS/SPECIFICATIONS OF ALL EQUIPMENT FROM THE GENERAL CONTRACTOR PRIOR TO PURCHASING AND INSTALLING ELECTRICAL EQUIPMENT FOR SAME. NOTIFY ENGINEER OF ANY DISCREPANCIES BETWEEN ACTUAL EQUIPMENT INSTALLED AND CONTRACT DOCUMENTS.
20. ELECTRICAL WORK SHALL BE GUARANTEED FOR A PERIOD OF ONE YEAR FROM DATE OF WHICH SYSTEM IS PUT INTO SERVICE.
21. WORK SHALL BE GROUNDED IN ACCORDANCE WITH CODE REQUIREMENTS. COMPLETE EQUIPMENT (INSULATED GREEN WIRE) GROUNDING SYSTEM SHALL BE INSTALLED.
22. PANELBOARDS SHALL BE DEAD FRONT, THERMAL MAGNETIC BOLT-ON CIRCUIT BREAKER TYPE, DESIGNED FOR SURFACE OR FLUSH MOUNTING AS INDICATED ON PLAN, AND HAVING CONNECTIONS TO 120/208 OR 277/480 VOLT, 3 PHASE, 4 WIRE SERVICE. ALL BUS BARS SHALL BE COPPER. CABINETS SHALL BE MADE OF CODE GAUGE GALVANIZED SHEET STEEL, WITH A MINIMUM OF 4 INCH GUTTERS, DOOR IN DOOR CONSTRUCTION, LOCKED DOOR, AND FLUSH HINGES. TYPEWRITTEN INDEX SHALL BE MOUNTED ON DOOR INSIDE TRANSPARENT COVER INDICATING LOAD SERVED. PANELS SHALL INCLUDE SEPARATE EQUIPMENT GROUND BUS.
23. PANELBOARDS, DISCONNECT SWITCHES, AND CONTROLLERS SHALL HAVE NAMEPLATES OF BLACK LAMINATED PLASTIC WITH ENGRAVED WHITE LETTERS, SECURED WITH SELF-TAPPING SCREWS.
24. CONNECTIONS AT MOTORS SHALL BE MADE WITH 18" LENGTH OF 1/2 INCH FLEXIBLE LIQUID TIGHT CONDUIT.
25. CONTRACTOR SHALL PHASE BALANCE PANELBOARDS IN THE FIELD. LOAD ON EACH PHASE SHALL BE BALANCED WITHIN 10% OF EACH OTHER.
26. TOGGLE SWITCHES SHALL BE OF THE SINGLE POLE A.C. QUIET TOGGLE TYPE FOR MOUNTING IN A SINGLE GANG SPACING. TOGGLE SWITCHES SHALL BE FULLY RATED 20 AMPERES AT 120/277 VOLT.
27. DUPLEX WALL RECEPTACLES SHALL BE 2 POLE, 3 WIRE, GROUNDING TYPE 20 AMPERE, 125 VOLT WITH METAL PLASTER EARS. RECEPTACLES SHALL BE NEMA STANDARD CONFIGURATION 5-20R.
28. FUSED OR UNFUSED SAFETY SWITCHES SHALL BE TOTALLY ENCLOSED, HEAVY DUTY TYPE. SWITCHES SHALL HAVE VOLTAGE, HORSEPOWER AND AMPERE RATING SUITABLE FOR THE APPLICATION. PROVIDE NUMBER OF POLES AS REQUIRED. SWITCHES LOCATED EXTERIOR TO THE BUILDING OR IN DAMP/WET LOCATIONS SHALL BE IN A NEMA 3R ENCLOSURE.
29. FUSES SHALL BE DUAL ELEMENT, TIME DELAY TYPE, AS MANUFACURED BY BUSSMAN, RELIANCE OR APPROVED EQUAL.
30. FURNISH AND INSTALL SLEEVES IN FLOORS, BEAMS, WALLS, ETC. REQUIRED FOR INSTALLING THIS WORK.
31. CONDUIT PASSING THROUGH FIRE RATED WALLS AND FLOORS SHALL BE PROVIDED WITH ALL NECESSARY MATERIALS TO ENSURE THAT THE FIRE RATED INTEGRITY IS MAINTAINED.
32. LFEEDER TAPS WILL NOT BE ALLOWED IN PANELBOARD GUTTERS.
33. CONTRACTOR SHALL CHECK EXISTING CONDITIONS TO DETERMINE EXACT EXTENT OF WORK TO BE PERFORMED PRIOR TO BIDDING. DIMENSIONS RELEVANT TO EXISTING WORK SHALL BE VERIFIED IN THE FIELD.
34. IN AREAS NOT AFFECTED BY THIS RENOVATION, THIS SUBCONTRACTOR SHALL MAINTAIN CONTINUITY OF ELECTRIC SERVICE.
35. WHERE CONNECTIONS ARE MADE IN EXISTING PANELS, THE PANEL INDEX SHALL BE REVISED TO INDICATE THE NEW LOADS SERVED. NEW CIRCUIT BREAKERS ADDED TO EXISTING PANELS SHALL BE THE SAME FRAME SIZE, VOLTAGE RATING AND INTERRUPTING CAPACITY AS EXISTING PANEL AND CIRCUIT BREAKERS.
36. ELECTRICAL SHUTDOWN SHALL BE AT A TIME AND DATE APPROVED BY THE OWNER.
37. PROVIDE AS-BUILT "CADD" DRAWINGS AT THE COMPLETION OF THE PROJECT.

Project:
IMPROVEMENTS TO LOKER CONSERVATION AND RECREATION AREA
410 COMMONWEALTH RD, WAYLAND, MA 01778

Weston & Sampson
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617.412.4480 800.SAMPSON
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Consultants:

Revisions:

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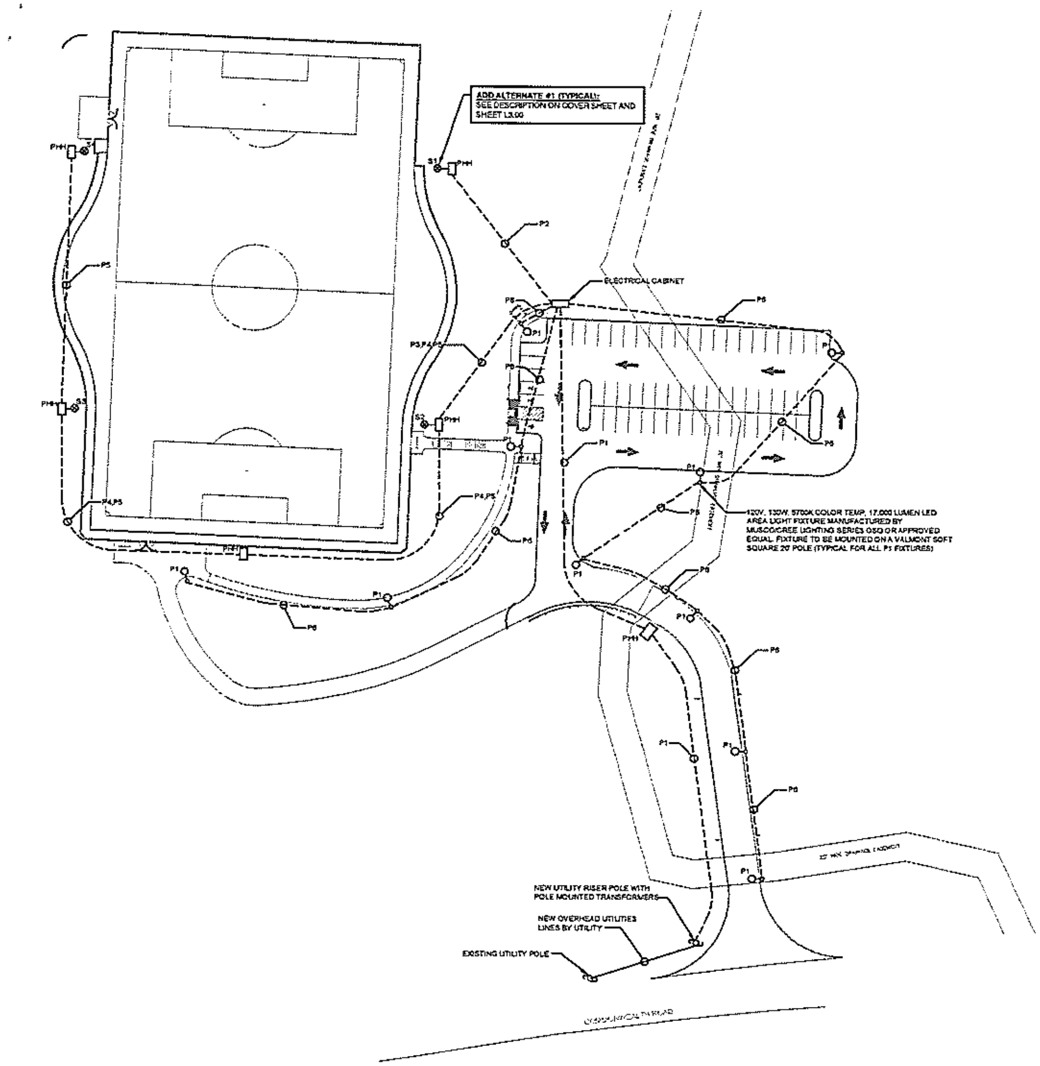
Drawing Title:
ELECTRICAL LEGEND, ABBREVIATIONS AND GENERAL NOTES

Sheet Number: E0.01



ELECTRICAL SITE PLAN

SCALE: 1" = 40'-0"

SCALE: 1"=40'

CONDUIT & WIRING SCHEDULE

CONDUIT	FEEDER	FROM	CONTACTOR NUMBER	TO	FIXTURES	LOAD	CONTACTOR SIZE	REMARKS
P1	2"C., 4#1 & 1#4GND	UTILITY TRANSFORMER	-	PANEL PPH2	-	100A	-	UNDERGROUND
P2	2"C., 3#10 & 1#10GND	MUSCO LIGHTING CONTROL CABINET NO.3 IN ELECTRICAL CABINET	C1	FIXTURE S1	6 @ 1150W	6.9 KW	30A	
P3	2"C., 3#10 & 1#10GND	MUSCO LIGHTING CONTROL CABINET NO.3 IN ELECTRICAL CABINET	C2	FIXTURE S2	6 @ 1150W	6.9 KW	30A	
P4	1"C., 3#6 & 1#6GND	MUSCO LIGHTING CONTROL CABINET NO.3 IN ELECTRICAL CABINET	C3	FIXTURE S3	6 @ 1150W	6.9 KW	30A	
P5	2"C., 3#6 & 1#6GND	MUSCO LIGHTING CONTROL CABINET NO.3 IN ELECTRICAL CABINET	C4	FIXTURE S4	6 @ 1150W	6.9 KW	30A	
P6	2"C., 2#6 & 1#6GND	PANEL PPL2 IN ELECTRICAL CABINET	-	PARKING LOT LIGHTING	-	-	-	VIA NEW TIME CLOCK ELECTRICAL CABINET

DRAWING NOTES:

1. REFER TO DRAWING E0.01 FOR ELECTRICAL LEGEND, ABBREVIATIONS AND GENERAL NOTES.
2. CONTRACTOR SHALL BE RESPONSIBLE FOR DOWNSIZING FEEDERS AT ELECTRICAL DEVICES FOR CONNECTION IN FIELD. FEEDERS HAVE BEEN OVERSIZED FOR VOLTAGE DROP.
3. THE CONTRACTOR SHALL FURNISH & INSTALL A HANDHOLE AT EACH LIGHT POLE BASE FOR TRANSITIONING TO LIGHT POLE RISER CONDUIT. RUN CONDUIT UP POLE APPROXIMATELY 10' TO LIGHT POLE JUNCTION BOX. ADDITIONAL HANDHOLES SHALL BE INSTALLED AS REQUIRED TO FACILITATE THE INSTALLATION OF WIRING. HANDHOLES SHALL NOT BE INSTALLED ON FIELD.

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ELECTRICAL SITE PLAN

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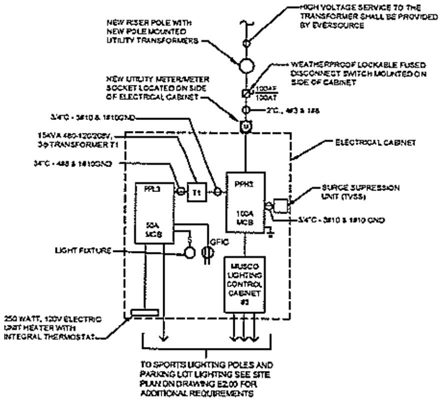
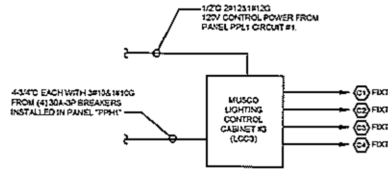
E1.00



ELECTRICAL ONE LINE DIAGRAM – LOKER
NOT TO SCALE



NOTES:

1. TYPICAL FOR CONTACTORS C1 THROUGH C4, CONTRACTOR SHALL RUN CONDUIT AND WIRING AS INDICATED IN SCHEDULE FROM EACH CONTACTOR TO DESIGNATED LIGHTING POLE. CONTRACTOR SHALL RUN CONDUIT TO 10'-0" AFG FOR CONNECTION TO POLE MOUNTED LIGHTING CONNECTION BOX.

SPORTS LIGHTING CONTROL CABINET DIAGRAM – LOKER
NOT TO SCALE

PANELBOARD SCHEDULE - LOKER

DESIGNATION: PPH3 | S.C. RATING: 22,000A RMS SYM | REMARKS: SERVICE ENTRANCE RATED
LOCATION: ELECTRICAL CABINET | SERVICE:
RATING: 100 AMPS | MOUNTING: SURFACE
MAIN: 100 MCB

CKT NO.	LOAD DESIGNATION	BREAKER TRIP	BREAKER POLE	PHASE A B C	BREAKER POLE	BREAKER TRIP	LOAD DESIGNATION	CKT NO.
1	-	-				-	-	2
3	FIXTURE POLE S1/CONTACTOR C1	30				30	FIXTURE POLE S2/CONTACTOR C2	4
5	-	-				-	-	6
7	-	-				-	-	8
9	FIXTURE POLE S3/CONTACTOR C3	30				30	FIXTURE POLE TS/CONTACTOR C4	10
11	-	-				-	-	12
13	-	-				20	SPARE	14
15	15KVA CABINET TRANSFORMER	50				20	SPARE	16
17	-	-				20	SPARE	18
19	SPARE	20				20	SPARE	20
21	SPARE	20				20	SPARE	22
23	SPARE	20				20	SPARE	24
25	SPARE	20				20	SPARE	26
27	SPARE	20				20	SPARE	28
29	SPARE	20				20	SPARE	30

PANELBOARD SCHEDULE - LOKER

DESIGNATION: PPL3 | S.C. RATING: 10,000A RMS SYM | REMARKS:
LOCATION: ELECTRICAL CABINET | SERVICE:
RATING: 100 AMPS | MOUNTING: SURFACE
MAIN: 50A MCB

CKT NO.	LOAD DESIGNATION	BREAKER TRIP	BREAKER POLE	PHASE A B C	BREAKER POLE	BREAKER TRIP	LOAD DESIGNATION	CKT NO.
1	LIGHTING IN ELECTRICAL CABINET	20				20	ELECTRIC HEATER IN ELECTRICAL CABINET	2
3	RECEPTACLE IN ELECTRICAL CABINET	20				20	PARKING LOT LIGHTING	4
5	SPARE	20				20	SPARE	6
7	SPARE	20				20	SPARE	8
9	SPARE	20				20	SPARE	10
11	SPARE	20				20	SPARE	12

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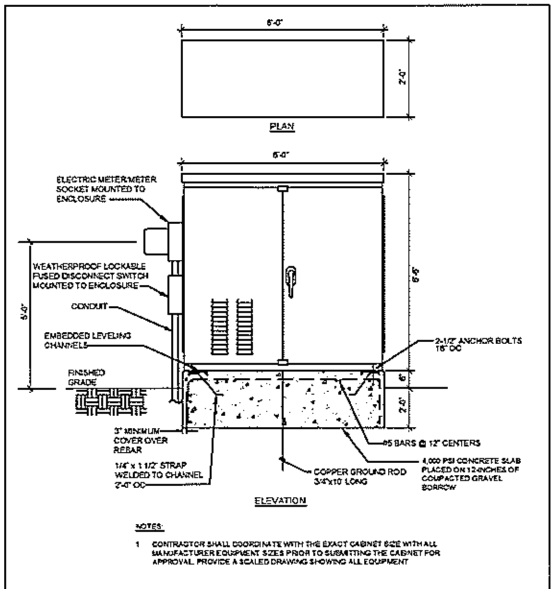
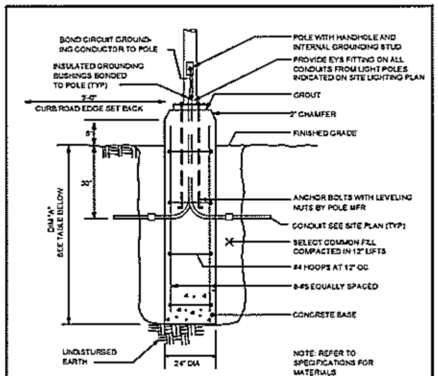


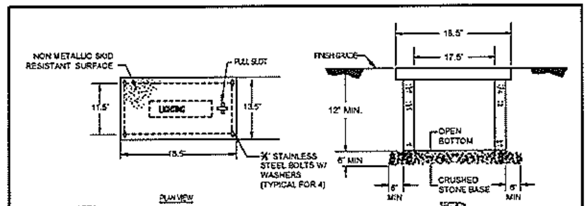
1 PAD MOUTNED ELECTRICAL CABINET DETAIL — NO SCALE



POLE HEIGHT	DIMENSION "A"
10'-0"	4'-0"
25'-0"	4'-6"
30'-0"	5'-6"
40'-0"	5'-6"

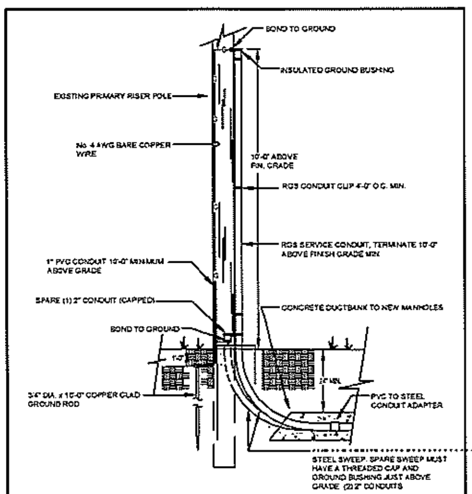
NOTE:
ELECTRICAL CONTRACTOR SHALL COORDINATE WITH THE GENERAL CONTRACTOR. ALL EXCAVATION, BACKFILL & CONCRETE SHALL BE BY GENERAL CONTRACTOR

4 TYPICAL LIGHT POLE BASE DETAIL — NO SCALE

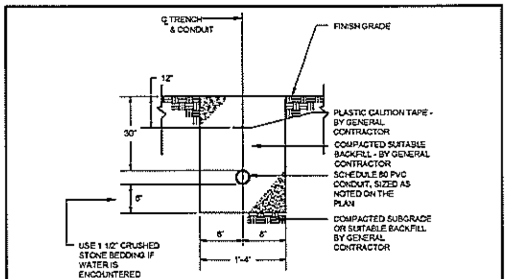


NOTES:
1. THIS HANDHOLE IS INTENDED FOR NON-DELIBERATE VEHICULAR TRAFFIC ONLY.
2. HANDHOLE SHALL BE PREFABRICATED POLYMER CONCRETE AGGREGATE EQUAL TO QUAZITE OR EQUAL PRE CAST CONCRETE CONSTRUCTION.

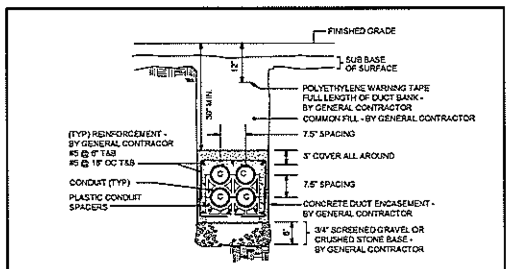
5 PREFABRICATED HANDHOLE "HH" DETAIL — NO SCALE



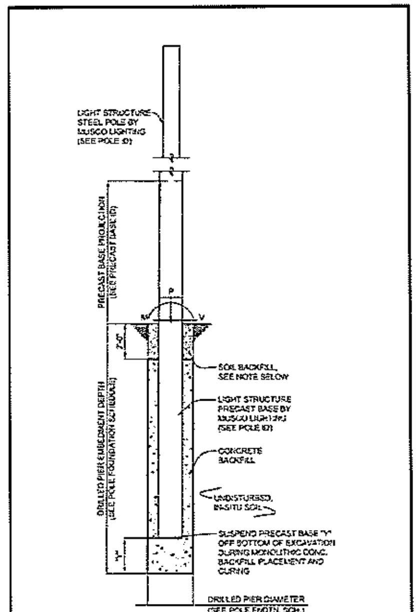
2 TYPICAL RISER POLE DETAIL — NO SCALE



2 TYPICAL DIRECT BURIED DUCTBANK DETAIL — NO SCALE



3 TYPICAL CONCRETE ENCASED DUCTBANK DETAIL — NO SCALE



POLE FOUNDATION ELEV.
SCALE: NOT TO SCALE

SOIL BACKFILL NOTE:
THE TOP TWO FEET OF ANNULUS SHALL BE BACKFILLED WITH SOIL, WITH A CLASSIFICATION OF CLASS 5 (TABLE 1808.2) OR BETTER. COMPACTION, 95% FOR COHESIVE SOIL AND 95% FOR A COHESIONLESS SOIL BASED UPON STANDARD PROCTOR TESTING (ASTM D698).

1 SPORTS LIGHT POLE BASE DETAIL — NO SCALE

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APPENDIX K:
PFAS Memo and Infill Materials Chart

Below is a table describing the various infill options considered by the Town:

Synthetic Turf Field Infill Options

	Infill Type	Life Span	Maintenance	Irrigation System	Estimated Infill Cost - HIGH SCHOOL (90,620 s.f.)	Estimated Infill Cost - LOKER (75,250 s.f.)	Annual Maintenance Cost
	Crumb Rubber Infill	Life of the carpet	- Grooming per 100 hours - Decompaction every 3-4 years - Top dressing every 2-3 years - Annual G-MAX monitoring	Not required	---	---	$5,000 - $10,000 (Plus 300 hours of labor)
	EPDM Infill	8-10 years	- Grooming per 100 hours - Decompaction every 3-4 years - Top dressing every 2-3 years - Annual G-MAX monitoring	Not required	+ $181,240	+ $150,500	$5,000 - $10,000 (Plus 300 hours of labor)
	Coated Silica Sand Infill	16 year maximum	- Grooming per 100 hours - Top dressing every 2-3 years - Annual G-MAX monitoring	Not required	+ $181,240	+ $150,500	$5,000 - $10,000 (Plus 300 hours of labor)
	Cork & Coconut Fibers (GreenPlay)	8 years	- Grooming per 100 hours of play - Replace 10% of infill every 2-3 years - Decompaction 2 times a year - Annual G-MAX Monitoring - Monitor moisture content twice a week	$40,000.00	+ $181,240	+ $150,500	$12,000 - $18,000 (Does not include cost of water. 12,000 gallons twice a week is the recommended average)
	Coconut Husk, Rice Husk and Cork (Infill-Pro Geo)	8 years	- Grooming per 100 hours of play - Replace 10% of infill every 2-3 years - Decompaction 2 times a year - Annual G-MAX Monitoring - Monitor moisture content twice a week	$40,000.00	+ $181,240	+ $150,500	$14,000 - $20,000 (Does not include cost of water. 12,000 gallons twice a week is the recommended average)
	Walnut Shells (SafeShell)	Life of carpet	- Grooming per 100 hours - Decompaction every 3-4 years - Top dressing every 2-3 years - Annual G-MAX monitoring	Not required	+ $158,585	+ $131,688	$5,000 - $10,000 (Plus 300 hours of labor)

A question was raised regarding whether artificial turf fields may pose greater danger of severe burns and heat illness during summer weather since field surface temperatures are higher on artificial turf fields; surface temperatures can reach as high as 200 degrees Fahrenheit. Even in New England, turf surface temperatures can get hot. We've seen turf surface readings in Wayland as high as 168 degrees on July 3, 2018. (The natural grass was 125 degrees that day). The Recreation Department, summer camps and school athletics all have protocols in place to keep users off hot fields (grass or turf). Existing Operating Procedures that have been in effect since the first artificial turf field was installed at the Wayland High School Stadium 12 years ago continue to help keep users safe during Heat Warnings and Heat Advisories.

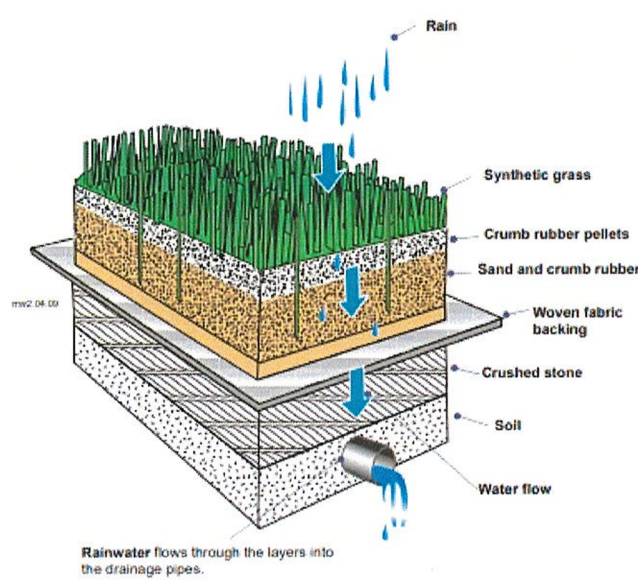
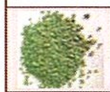


Figure 1.1 Cross-section of a typical synthetic turf field configuration

Wayland MA

Synthetic Turf Infill Options

	Infill Type	Examples	Material Description	Facts and Advantages	Disadvantages	Life Span	Maintenance	End of Life Cycle	Cost / S.F. *Carpet and infill system only	Irrigation System	Estimated Rt. 33 Field Synthetic Turf Cost (Field Extents - 90,620 s.f.) * Carpet, infill, shock pad (if required) and irrigation system (if required) only	Annual Maintenance Cost
	Crumb Rubber Infill	1. Gillette Stadium, MA 2. Hoover High School, CA 3. Ames High School, IA	Crumb rubber infill is derived from recycled tires. There are two types: Ambient and Cryogenic. Ambient crumb rubber is created through a process where the tires are kept at room temperature during the crumbling process. Cryogenic crumb rubber is created by freezing the tires prior to granulation. This process avoids heat degradation. Crumb rubber infill is the most widely used infill material for synthetic sports fields.	This is currently the most inexpensive and widely used infill material on the market. Crumb rubber is metal free and does not contain liberated fibers in an amount that exceeds .01% of the total weight of the crumb rubber. The metal and liberated fibers are materials used in the tire manufacturing process. According to the Sports Turf Council (STC) crumb rubber meets the European Union EN 73-1 Standards which are the standards for compliance of chemicals in children's toys. Most used, tested and proven infill in the industry.	Although numerous studies have proven crumb rubber to be non - toxic to the field users, many safety concerns have risen in the media. Because of its black colour SBR has high surface temperatures caused by sunlight.Crumb rubber gives off odors at high temperatures and can not be recycled, only re-used.	Life of the carpet	- Grooming per 100 hours - Decompaction every 3-4 years - Top dressing every 2-3 years - Annual G-MAX monitoring	Can be reused (not recycled) ex: Field infill, asphalt, acoustic barriers, ADA compliant playground surfacing, natural turf soil amendments, etc.	$4.00 - $4.50	Not required	$404,123	$5,000 - $10,000 (Plus 300 hours of labor)
	Coated Crumb Rubber Infill	1. Mary E. Grogan Community Park, CA 2. Randall Island Sport Complex, NY 3. Buckingham Browne & Nichols School, MA	Both the ambient and cryogenic rubber can be coated with colorants, sealers, and anti-microbial substances. Similar to crumb rubber infill, coated crumb rubber also does not contain metal and lose fibers used during the tire manufacturing process as well meets the EN 73-1 standards.	Coated crumb rubber provides additional aesthetics appeal, reduction of dust by product during the manufacturing process and complete encapsulation of the rubber particle.	High cost, same chemical make-up as SBR rubber, and limited availability.	Life of the carpet	- Grooming per 100 hours - Decompaction every 3-4 years - Top dressing every 2-3 years - Annual G-MAX monitoring	Select products can be recovered, cleaned and recoated for reuse as infill. Can also be recycled into rubberized asphalt or molded products.	$4.75 - $5.25	Not required	$471,476	$5,000 - $10,000 (Plus 300 hours of labor)
	EPDM Infill	1. Los Prados Park, CA	EPDM (Ethylene Propylene Diene Monomer) is a polymer elastomer with high resistance to abrasion and wear. Available in a variety of colors and has similar physical characteristics to crumb rubber infill.	EPDM has proven its durability as an infill product in all types of climates. Its excellent elasticity properties and resistance to atmospheric and chemical agents provide a stable, high performance infill product.	Over time EPDM can harden because the cross-linking reaction used to make the product continues. This has a negative impact on playing characteristics and can affect the fibre characteristics.Recycling is not possible.	8-10 years	- Grooming per 100 hours - Decompaction every 3-4 years - Top dressing every 2-3 years - Annual G-MAX monitoring	Can be reused as infill and recycled into new infill or other products.	$6.75 - $7.00 (Includes $2.00 Shock Pad)	Not required	$628,635	$5,000 - $10,000 (Plus 300 hours of labor)
	TPE Infill	1. Sprague School, MA	Thermo Plastic Elastomer (TPE) infill is a non-toxic elastomer, available in variety of colors, very long lasting and 100% recyclable and reusable as infill when the field is replaced. TPE has a similar feeling as it relates to play characteristics to crumb rubber.	TPE infill, when used with virgin-based resins, will offer consistent performance and excellent g-max over a wide temperature range. It is used in combination with a shock pad.	High cost, must use proven, proprietary formulas for quality, and limited availability. Has been known to get sticky in hot climates in proper formula is not used.	8-10 years	- Grooming per 100 hours - Decompaction every 3-4 years - Top dressing every 2-3 years - Annual G-MAX monitoring	Can be reused as infill and recycled into new infill or other products.	$7.50 - $7.75 (Includes $2.00 Shock Pad)	Not required	$695,989	$5,000 - $10,000 (Plus 300 hours of labor)
	Nike Grind	1. Lincoln High School, OR 2. Lafayette Park, CA 3. Glassel Park, CA	Nike Grind includes three types of raw materials made from recycled athletic shoes and manufacturing byproducts: rubber from the outsole, foam from the midsole and fabric from the upper. These materials are ground up and used by select companies in sport and playground surfaces, as well as in numerous Nike apparel, footwear and equipment products.	Nike Grind Reduces water consumption by hundreds of thousands of gallons each year over natural grass fields. It's optimized construction is rigorously tested for impact performance, and is virtually odorless and won't mark balls, shoes or players.Nike Grind can use a lighter color profile to reflect sunlight and generate 10–15-percent less heat build up, helping to sustain athletic performance.	It take 50,000 - 75,000 pairs of shoes to make a full size soccer field, which limits that availablity of this prodect. The demand tends to be higher then can be supplied, making annual infill replacement difficult and unreliable.	10 years of play at 40 hours a week.	- Grooming per 100 hours - Decompaction every 3-4 years - Top dressing every 2-3 years - Annual G-MAX monitoring	Can be reused (not recycled) ex: Field infill, asphalt, acoustic barriers, ADA compliant playground surfacing, natural turf soil amendments, etc.	$5.75 - $6.00	Not required	$538,830	$5,000 - $10,000 (Plus 300 hours of labor)
	EcoMax	1. Bellarmin College Preparatory , CA	This infill is comprised of an extruded composite of recycled turf and thermoplastic elastomer (TPE). The EcoMax granules deliver a new, impact absorbing infill that offers safe and comfortable performance.	EcoMax offers great playability characteristics (plays close to high end cryogenic rubber/sand infill system), good compression/compaction characteristics, slight heat reduction, and is Tested rigorously for mechanical wear and weathering.	High cost, limited availability, and limited installation and long term use history.	8 years	- Grooming per 100 hours - Decompaction every 3-4 years - Top dressing every 2-3 years - Annual G-MAX monitoring	Can be returned to select manufacturers to be cleaned and recycled. Can also be reused as infill in synthetic turf field.	$7.00 - $7.50 (Includes $2.00 Shock Pad)	Not required	$673,538	$5,000 - $10,000 (Plus 300 hours of labor)
	Sand (Silica)	Used as a ballast in all rubber systems	Pure silica sand is one of the original infill materials utilized in synthetic turf system. This product is a natural infill that is non-toxic chemically stable and fracture resistant. Typically tan or white in color. As a natural product there is no heavy material within the silica. It is important the silica have a high purity (greater than 90%) to resist deterioration and absorption of bacteria.	It can be used in conjunction with many other infills on the market to provide safe and more realistic playing surface. Silica can be mixed with rubber products. Silica sand can either be coated with different materials as a standalone product or can be used to firm up a combination of traditional infill systems. It is used in combination with a shock pad.	The relative hardness of the material is very high, high abrasive quality, high cost due to required shock pad, high transportation costs due to weight, and more infill needed due to small particle size and heavy compaction.	Life of carpet	- Grooming per 100 hours - Top dressing every 2-3 years - Annual G-MAX monitoring	Can be reused as infill on new field, in landscape installations, and for natural turf soil amendments.	$6.75 - $7.00 (Includes $2.00 Shock Pad)	Not required	$628,635	$5,000 - $10,000 (Plus 300 hours of labor)
	Coated Silica Sand Infill	1. Newburyport High School, MA 2. South Windsor High School, CT	This class of infill consists of coated, high-purity silica sand with either a soft or rigid coating specifically engineered for synthetic turf. These coatings are either elastomeric or acrylic in nature (non-toxic) and form a bond with the sand grain sealing it from bacteria to provide superior performance and durability. Coated sand is available in various sizes.	This material is typically used in a homogenous infill which provides both ballast and shock absorbing qualities in combination with a shock pad.	The relative hardness of the material is very high, high cost due to required shock pad, high transportation costs due to weight, and more infill needed due to small particle size and heavy compaction.	16 year maximum	- Grooming per 100 hours - Top dressing every 2-3 years - Annual G-MAX monitoring	Can be returned to select manufacturers to be cleaned and recoated. Can also be reused as top dressing on natural turf fields.	$6.75 - $7.00 (Includes $2.00 Shock Pad)	Not required	$628,635	$5,000 - $10,000 (Plus 300 hours of labor)
	ZeoFill	1. Jesuit High School, CA 2. John Ferraro Athletic Fields, CA 3. Van Nuys - Sherman Oaks Complex, CA	Zeolites are naturally occurring minerals found in specific types of sedimentary rocks. Due to their natural absorbent/adsorbent qualities, zeolites have been used for many different applications. The use of ZeoFill was of particular interest to the synthetic grass industry since it is certified organic and therefore poses no safety concerns.	ZeoFill provides a cooler surface, less pungent rubber smell, no harmful silica sand dust which increase chances of silicosis and helps clean waste water run-off.	The Synthetic Turf industry has adopted zeolite as an alternative infill but most companies don't realize the potential harm if they use the wrong type of zeolite. Also due to the relative hardness of ZeoFill, a shock pad is required.	8 years	- Grooming per 100 hours - Top dressing every 2-3 years - Annual G-MAX monitoring	Can be re-used as a soil amendment, cat litter or even storm water filtration	$6.25 - $6.50 (Includes $2.00 Shock Pad)	Not required	$583,733	$5,000 - $10,000 (Plus 300 hours of labor)
	CoolPlay	1. University of Tulsa, OK 2. Saratoga High School, CA 3. University of Maryland, MD	FieldTurf's exclusive and innovative Extruded Cork Composite (ECC) top dressing allows the CoolPlay system to deliver the same behavior and overall stability as FieldTurf's Elite system fields found in the world's most famous stadiums. CoolPlay takes nothing away from performance... exept the heat.	The special ECC top dressing could replace the top layer of crumb rubber on the three-layer infill system - which is proven to offer better performance and safety. The ECC granule is durable, shock absorbing and absorbs far less heat than other alternatives. No irrigation needed. CoolPlay has higher resiliency than other organics.	Still uses crumb rubber in the infill system which comes with all of the same concerns as having a regular crumb rubber infill and the top cork layer will breakdown over time.	8 years	- Grooming per 100 hours of play - Replace 10% of infill every 2-3 years - Decompaction 2 times a year - Annual G-MAX Monitoring	Can be used to topdress natural turf fields.	$4.75 - $5.00	Not required	$449,025	$12,000 - $18,000
	Cork & Coconut Fibers (GreenPlay)	1. St. Timothy's School, MD	A select, high tensile strength coconut fiber matrix blended with ground virgin cork. No chemicals are added and it comes in a variety of browns and earth tone colors.	This environmentally sustainable, highly permeable,100% recyclable infill has proven to reduce turf temperatures up to 65 degrees, reduce G-Max levels, increase foot stability and reduce energy restitution with proven durability for the life of the field. These materials have a natural resistance to mold & fungus. Irrigation and a shock pad are required.	Requires irrigation to avoid hardening, requires annual additional infill, unproven longterm performance, increased cost per square foot, and higher maintenance costs.	8 years	- Grooming per 100 hours of play - Replace 10% of infill every 2-3 years - Decompaction 2 times a year - Annual G-MAX Monitoring - Monitor moisture content twice a week	Top layer (40%) can be reused as infill, the remaining 60% can be used to topdress a natural turf field.	$6.75 - $7.00 (Includes $2.00 Shock Pad)	$40,000.00	$668,635	$12,000 - $18,000 (Does not include cost of water. 12,000 gallons twice a week is the recommended average)

	Infill Type	Examples	Material Description	Facts and Advantages	Disadvantages	Life Span	Maintenance	End of Life Cycle	Cost / S.F. *Carpet and infill system only	Irrigation System	Estimated Rt. 33 Field Synthetic Turf Cost (Field Extents - 90,620 s.f.) * Carpet, infill, shock pad (if required) and irrigation system (if required) only.	Annual Maintenance Cost
	Cork (PureFill)	1. Santa Flavia- Palermo, Italy 2. SV Wateringseveld- The Netherlands 3. Signal Iduna Park- Dortmund, Germany	Cork infill is a natural infill that is 100% environment friendly and non-toxic. It is an organic, recyclable and sustainable product that is harvested from the cork oak tree every nine years, without harming the trees.	Cork is considered an unalterable and unperishable material. It has a low thermal conductivity due to its natural structure which will reduce the surface temperature significantly. The suberin component of cork is anti-microbial and anti-allergenic and will repel pests, mold, and prevent the cork from rotting. No water is required, but a shock pad is necessary.	Moderate resiliance, low density allows materials to float, cling to fibers with static charge, may require irrigation to remove static charge, and limited availability.	8 years	- Groom after heavy rain - Replace 10% of infill every 2-3 years - Decompaction 3 times a year/ every 4-6 weeks - Annual G-MAX Monitoring	Can be used to topdress natural turf fields or recycled directly into the environment.	$6.25 - $7.50 (Includes $2.00 Shock Pad)	Not required	$673,538	$14,000 - $20,000
	Coconut Fibers (GeoFill)	1. Google Corporate Campus Soccer Field, CA 2. Pleasantville High School and Middle School Fields, NY	Coconut fibers allows for clean water runoff, is 100% recyclable and is naturally resistant to mold and fungus. These fiber's unique organic properties, gives the entire system synthetic grass an amazing touch of naturalness	Coconut fibers are layered with sand and a shock pad to provide a stable surface that prevent infill shifts and flyouts. Naturally cooler because the composition of the fibers holds moister and is resistant to mold and fungus. This infill system will require irrigation and annual top dressing and decompaction.	Requires irrigation to avoid hardening, requires annual top dressing and decompaction, unproven longterm performance, increased cost per square foot, and higher maintenance costs.	8 years	- Grooming per 100 hours of play - Replace 10% of infill every 2-3 years - Decompaction 2 times a year - Annual G-MAX Monitoring - Monitor moisture content twice a week	Can be used to topdress natural turf fields or recycled directly into the environment.	$6.75 - $7.00 (Includes $2.00 Shock Pad)	$40,000.00	$668,635	$12,000 - $18,000 (Does not include cost of water, 12,000 gallons twice a week is the recommended average)
	Coconut Husk, Rice Husk and Cork (Infill-Pro Geo)	1. The Fessenden School, MA 2. Virginia Soccer Training Center, VA 3. Highlands Field, CA	This unique natural infill is composed by selected organic fibres that guarantee better technical and sporting performances, provide better conditions for athletes, the environment and safety. Provides a natural grass-like look	Excellent UV resistance Due to the fibre nature and the plant origin, it has a high UV resistance making deterioration very slow over a very long time. This infill can be recycled for agricultural use therefore when the artificial turf comes to the end of its life, it is easy and economical to remove.	Requires irrigation to avoid hardening, requires annual additional infill, unproven longterm performance, increased cost per square foot, and higher maintenance costs.	8 years	- Grooming per 100 hours of play - Replace 10% of infill every 2-3 years - Decompaction 2 times a year - Annual G-MAX Monitoring - Monitor moisture content twice a week	Can be used to topdress natural turf fields or recycled directly into the environment.	$6.75 - $7.00 (Includes $2.00 Shock Pad)	$40,000.00	$668,635	$14,000 - $20,000 (Does not include cost of water, 12,000 gallons twice a week is the recommended average)
	Walnut Shells (SafeShell)	1. Baseball Field, Cincinnati, OH	Safeshell is made of 100% USA grown walnut shells.Safeshell teamed up with a leading biotechnology firm to develop a unique process that virtually eliminates residual protein allergens which remain on the shell after processing. SafeShell is a blend of Black and English walnut shells. Black walnut shells are more rounded than English walnut shells. The result of this proprietary mix is the perfect balance of firm, fast and player friendly.	Safeshell excels at evaporative cooling. Safeshell absorbs water with minimal expansion and then releases it slowly over time to help keep surfaces from heating up too quickly. Even dry, Safeshell plays cooler than crumb rubber. Safeshell is made from one of the hardest nut shells on the planet. It doesn't float and plays the same wet or dry. 100% organic.	Safeshell is a made from walnut shells because they are the hardest nut in the world. The trade-off is the abrasion factor.Also SafeShell has only been around for a little over two years so there is limited installation and long term use history.	Life of carpet	- Grooming per 100 hours - Decompaction every 3-4 years - Top dressing every 2-3 years - Annual G-MAX monitoring	Can be used to topdress natural turf fields or recycled directly into the environment.	$6.50 - $6.75 (Includes $2.00 Shock Pad)	Not required	$606,184	$5,000 - $10,000 (Plus 300 hours of labor)

APPENDIX L:
LSP Opinions (4)

October 29, 2019 (revised 11/21/19)

Wayland Board of Selectmen
41 Cochituate Road
Wayland, MA 01778

Re: Preliminary Document Review Findings
Former Dow Chemical Property
412 Commonwealth Road, Wayland MA
Release Tracking Number (RTN) 3-3866
CMG ID 2019-131

Dear Selectmen:

CMG Environmental, Inc. (CMG) has completed our initial review of publicly-available documentation on the former Dow Chemical property located at 412 Commonwealth Road (Route 30) in Wayland, Massachusetts (the Site) as found on the Massachusetts Department of Environmental Protection (DEP) webpage for RTN 3-3866 (https://eeaonline.eea.state.ma.us/EEA/fileviewer/Rtn.aspx?rtn=3-0003866). This letter presents the findings of our initial review.

There are 36 scanned .pdf files available for download on this webpage, the majority of which are individual reports submitted to DEP between September 1992 and March 2000. In addition, the 'Correspondence File' for RTN 3-3866 contains 1,762 pages of scanned documents that DEP obtained, dating between July 1961 and March 2000. Due to time constraints and the large body of available documentation, CMG limited our initial review to the following reports:

- 9/20/95 "Reference Doses and MCP Risk-Based Soil Standards for Selected Organotin and Organomercury Compounds" prepared by the Gradient Corporation (Gradient) of Cambridge, Massachusetts;
- 3/31/99 "Phase II Comprehensive Site Assessment, Former Dow Chemical facility" (volume I of IV) prepared by Ransom Environmental Consultants, Inc. (Ransom) of Newburyport, Massachusetts;
- 1/10/00 "Phase II Comprehensive Site Assessment Addendum and Errata Sheet, Former Dow Chemical Facility" prepared by Ransom;
- 2/25/00 "Method 3 Risk Characterization, Former Dow Chemical Facility" (M3RC) prepared by Gradient; and
- 3/30/00 "Response Action Outcome (RAO) Statement, Former Dow Chemical Facility" prepared by Ransom.

CMG also reviewed online DEP information for RTN 3-3866.

DEP STATUS

DEP first listed the Site as a "Reserved Site" (Case #3-3866) in July 1992. During transition to the 'new' MCP (Massachusetts Contingency Plan, 310 CMR 40.0000 – first promulgated in its current form on 10/31/93), DEP listed the Site as a "Confirmed Disposal Site" effective July 15, 1993 and cited both the Dow Chemical Company and NED Wayland Realty Trust (NED, property owner at that time) as Potentially Responsible Parties (PRPs).

The Grass Roots Group (a/k/a Dow Neighbors, Inc.) petitioned DEP to name the Site a Public Involvement Plan (PIP) site on March 15, 1993 and DEP designated RTN 3-3866 as a PIP site on March 26, 1993.

NED submitted 'Waiver of Approvals' application to DEP in July 1993 but DEP denied this application and classified RTN 2-3866 as a 'Priority Site' in April 1994. As such the Site transitioned to Tier 1A status (meaning all response actions conducted at the Site were under direct DEP oversight). DEP expressed concern regarding the potential presence of specialty chemicals at the Site not identifiable through standard environmental analyses, and a lack of information regarding past chemical usage at the Site. DEP and Dow executed a Tier IA Permit for RTN 2-3866 effective November 18, 1994.

Environmental Science Services, Inc. of Providence, Rhode Island submitted a Release Abatement Measure (RAM) Plan to DEP in May 1994 on behalf of NED. Ransom conducted RAM activities at the Site between October 1994 and January 1998 to investigate four areas of environmental concern at the Site (upper septic system area, underground storage tank [UST] area, burn bucket & fire training area, and shallow glass disposal area). RAM activities included:

- Seismic refraction study to determine bedrock contours;
- Removal of a 1,000-gallon No. 2 fuel oil UST and a 6,000-gallon No. 4 fuel oil UST, with collection of post-removal soil samples;
- Advancement of 14 soil borings throughout the Site, with completion of 7 of these as groundwater monitoring wells (at least 13 other monitoring wells existed at the Site as of 1999, previously installed by others);
- Excavation of test pits in the burn and glass disposal areas;
- Laboratory analysis of soil, groundwater, sediment, and surface water samples via EPA Methods 8140, 8150, 8260 & 8270, along with testing for 38 metals/elements and mass spectrophotometry library searches of the organic analyses (8260 & 8270) to identify specialty chemicals;
- Removal of the concrete 'burn pad' from the solvent burning/fire training area and approximately 200 cubic yards of impacted soil for proper disposal, with collection of post-excavation confirmatory samples;
- Removal of approximately 4 cubic yards of soil from the glass disposal area (along with broken and intact vials, bottles, and other laboratory glassware) for transport to the Dow facility in Midland MI for disposal by high-temperature incineration;
- Removal of an additional 200 cubic yards of soil from the glass disposal area, with collection of post-excavation confirmatory samples; and

- Collection of soil samples to determine background concentrations for Site contaminants of concern.

Ransom prepared documentation to reclassify the Site, which Dow submitted in October 1997. DEP allowed reclassification of the Site to Tier IC effective June 15, 1998.

Ransom prepared a Phase II Comprehensive Site Assessment report for the Site, which Dow submitted to DEP on March 31, 1999. Ransom also prepared a Phase II Addendum and errata sheet, which Dow submitted to DEP on January 10, 2000. Gradient prepared a Site-specific M3RC, which Dow submitted to DEP on February 25, 2000. Finally, Ransom prepared a Class A-2 RAO Statement based on the RAM & Phase II investigations and the Gradient M3RC, which DOW submitted to DEP on March 30, 2000 to close out RTN 3-3866.

PROPERTY OWNERSHIP

South Middlesex County Registry of Deeds records indicate the following ownership of the Site:

PROPERTY OWNERSHIP

DATE OF TRANSFER	SITE OWNER	REFERENCE
May 9, 2000	Town of Wayland	Land Court Certificate 218188 (L.C. Book 1221, Page 38) Registry Book 31387, page 167
February 10, 1995	The Dow Chemical Company	Land Court Certificate 201533 (L.C. Book 1137, Page 183) Registry Book 25175, Page 174
March 2, 1989	NED Wayland Realty Trust (Stephen R. Karp and Steven S. Fischman, Trustees)	Land Court Certificate 184889 (L.C. Book 1054, Page 139) Registry Book 19677, Page 325
October 17, 1962	The Dow Chemical Company	Land Court Certificate 111719 (L.C. Book 688, Page 169) Registry Book 10146, Page 486
March 14, 1958	Estate of Leonard Anzivino	Registry Book 9114, Page 83

Thus DEP information for the Site generally identifies both Dow and NED as PRPs until February 1995 but only Dow from then through May 2000. Any current or future DEP submittals for the Site would need to reference both Dow and the Town of Wayland as PRPs.

HUMAN HEALTH RISK

Ransom's March 2000 RAO Statement for RTN 3-3866 relies on Gradient's February 2000 M3RC to demonstrate 'No Significant Risk' to health, safety, public welfare, or the environment. Gradient used standard risk assessment methodologies to estimate numeric values of excess lifetime cancer risk (ELCR) and hazard index (HI) for ten different reasonably foreseeable human receptors. For the two most at-risk receptors ('hypothetical future resident' and 'community gardener') they derived separate HI values for four discrete areas at the Site and ELCR values for three of these areas. They then compared the estimated ELCR and HI values to the 'significant risk' numeric thresholds set forth by DEP (1×10^{-5} for ELCR and 1 for HI).

The estimated ELCR values Gradient derived for potential human receptors range from 1×10^{-10} (1 in 10 billion) to 1×10^{-6} (1 in 1 million), all of which are substantially lower than the DEP standard of 1×10^{-5} (1 in 100,000). The estimated HI values Gradient derived for potential human receptors range from 0.0001 to 0.1, all of which are substantially lower than the DEP standard of "one." Furthermore, these estimated ELCR and HI values are almost certainly overstated because Gradient followed the standard risk assessment procedure of assuming that human receptors would accrue all (or nearly all) of their health risk from exposure to Site contaminants (e.g., a resident would remain at the Site 24/7 for 30 years and a community gardener would consume all their vegetables from what they grew at the Site during the 6-month growing season).

Gradient's 'hypothetical future resident' and 'community gardener' potential receptors provide conservative exposure estimates for potential future recreational use of the Site. Their assumptions of human exposure for these two potential receptors was as follows:

- Resident – Exposure duration 30 years (ages 1 through 31); on-Site 24 hours/day, 7 days/week, 350 days/year; direct exposure to Site soil 5 days/week for 7 months/year (260 days/year); consumption of produce grown on-Site 350 days/year.
- Community Gardener – Adult, direct contact exposure to soil duration 2 hours/day, 3 days/week, 5 months/year (130 hours/year) for 30 years; consumption of produce grown on-Site 350 days/year.

Gradient did not consider use of the Site for recreational purposes (soccer field) and resulting exposures to child or adolescent players, adult coaching staff, or children or adult spectators. However, CMG opines that potential soccer players, coaches, and spectators would not be exposed to as much Site contamination as the hypothetical future resident and community gardener receptors would be. Therefore, we conclude that Gradient's determination of 'No Significant Risk' would also be valid for future recreational soccer field use of the Site.

OTHER CONCERNS

CMG's primary concern regarding environmental assessment of the Site was the storage, use, and synthesis of specialty chemicals by Dow, in particular if there were any such chemicals released at the Site which standard laboratory analyses would not detect. Evidently many others had the same concern, and DEP requested that Dow provide a list of specialty chemicals used or stored at the Site in at least three separate 'Request for Information' letters (sent in January 1992, September 1992, and February 1994). Dow provided a list of 178 such chemicals to DEP in June 1994, and this list was used to develop the scope of work for RAM and Phase II investigation of the Site from October 1994 through January 1998.

Among the specialty chemicals reported by Dow are 12 organotin compounds and 4 organomercury compounds. Gradient developed Reference Dose values for the three most toxic organotin compounds (trimethyltin, triphenyltin & tributyltin oxide) and the two most toxic organomercury compounds (methylmercury & phenylmercury). DEP retained Dr. David K. Ryan of UMass/Lowell to assist them in reviewing the organometals information presented by Gradient on behalf of Dow. Gradient incorporated comments provided by DEP in their final M3RC of the Site. Ransom submitted samples for specialized organotin and organomercury analyses during RAM and Phase II investigation of the Site. The only detection was of 4 μg/Kg triphenyltin in a sample collected from Test Pit 2 (in the glass disposal area) on November 13, 1996. This value is substantially below the 1.9 mg/Kg (1,900 μg/Kg) S-1 soil standard Gradient derived for triphenyltin. CMG concludes that Ransom conducted sufficient investigation to determine there was no significant release of organotin or organomercury compounds at the Site.

ADDITIONAL REVIEW

CMG is able to conduct additional review of documents pertaining to the Site either available from the DEP webpage for RTN 3-3866 or at the Wayland Board of Health PIP repository for the Site. Please advise if you have specific questions you would like us to address through such additional research.

Please contact the undersigned with any questions regarding the information presented in this letter, or if CMG can be otherwise be of assistance to you.

Sincerely,
CMG ENVIRONMENTAL, INC.

Benson R. Gould, LSP, LEP
Principal

2019-131\Preliminary Findings (11-21-19).doc

February 10, 2020

Questions from a Citizen and CMG responses:

1) *Has he reviewed the Loker field project plans to get an understanding of the excavation that will be done in the septic system leach field area.*

Briefly. The northerly half of the proposed soccer field is in about the same location as the "Upper Septic System Area" as identified by Ransom Environmental Consultants, Inc. and the southeast corner of the proposed soccer field is within their "Underground Storage Tank/Lower Septic System Area," both focuses of Ransom's RAM investigations conducted between October 1994 and January 1998. Data obtained during these investigations was part of the data set which Gradient Corporation used in conducting their Method 3 risk characterization. That means that barring any major surprises uncovered during excavation for the Loker field project, there would be no significant change to the risk characterization conclusions.

2) *Has he reviewed the testimony of the former Dow employees to understand what they did with hazardous waste at the site.*

No. Dow conducted interviews of "27 former Dow employees and local Wayland residents" and provided that information in a letter to DEP dated April 29, 1994. The 4/29/94 letter is not a separate document in DEP files for RTN 3-3866. It may be buried within the 1,762 pages of documents compiled into DEP's "Correspondence File" but it is not one of the dozens of flagged items in this file. It is possible that the Town's information repository at the Health Department office might contain the 4/29/94 letter, but the Board of Selectmen have not tasked CMG to research that information as yet.

Dow also provided a written response to DEP dated June 9, 1994 (which is a separate document in DEP files), which CMG has reviewed. That (summary) document makes it clear that Dow employees segregated "reaction wastes from lab experiments" for off-Site disposal (initially by "an outside contractor," and later "solely to Dow's Midland, Michigan permitted waste disposal facility").

3) *Is there any information in the cleanup record that indicates why the septic system leach field was left in place. For example, did they test for hazardous wastes and determined there were none left or did they believe that the soil cap was sufficient to make the area safe.*

Ransom's soil sampling did not identify significant metals contamination within the Upper Septic System Area (nothing exceeding RCS-1 standards), and virtually no organic contaminants (see Section 6.2.1.2 [p.21] and Tables 2 & 3 of 3/31/99 Phase II CSA Report).

4) *Did he review the Weston and Sampson test results from samples they took from the bore holes used to determine the depth of the ledge. Was there enough sampling in the leach field area to assure that no hazardous wastes will emerge when the leach field is excavated.*

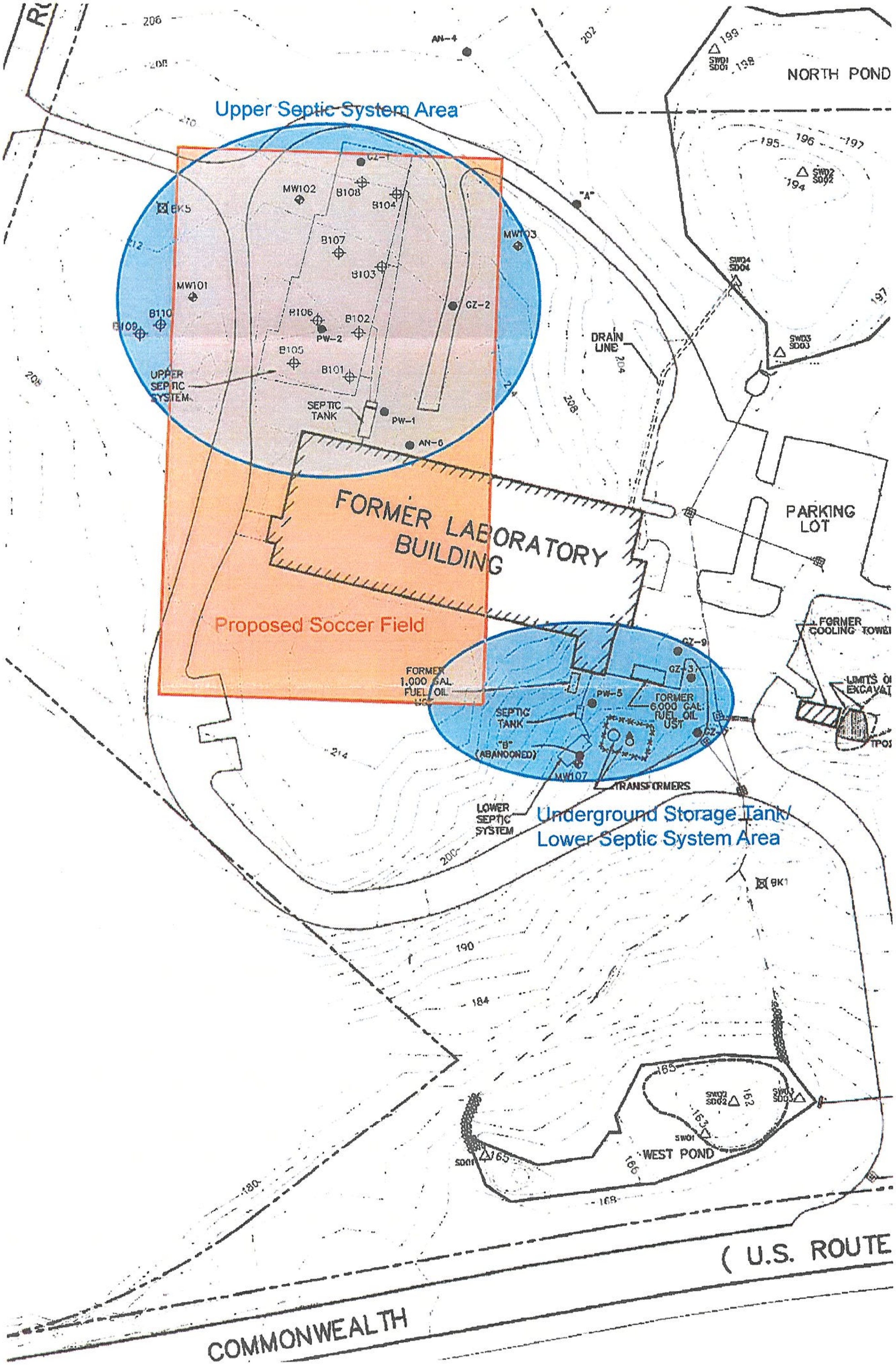
11/5/88

GZA advanced borings GZ-1 (refusal at 17') and GZ-2 (refusal at 8') within the footprint of the proposed soccer field. Anderson-Nichols also advanced boring AN-6 (refusal at 7') and Environmental Science advanced boring PW-2 (refusal at 9'3") within this footprint. 7/6/91

3/30/93

Ransom advanced borings B101 (8' no refusal), B102 (refusal at 6'9"), B103 (8' no refusal), B104 (7'6" no refusal), B105 (6' weathered rock), B106 (6' no refusal), B107 (6' no refusal), B108 (6' no refusal) B111/MW101 (competent rock at 20', well drilled to 29') & B112/MW102 (competent rock at 19', well drilled to 30') within the footprint of the proposed soccer field and B109 (4' no refusal) & B110 (2' no refusal) just west of it. They submitted 14 samples from borings B101 through B110 for laboratory analyses. This seems sufficient analysis to adequately characterize subsurface conditions within the "Upper Septic System Area."

10/30/94 to 12/6/94


Upper Septic System Area
NORTH POND
MW102
B108
B104
BK5
MW103
B107
B103
MW101
GZ-2
B110
B106
B102
B109
PW-2
DRAIN LINE
B105
B101
UPPER SEPTIC SYSTEM
SEPTIC TANK
PW-1
AN-6
AN-4
"A"
FORMER LABORATORY BUILDING
PARKING LOT
FORMER COOLING TOWER
Proposed Soccer Field
FORMER 1,000 GAL FUEL OIL UST
GZ-9
GZ-3
PW-5
FORMER 6,000 GAL FUEL OIL UST
SEPTIC TANK
"B" (ABANDONED)
MW107
TRANSFORMERS
LOWER SEPTIC SYSTEM
Underground Storage Tank/
Lower Septic System Area
BK1
WEST POND
(U.S. ROUTE
COMMONWEALTH

RANSOM
Consulting, Inc.

Consulting Engineers and Scientists

January 15, 2019

Project 941.01189

Mr. Sarkis Sarkisian, Town Planner
Town of Wayland
41 Cochituate Road
Wayland, Massachusetts 01778

RE: Environmental Conditions
Former Dow Chemical Facility
412 Commonwealth Road
Wayland, Massachusetts

Dear Mr. Sarkisian:

As requested, Ransom Consulting, Inc. (Ransom) has prepared this letter for Town of Wayland regarding the environmental conditions of the above-referenced property (the Site). Ransom understands that the Town plans to re-develop a portion of the Site with an athletic field and associated parking lot.

Between 1994 and 2000 and under the supervision of the Massachusetts Department of Environmental Protection MassDEP), Ransom worked with The Dow Chemical Company (Dow) during the performance of preliminary and comprehensive response actions, as defined by the Massachusetts Contingency Plan (MCP) at the Site. The response actions were focused on several potential/suspected areas of contamination at the Site, including two on-site septic systems, a "former burn area", former "shallow disposal/glass disposal area", dredge spoils piles, and two fuel oil underground storage tanks (USTs). Dow also undertook additional voluntary response actions at the Site in response to public comments and a request from the Board of Selectmen; these actions include sampling of environmental media at other portions of the Site as requested by the public. Finally, in 1999, Dow undertook a voluntary facility closure project which included the demolition of the on-site buildings, the closure of the two septic systems, the removal of approximately 13,000 tons of sediments associated with two dredge spoils piles and the restoration of the Site. In March 2000, a Class A-2 Response Action Outcome (RAO) Statement, concluding that a Permanent Solution had been achieved at the Site, was submitted to the MassDEP.

Based on the response actions completed at the Site and the regulatory status of the Site, Ransom does not anticipate that the Site's past use will be an impediment to the proposed redevelopment plan.

If you have any questions regarding this letter, please contact me at (978) 465-1822.

Sincerely,

Timothy J. Snay
2019.01.15
11:16:33 -05'00'

Timothy J. Snay, LSP, LEP
Principal, Vice President/Senior Scientist

TJS:ts

12 Kent Way, Suite 100, Byfield, Massachusetts 01922-1221, Tel (978) 465-1822, Fax (978) 465-2986
400 Commercial Street, Suite 404, Portland, Maine 04101, Tel (207) 772-2891
Pease International Tradeport, 112 Corporate Drive, Portsmouth, New Hampshire 03801, Tel (603) 436-1490
60 Valley Street, Building F, Suite 106, Providence, Rhode Island 02909, Tel (401) 433-2160
2127 Hamilton Avenue, Hamilton, New Jersey 08619, Tel (609) 584-0090

www.ransomenv.com

Weston & Sampson

85 Devonshire Street, 3rd Floor, Boston, MA 02109
Tel: 617.412.4480

MEMORANDUM

TO: Brandon Kunkel, Team Leader, Weston & Sampson

FROM: Daron Kurkjian P.E., Project Manager - EGE, Weston & Sampson
Sean Healey, LSP, Team Leader - EGE, Weston & Sampson

DATE: April 4, 2018

SUBJECT: Proposed Recreation Field – Loker Conservation and Recreation Area
Focused Environmental Records Review & Soil Assessment

We understand that the Town of Wayland is considering redevelopment of portions of the Loker Conservation and Recreation Area in Wayland, Massachusetts (the Site) for recreational purposes. Pursuant to your request, we have performed an environmental records review and soil assessment of areas planned for redevelopment. A summary of our review and subsequent soil assessment is provided below.

ENVIRONMENTAL RECORDS REVIEW:

The Site planned for redevelopment is a portion of the Loker Conservation and Recreation area in the Town of Wayland. The area of the Site was previously occupied by a Dow Chemical testing facility which operated at the Site between 1964 and 1988. The Dow Chemical facility was demolished in 1999 to 2000.

The area planned for redevelopment is defined in previous environmental reports as 16-acres of the 32-acre former Dow Chemical property. Several former buildings were previously located on-Site including a main office building and laboratory building, a cooling tower building, a solvent storage shed, a garage and a small shed. The proposed area for athletic field redevelopment is limited to the area of the main office building on the western portion of the Site. Dow's research included testing relative to:

- Inorganic and organo-metallic chemistry related to the synthesis of ceramics and catalyst;
- Organic chemistry/biochemistry related to enzymes and epoxies;
- Synthesis of agricultural and pharmaceutical compounds; and
- Catalyst research related to hydrogen production.

The Site is listed with the Massachusetts Department of Environmental Protection (MassDEP) under Release Tracking Number (RNT) 3-3866. This RTN is associated with environmental investigations conducted at the Site between 1987 and 1994 by Ransom Environmental on behalf of Dow Chemical. In 1993, the Site became a MassDEP Public Involvement Plan (PIP) Site following receipt of a citizen petition. The investigations identified known and suspected areas of subsurface disposal and contamination including:

1) The Upper Septic system area, located north of the former laboratory building;
2) A former shallow disposal/glass disposal area, located in the vicinity of the former solvent storage shed and former cooling tower building;

3) A former burn area, consisting of the burn bucket and concrete pad incineration areas; and
4) A former underground storage tank (UST) and Lower Septic system area, located near the southeast corner of the laboratory building.

Of these four areas, the Upper Septic system area is the only area that is proposed to be disturbed by the proposed athletic field construction. The remaining three areas of historic environmental concern are not planned to be disturbed during the proposed athletic field construction.

Remedial actions were performed at the Site in 2000 and included:

- Removal of surface soils from a former fire training area;
- Removal of two dredge spoil piles; and
- UST removal.

None of the above remediation areas are in the areas planned to be disturbed by the proposed athletic field construction.

In 2000, Ransom submitted a Class A-2 Response Action Outcome (RAO) Statement for RTN 3-3866 in support of regulatory closure. The RAO applies to four discrete locations identified above. The RAO is supported by a Method 3 risk characterization for each of the four areas. The RAO and Method 3 concluded that there is No Significant Risk to human health or the environment from residual contaminants at the Site. Weston & Sampson has reviewed the Method 3 risk characterization and based on the data presented the conclusions appear reasonable.

Additional Site closure activities were also conducted in 2000 and included the abatement of asbestos containing material within the building and demolition of building and structures on the Site. According to previous reports, the Upper and Lower Septic tanks were removed. The Upper Septic system distribution system status is unknown and appears to remain in place. No distribution system was listed to be associated with the Lower Septic tank.

In response to a request from the Wayland Board of Health, in 2000 the Massachusetts Department of Public Health's Bureau of Environmental Health Assessment reviewed cancer incidence and potential exposure from the Site. This assessment focused on residents that live in the area of the Site. No statistically significant increased incidence of cancer was found.

Weston & Sampson focused our review within the areas associated with potential Site redevelopment. Based on our preliminary review of the RAO and Method 3 risk characterization (March 2000) and the Facility Closure Report (April 2000), we identified the following concerns:

- Site risk assessment and risk characterization applied only to the four discrete areas of the Site identified above. Of these four areas, the Upper Septic system area is the sole area proposed to be disturbed by the athletic field construction. There was limited historic soil or groundwater data in the areas planned for redevelopment as recreational fields.

  The risk characterization did not evaluate a park or recreation field visitor. It did evaluate residential use in three of the four areas, which may be protective of park or recreation field visitors; however, there is no residential use evaluation in certain areas planned for redevelopment. The residential use evaluation is a conservative exposure pathway. In 2004, the

Town of Wayland added deed restrictions to the Site limiting future uses to conservation and/or recreation. Therefore, no residential redevelopment is allowed on the Site.

SOIL ASSESSMENT:

To assess soil conditions in the area of proposed redevelopment, Weston & Sampson collected soil samples from five (5) soil borings, six (6) test pits, and seven (7) surface soil sample locations. Soil assessment was focused on areas of proposed cut and fill and areas where soils are planned to be excavated and relocated on-Site. Soil sample locations were also placed in areas where future field users and spectators will congregate. Results of the soil assessment are detailed below.

Soil Borings:

On March 12, 2018, Weston & Sampson directed the advancement of five (5) soil borings at the Site. See Figure 1 for approximate soil boring locations.

Soil samples were collected at continuous intervals within the borings. Soils encountered generally consisted of brown silty sands with trace gravel. Refusal indicating shallow bedrock ranged from approximately 5 to 8 feet below ground surface (bgs). No odors or staining were observed in soil samples collected from the borings. Soil samples were field screened with a photo-ionization detector (PID) meter to evaluate potential volatile constituents. The PID readings were low and the highest reading was 4.6 parts per million by volume (ppmv).

Weston & Sampson collected and submitted soil samples for off-Site laboratory analysis. Five (5) soil samples (one from each boring) were submitted for volatile organic compounds (VOCs), polycyclic aromatic hydrocarbons (PAHs), Resource Conservation and Recovery Act (RCRA) 8 metals plus cobalt and/or pesticides and herbicide analysis.

Test Pits and Surface Soil Sampling:

On March 21, 2018, Weston & Sampson directed the advancement of six (6) test pits at the Site. Soil samples were collected from at least two depth intervals from each test pit. Weston & Sampson also collected seven (7) surface soil samples at the Site. Surface soil samples were hand dug and collected to a depth of 12 inches below grade. See Figure 1 for test pit and surface soil sample locations.

The soil samples were field screened with a PID and no evidence of contamination was observed. The highest PID reading from test pits and surface soil samples was 1.5 ppmv.

In the locations of test pits TP-1 and TP-2, remnants of the Upper Septic system, including approximately six-inch diameter clay pipe, were observed. A concrete wall was also identified at the Upper Septic system location.

Five (5) soil samples from the test pits and three (3) soil surface soil samples were submitted for off-Site laboratory for varying analysis including VOCs, semi-volatile organic compounds (SVOCs), PAHs, RCRA 8 metals plus cobalt and/or pesticides and herbicide analysis. Two test pit soil samples from within or below the Upper Septic distribution system were submitted for SVOCs instead of PAH analysis. SVOC analysis includes PAH and provides a wider range of analytes than PAH analysis. As historical records indicated testing waste was discharged to the Upper Septic system, this wider range of SVOC analytes was selected for these two test pit locations (TP-1 and TP-2).

SOIL ANALYTICAL RESULTS & SUMMARY:

The soil assessment included investigation within a total of 18 locations at the Site, with 13 soil samples submitted for off-Site laboratory analysis. These sample locations were limited to areas of proposed soil disturbance or congregating areas of users or spectators. See Table 1 and Table 2 for a summary of soil analytical results. As shown in the tables, there were no analytes detected in excess of MassDEP Massachusetts Contingency Plan (MCP) reportable concentrations (RCs).

In summary, our historical records review and subsurface assessment has found no evidence of residual contamination at the Site. Analyzed soil samples exhibited analyte concentration below RCs. These analytes included VOCs, SVOCs and/or PAHs, RCRA 8 metals plus cobalt and/or pesticides and herbicide analysis. Weston & Sampson's soil assessment of Site areas to be disturbed as part of potential redevelopment do not change the findings of the 2000 Method 3 risk characterization report. Specifically, the 2000 RAO closure report conclusion remains unchanged that "the Site also poses no significant risk of harm to the safety, the environment, and public welfare." Based on these results, no further environmental testing is required or recommended for the pre-design phase of this project.

Remaining Septic System and Foundation:

The area planned for a multi-purpose athletic field is on top of the former Upper Septic field and includes much of the former building footprint. While the Upper Septic system tank was reportedly removed, we observed evidence that the septic system distribution system and a concrete wall remain below grade. We recommend that the Weston & Sampson structural engineering and/or geotechnical team review these subsurface structures and their potential impact to the proposed athletic field construction.

LIMITATIONS:

Based on the multi-acre Site footprint, it is possible that areas of contamination may be outside of analyzed areas. In addition, the area east of the parking location was not assessed as part of our soil assessment. This area included a historic fire training that may have used per- and poly-fluorinated alkylated substances (PFAS), a class of emerging contaminants has been associated with fire training areas. Based on the proposed construction away from fire training areas, assessment of PFAS was not included in this assessment.

This memo was prepared for the use of the Town of Wayland, exclusively. The findings provided by Weston & Sampson in this report are based solely on the information reported in this document. Future investigations, and/or information that was not available to Weston & Sampson at the time of the investigation, may result in a modification of the findings stated in this memo.

Should additional information become available concerning this Site or neighboring properties that could directly impact the Site in the future, that information should be made available to Weston & Sampson for review so that, if necessary, conclusions presented in this report may be modified. The conclusions of this report are based on conditions observed by Weston & Sampson personnel at the time of the investigation, information provided by the Town of Wayland and samples collected and analyzed on the dates shown or stated in this report. This memo has been prepared in accordance with generally accepted engineering and geological practices. No other warranty, express or implied, is made.

ADDITIONAL BACK-UP FROM HISTORIC REPORTS:

Excerpt from March 2000 RAO Report:

Sampling results for each exposure area are summarized in Appendix A. Soil in the Upper Septic System Area is impacted by low concentrations of volatile organic compounds (VOCs) and semivolatile organic compounds (SVOCs). Soil in the Former Burn Area is impacted by residual concentrations of polynuclear aromatic hydrocarbons (PAHs). Soil in the Former Shallow Disposal Area is impacted by low concentrations of SVOCs including PAHs. Soil in the Former UST Area contains very low concentrations of petroleum hydrocarbons. Ground water in the area downgradient of the Former Shallow Disposal Area has been impacted by low concentrations of VOCs, including chlorinated compounds. Pond sediments are impacted by low concentrations of VOCs, SVOCs, PAHs, polychlorinated dibenzodioxins (PCDDs), and polychlorinated dibenzofurans (PCDFs). Surface water from the ponds contains trace concentrations of bis(2-ethylhexyl)phthalate (an SVOC) and low concentrations of metals.

Excerpt from April 2000 Closure Report, related to backfill:

3.5 Restoration Activities

Following removal the Site buildings, excavation of the two septic systems and sump, and elimination of the two Dredge Spoils Piles as part of the RAM, the Site was restored. An elevation survey was conducted to determine the approximate volume of material required to return all impacted areas to original grade. The baseline survey was compared to a February 1994 site plan provided by the Town of Wayland Assessor's office which depicts the original topography of the area. Approximately 3,500 yards of a loam backfill was used to grade the area formerly occupied by the Site buildings and septic system areas and approximately 12 yards of loam was used to grade the Dredge Soil Piles area. Prior to delivering backfill material, two composite samples of the backfill material were collected and submitted under chain-of-custody to Alpha and analyzed for the following parameters:

1. VOCs with an extended library search;
2. SVOCs with an extended library search; and
3. Toxicity Characteristic Leaching Procedure (TCLP) Metals.

No contaminants were detected above the method detection limits in either of the samples sent for analysis. Copies of the laboratory chemical analysis data sheets are provided in Appendix H.

Weston & Sampson estimates that 12 to 24 inches of backfill are present at the Site.

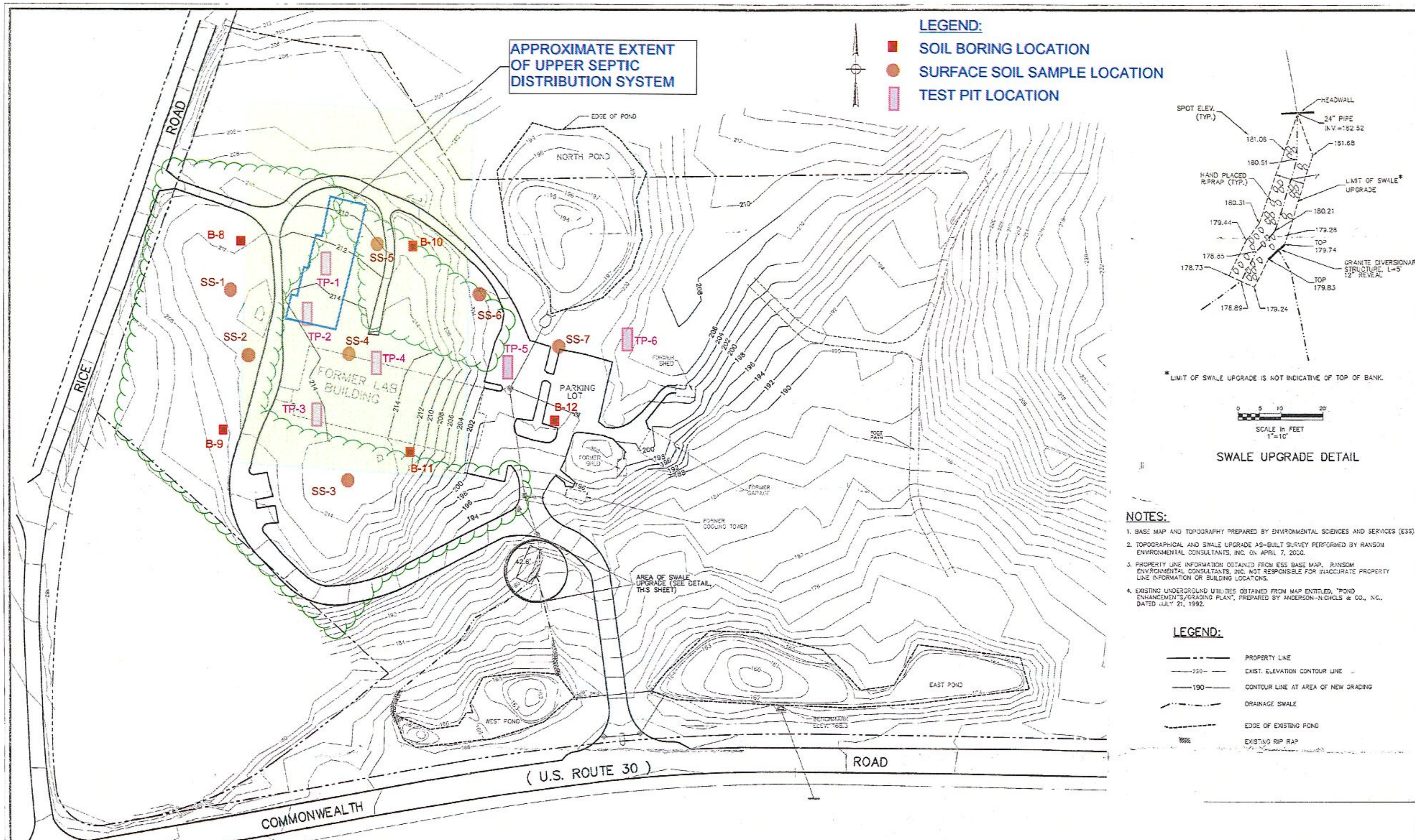


FIGURE 1: SITE SKETCH
LOKER CONSERVATION AND RECREATION AREA

NOTES:
1. SITE SKETCH OVERLAIN ON RANSOM 2000 AS BUILT PLAN.
2. ALL LOCATIONS ARE APPROXIMATE AND FOR GRAPHICAL PURPOSES ONLY.
3. FIELD SAMPLING PERFORMED BY WESTON & SAMPON IN MARCH 2018.

Table 1
Summary of Soil Boring Analytical Results
Loker Conservation and Recreation Area
Wayland, Massachusetts

Parameter	Reportable Concentrations (RCs)		SAMPLING LOCATION (Depth)				
	RCS-1	RCS-2	B-8 (1-2')	B-9 (2-3')	B-10 (1-2')	B-11 (0-2')	B-12 (2-3')
Sampling Date			3/12/2018				
Metals (mg/kg)							
ARSENIC	20	20	< 2.1	< 1.9	**3.9**	**4.8**	**3.7**
BARIUM	1000	3000	**25**	**21**	**22**	**33**	**27**
CADMIUM	70	100	< 0.21	< 0.19	< 0.22	< 0.19	< 0.21
CHROMIUM	100	200	**19**	**16**	**17**	**11**	**17**
COBALT	500	5000	**5.4**	**9.7**	**4.7**	**7.0**	**5.8**
LEAD	200	600	**21**	**5.5**	**13**	**6.1**	**10**
MERCURY	20	30	**0.052**	< 0.028	**0.043**	< 0.029	< 0.031
SELENIUM	400	700	< 4.2	< 3.7	< 4.3	< 3.7	< 4.1
SILVER	100	200	< 0.42	< 0.37	< 0.43	< 0.37	< 0.41
Pesticides (mg/kg)							
TOTAL PESTICIDES	~	~	NT	ND	NT	ND	NT
Herbicides (µg/kg)							
TOTAL HERBICIDES	~	~	NT	ND	NT	ND	NT
VOCs 8260C (mg/kg)							
TOTAL VOCs	~	~	ND	ND	ND	ND	ND
SVOCs 8270D (mg/kg)							
FLUORANTHENE	1000	3000	**0.36**	< 0.19	< 0.22	< 0.19	< 0.21
PHENANTHRENE	10	1000	**0.24**	< 0.19	< 0.22	< 0.19	< 0.21
PYRENE	1000	3000	**0.30**	< 0.19	< 0.22	< 0.19	< 0.21

NOTES:
1. **Bolded** values are detected compounds.
2. ND = Not detected above the lab reporting limits.
3. NT = Not tested.
4. ~ = No Massachusetts Contingency Plan (MCP) standard available
5. Soil results compared to MCP Reportable Concentrations (RCs).
6. mg/kg = milligrams per kilogram
7. VOCs = volatile organic compounds, SVOCs = semi-volatile organic compounds.
8. RCs taken from the MCP 310 Code of Massachusetts Regulations (CMR) 40.00 dated 4/25/2014.

Weston & Sampson[SM]

Table 2
Summary of Surface Soil (SS) Sample and Test Pit (TP) Soil Sample Analytical Results
Loker Conservation and Recreation Area
Wayland, Massachusetts

Parameter	Reportable Concentrations (RCs)		SAMPLING LOCATION (Depth)							
	RCS-1	RCS-2	SS-1 (0-12")	SS-3 (0-12")	SS-6 (0-12")	TP-1 (0-16")	TP-1 (43")	TP-2 (59")	TP-4 (0-16")	TP-5 (12-16")
Sampling Date			March 21, 2018							
SM 2540G (% Wt)										
% Solids	~	~	77.5	51.2	79.3	85.0	95.9	96.0	85.8	87.0
Metals (mg/kg)										
ARSENIC	20	20	< 2.1	**3.9**	**4.0**	**3.9**	**1.9**	< 1.7	< 1.9	**3.4**
BARIUM	1000	3000	**12**	**12**	**19**	**17**	**14**	**9.4**	**12**	**15**
CADMIUM	70	100	< 0.21	< 0.32	**0.30**	**0.30**	< 0.17	< 0.17	< 0.19	**0.26**
CHROMIUM	100	200	**6.1**	**7.5**	**7.1**	**6.2**	**6.4**	**4.8**	**4.3**	**5.3**
COBALT	500	5000	< 2.1	< 3.2	**2.2**	**2.0**	< 1.7	< 1.7	**3.4**	< 1.9
LEAD	200	600	**9.6**	**55**	**36**	**26**	**4.8**	**5.5**	**4.5**	**34**
MERCURY	20	30	**0.045**	**0.12**	**0.040**	**0.042**	**0.52**	**0.95**	**0.043**	< 0.029
SELENIUM	400	700	< 4.1	< 6.4	< 4.3	< 3.9	< 3.5	< 3.4	< 3.7	< 3.8
SILVER	100	200	< 0.41	< 0.64	< 0.43	< 0.39	**1.6**	**2.2**	< 0.37	< 0.38
Pesticides (mg/kg)										
4,4'-DDT	6	30	NT	NT	**0.072**	< 0.047	< 0.0042	< 0.0042	NT	NT
TOTAL PESTICIDES	~	~	NT	NT	**0.072**	ND	ND	ND	NT	NT
Herbicides (µg/kg)										
TOTAL HERBICIDES	~	~	NT	NT	ND	ND	ND	ND	NT	NT
VOCs 8260C (mg/kg)										
TOTAL VOCs	~	~	ND	ND	ND	ND	ND	ND	ND	ND
SVOCs 8270D (mg/kg)										
TOTAL SVOCs	~	~	NT	NT	NT	NT	ND	ND	NT	NT
SVOCs PAH Subset 8270D (mg/kg)										
ANTHRACENE	1000	3000	< 0.22	< 0.33	**0.31**	< 0.20	NT	NT	< 0.20	< 0.20
BENZO(A)ANTHRACENE	7	40	< 0.22	< 0.33	**1.6**	< 0.20	NT	NT	**0.82**	< 0.20
BENZO(A)PYRENE	2	7	< 0.22	< 0.33	**1.8**	**0.22**	NT	NT	**0.73**	< 0.20
BENZO(B)FLUORANTHENE	7	40	< 0.22	< 0.33	**2.6**	**0.31**	NT	NT	**0.95**	< 0.20
BENZO(G,H,I)PERYLENE	1000	3000	< 0.22	< 0.33	**1.3**	< 0.20	NT	NT	**0.53**	< 0.20
BENZO(K)FLUORANTHENE	70	400	< 0.22	< 0.33	**1.0**	< 0.20	NT	NT	**0.38**	< 0.20
CHRYSENE	70	400	< 0.22	< 0.33	**2.1**	**0.26**	NT	NT	**0.98**	< 0.20
DIBENZ(A,H)ANTHRACENE	0.7	4	< 0.22	< 0.33	**0.30**	< 0.20	NT	NT	< 0.20	< 0.20
FLUORANTHENE	1000	3000	< 0.22	< 0.33	**5.4**	**0.56**	NT	NT	**2.0**	< 0.20
INDENO(1,2,3-CD)PYRENE	7	40	< 0.22	< 0.33	**1.4**	< 0.20	NT	NT	**0.53**	< 0.20
PHENANTHRENE	10	1000	< 0.22	< 0.33	**3.0**	**0.27**	NT	NT	**1.5**	< 0.20
PYRENE	1000	3000	< 0.22	< 0.33	**4.8**	**0.55**	NT	NT	**1.8**	< 0.20

NOTES:
1. **Bolded** values are detected compounds.
2. ND = Not detected above the lab reporting limits.
3. NT = Not tested.
4. ~ = No Massachusetts Contingency Plan (MCP) standard available
5. Soil results compared to MCP Reportable Concentrations (RCs).
6. mg/kg = milligrams per kilogram
7. VOCs = volatile organic compounds, SVOCs = semi-volatile organic compounds.
8. PAHs = polycyclic aromatic hydrocarbons.
9. RCs taken from the MCP 310 Code of Massachusetts Regulations (CMR) 40.00 dated 4/25/2014.

5

CDM Camp Dresser & McKee Inc.

consulting engineering construction operations

One Cambridge Place
50 Hampshire Street
Cambridge, Massachusetts 02139
Tel: 617 452-6000 Fax: 617 452-8000

close to closing

April 12, 2000

DRAFT

Mr. Jeff Ritter
Executive Secretary
Wayland Town Offices
41 Cochituate Road
Wayland, MA 01778

Subject: Due Diligence Investigation and Report to the Board of Selectmen of the Town of Wayland

Dear Mr. Ritter:

CDM is pleased to submit this letter report to the Town of Wayland regarding the Dow property known as the former Dow Chemical Facility located at 412 Commonwealth Road and assigned DEP release tracking number 3-3866. This report is presented in two parts. The first part details our history with the property inclusive of our development of a Phase I Report in 1998 as well as a chronology of document consideration and review in the intervening period of time. The second part is our review of the final or nearly final documents recently submitted by Ransom Environmental.

Part 1. History of CDM Involvement.

Our history at the site started with an independent review of material in 1998. This review culminated in production of a Phase I report outlining our understanding of the site and recommending that the site proceed to the Phase II Comprehensive Site Assessment prior to any land taking or receipt of the site by the Town. In essence, this report recommended that Dow continue at the site through the Phase II comprehensive site assessment process including a risk characterization. Such completion of the risk characterization then clearly demonstrates current and future risks at the site relative to site reuse and allows the Town to consider the site in a completely characterized mode. This approach is much safer than that of an ordinary due diligence report at the Phase I level of site assessment but was certainly warranted in this case given the past use of the site by Dow. From the point of that recommendation, our history of review has consisted of the receipt and reading of the Phase II and RAM documents by our LSP, Mr. William Swanson. In addition to the pertinent documents provided by Dow's consultant, Ransom Environmental and attendance at the public meeting where the draft risk assessment was presented, Mr. Swanson also was provided the comments by the two senior LSP's employed by the site neighbors (NED/Dow Neighbors, Inc.). At key points in the process CDM provided written comments on the documents and copies of these letters are attached to this letter report.

Furthermore, our LSP, Mr. Swanson, walked over the site with the neighbors and other interested parties in autumn of 1999 (October 30) to select likely or suspect locations for additional due diligence sampling and analysis. It was determined that this work should be undertaken to provide a reasonable degree of assurance that the site had been fully remediated.

Part 2. Final Report Review.

The key document reviewed is the final Method 3 Risk Assessment Report for the site. The Method 3 approach utilized is the most detailed of the available approaches and uses site specific data and detailed information about the chemicals detected to arrive at an assessment of risk.

One way to view the results of the risk assessment is to go directly to the numbers computed for the cancer and noncancer risks. For cancer risks a total of 14 different possible scenarios were evaluated by Gradient Corp., a team subcontractor to Ransom. The acceptable level of risk according to DEP protocol is 1 additional risk of cancer in a population of 100,000. For conservation land uses the highest risk computed is 1 additional risk of cancer in a population of 1,000,000, ten times lower than or 10% of the allowable or acceptable level for the anticipated uses. Stated another way, the total cancer risk is 1/10 of the allowable risk. For residential scenarios in specific areas of the site where former Dow activities occurred, the highest risk is 6 additional cancer risks in a population of 1,000,000, somewhat lower than the allowable or acceptable level. Stated another way, the total cancer risk is 6/10 or 60% of the allowable risk. For noncancer risks, a total of 16 different possible scenarios were evaluated. The acceptable risk value is 1 and the highest computed value is 0.1, ten times lower than the allowable or 1/10 or 10% of the acceptable level. The numbers utilized in the computations are generally conservative, that is the computations are designed to overestimate risk due to uncertainties in the fundamental research and derivation of the numbers. So, the conclusion is that the site is safe for general use.

In addition, direct physical evidence of healthy biota at the site coupled with the chemical evidence indicate there is no adverse impact from the site to resident biota. These risk calculations were further reduced by the recent release abatement measure (RAM) activities.

In the risk assessment, Gradient dealt with background concentrations of contaminants for polynuclear aromatic hydrocarbons, dioxin and metals. Determination of background levels of dioxin in the Boston metropolitan area is problematic and the data that can be used to establish background is limited. Nevertheless, CDM views the dioxin concentrations at the site as residing on the low end of the concentration range of urban sites we have studied or are otherwise familiar with. For polynuclear aromatic hydrocarbons and metals, the concentrations appear to be above background and were thus subjected to detailed risk characterization to determine if they indeed resulted in a significant risk. As noted above, there was a determination of "no significant risk".

Our detailed comments appear below regarding review of the Method 3 Risk Characterization Former Dow Chemical Facility (Final) Dated February 25, 2000:

The Method 3 Human Health Risk Characterization was given a complete final review by CDM. Overall, the risk characterization was thorough and complete. The analytical data used to support the risk characterization was representative of site conditions and of sufficient quality to characterize site risks. MADEP protocols were generally followed regarding the development of exposure scenarios, exposure calculations, and the development of exposure point concentrations.

One exception to following MADEP guidance was the use of USEPA soil/skin adherence factors associated with dermal risk. While the use of the EPA values is acceptable, they are less conservative than the MADEP default factors. While the risk characterization may not be as conservative as if the default factors was used, the overall conclusion of "no significant" risk is consistent with the low levels of residual contaminants remaining on-site. The following are comments and observations that do not change the conclusions of the risk characterization:

Section 4.2.3

The fraction of surface soil from contaminated source parameter listed in Table 4-2 should be included in the ingestion equation (4-9).

Section 4.3.1

The sentence "Therefore this scenario assumes that a house is placed directly on the site and no mixing or regarding of the site occurs" is misleading since the subsurface soils are used to calculate EPCs.

Section 4.3.3

The landscaper exposure frequency extending from April through October should be stated as seven months rather than six months.

Table 4-2 Summary of Exposure Input Factors

The Soil/Skin Adherence Factors used in this table are cited as USEPA, 1999, which is Dermal Risk Assessment Interim Guidance. According to the USEPA, this document is not to be cited or quoted at this time, as it has not officially been released to the public. However, according to the USEPA, it is acceptable to cite the original study or studies contained within the document. Hence, while the procedure may not be conservative, the conclusions are not affected.

Appendix A Exposure Point Concentrations

The sample depths should have been included on either the A-1 series of tables or Table A-7.

Level of Completeness of the Assessment.

The assessment of the site is rated by CDM as exhibiting a high level of completeness. In addition to DEP oversight when the site was listed as a Tier 1A site, three independent LSP's have had opportunity to review and comment on the scopes of work as well as the work products. These work products were all provided by Dow and their consultant team led by Ransom Environmental Consultants Inc. There is always opportunity to find fault with such a complex set of procedures as was required to comprehensively assess this site. However, as noted in our remaining final comments, the site has been thoroughly characterized by current standards set for a comprehensive site assessment on a location of this nature.

One key aspect of the site assessment is the "uncertainty analysis" of the risk assessment which appears as Section 7. In most such documents, this portion of the assessment is perfunctory and is given little notice. However, because of the more unusual nature of prior site uses, this section takes on a higher degree of importance at this site. While CDM concurs that the assessment is "likely to overpredict actual site risks" as stated on page 40, we summarize as follows:

In response to the more exotic or unusual nature of the site. the analytical laboratory also provided a list of tentatively identified compounds (TIC's). Usually these compounds are not considered, however, to be more thorough they were included in the assessment. Stated another way, these compounds are those which may appear on the analytical instrument output but are not normally positively identified due to their understood or assumed insignificance in the risk assessment process. In order to quantitatively account for the risk associated with the presence, the compounds were assigned a health impact numerical value based on the known impact of a more commonly identified yet chemically similar compound. This approach is reasonable for dealing with the TIC's and is the only logical way to quantitate the risk. Furthermore, the approach provides an additional degree of conservatism in the overall risk calculations.

A similar likelihood of overestimation is described for the ecological risk assessment in that uncertainty analysis.

CDM Camp Dresser & McKee Inc.

DRAFT

With respect to Ransom's Completion Report Release Abatement Measure No. 3 dated March 30, 2000, CDM concurs that a class A-2 response action outcome statement (RAO) may be filed for the site.

Summary.

It is CDM's opinion that the site has been adequately characterized and remediated under the Massachusetts Contingency Plan process. CDM is not aware of any significant impediments or environmental encumbrances on the property and recommends that from an environmental management point of view the Town may proceed with the purchase of the property.

Very truly yours,

CAMP DRESSER & McKEE INC.

William R. Swanson, P.E., LSP
Vice Persident

cc: Bruce Haskell

C:\Projects\Swanson\jrltrletter.doc

APPENDIX M:
Vernal Pool Information

MASSWILDLIFE

DIVISION OF
FISHERIES & WILDLIFE

1 Rabbit Hill Road, Westborough, MA 01581
p: (508) 389-6300 | f: (508) 389-7890
MASS.GOV/MASSWILDLIFE

January 24, 2020

Dear Wayland Conservation Commission,

The Natural Heritage and Endangered Species Program (NHESP) has officially certified vernal pools in your town. Please see below for more pool information and links to view the pool location on MassGIS.

Town:	Wayland
CVP # & Pool Name/Report #:	CVP 8123 (*Loker Conservation Land Vernal Pool #1)* / V1818
Pool coordinates (Lat./Long.):	(42.326582, -71.34228)
Pool Viewer:	OLIVER
Download GIS datalayer:	Certified Vernal Pools

**Note: Updates to the CVP layer are posted monthly.*

The NHESP does not delineate the boundary of a CVP during certification, but rather demarcates the pool's location.

Please contact the DEP Regional Office for the town in which this pool occurs with all regulatory questions (DEP Regional Offices and Vernal pool Liaisons can be determined by visiting the NHESP Vernal Pool website at https://www.mass.gov/service-details/vernal-pool-protection). We encourage you to contact the NHESP with questions relating to the biological characteristics of vernal pools or the certification program.

Thank you for your concern and assistance with vernal pool conservation in your town.
Sincerely,

Everose Schlüter

Everose Schlüter, Ph.D.
Assistant Director

Linda,

I surveyed the pond yesterday, using polarized glasses for optimum viewing. I observed two (2) spotted salamander (*Ambystoma maculatum*) egg masses, plus a small number of spermatophores (presumably also from spotted salamanders), but no other evidence of breeding by vernal pool "obligate" species (photos attached). The maximum depth of the pond was approximately 45". I did not observe any fish, but the pond appears deep enough and may be permanently flooded, which would allow it to support fish. Based on my observations, the pond did not contain the necessary "biological" evidence (five or more egg masses) - despite the presence of spermatophores - to be certified as a vernal pool in accordance with the "Guidelines for the Certification of Vernal Pool Habitat." (NHESP, March 2009). A follow-up survey in the next 1-2 weeks would provide more certainty of whether additional egg masses were present but not detected by my survey.

Regarding the outlet to the pond, the Guidelines state that a pool must have "no permanently flowing outlet." The outlet was flowing during my survey, however if this outlet dries up during the year then the pond would meet the required "physical" criteria as a vernal pool.

-Dan

Dan Wells, Goddard Consulting, LLC
Photos Taken 4/10/19 - Pond at 412 Commonwealth Road, Wayland

Photo 1 - Spotted salamander egg mass (1 of 2 observed).

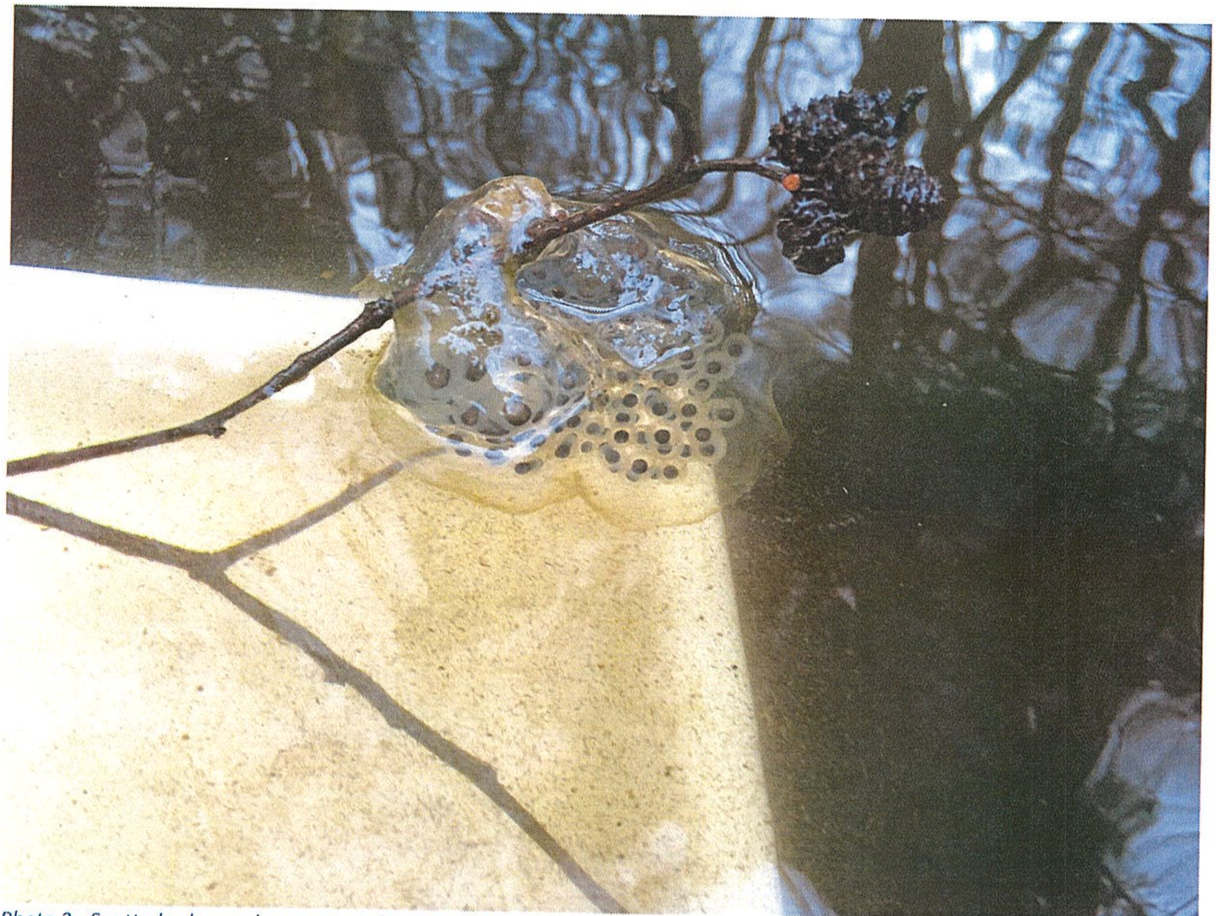


Photo 2 - Spotted salamander egg mass (2 of 2 observed).

Photo 3 - Spotted salamander spermatophores.

MATTHEW R. BURNE
80 Cross Street
Malden, MA 02148
mattburne@gmail.com

Linda Hansen, Administrator
Wayland Conservation Commission
41 Cochituate Road
Wayland, MA 01778

April 11, 2019

RE: Vernal Pool Evaluation, Loker Conservation and Recreation Area

Dear Ms. Hansen,

On Monday, 4/8/19, I was asked to conduct an evaluation of a potential vernal pool habitat located on the Loker Conservation and Recreation Area in the Town of Wayland on behalf of the Wayland Conservation Commission. I visited the site, along with Ryan Brown, Department Assistant, on Wednesday, 4/10/19, and I am pleased to provide you with the results of that evaluation.

Physical Description

The wetland in question is identified as a Potential Vernal Pool in the MassGIS database, and is shown on the aerial photo to the right. The pond is somewhat large; approximately 150 by 200 feet with a maximum depth estimated at 3.5 feet. It has a bottom characterized by deep muck and vegetation but is stony in portions of the basin. In the summer, I'd anticipate that the pool is well vegetated throughout. Without direct knowledge of the site, it's difficult to know whether this ever dries out, but I anticipate that it rarely, if ever dries completely.

Pond idenified on aerial photograph at Loker Conservation and Recreation Area. This is identified as a Potential Vernal Pool in the MassGIS database.

The pool margin is entirely forested, with trees over-reaching the water around its perimeter. In the western quadrant there is dense growth of mixed aquatic shrubs and hummocks with small trees. The north margin of the pool is fairly shallow and thinly vegetated with shrubs and small trees.

There is a man-made structure containing a flowing outlet, from which water flows to the south.

The pond is immediately adjacent to open field and parking to the south, and the viaduct to the north. There is mixed pine and hardwood forest proximal to the wetland.

Wildlife Observations

I arrived at the site at 12 PM on April 10, 2019. The sky was overcast but it was bright. Visibility was fairly poor, but aided by the use of polarized sunglasses. Temperature was about 40 degrees. I entered the pool in the western portion and immediately found two wood frog (*Lithobates sylvaticus*) egg masses.

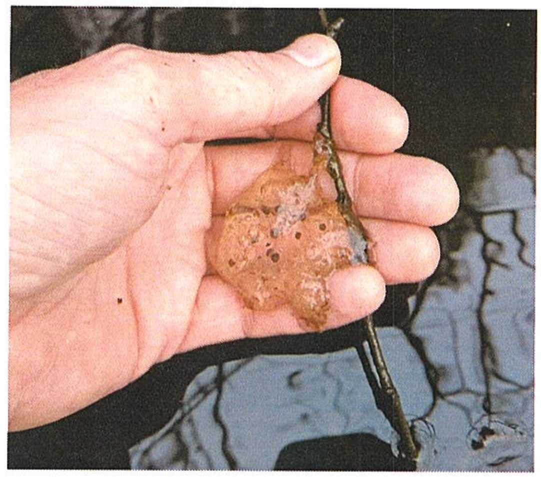
In the vegetation along the western edge, I found a young Painted Turtle (*Chrysemys picta*). Throughout the western and northern portions of the pool I observed a variety of insects, including caddisfly larvae, back swimmers (Notonectidae), and water skaters (Gerridae).

Along the eastern margin of the pool I found a total of seven Spotted Salamander (*Ambystoma maculatum*) egg masses. Some of these masses were very newly-laid, still showing the black-and-white polar regions of embryos in the very earliest stages of development. My opinion is that over the coming days, it is not unreasonable to anticipate an increase in the number of egg masses present in the pool, based on the assumption that these very newly-laid eggs indicate on-going breeding activity.

Conclusions

The minimum requirements for official certification of vernal pool habitat by the Natural Heritage & Endangered Species Program were met on my visit to the Loker pool, confirming the vernal pool function of this pond. Though the egg mass counts were somewhat low, there is additional evidence of the value to wildlife habitat that this pond provides with the capture of a turtle and variety of invertebrates.

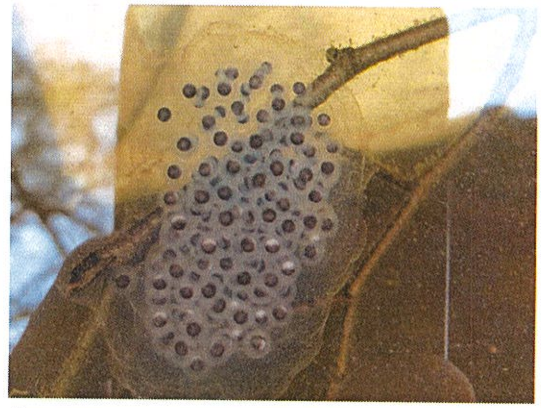
Two wood frog (Lithobates sylvaticus) egg masses found in the western portion of the pool.



Spotted Salamander (Ambystoma maculatum) egg masses were found in low numbers in the pool. Seven individual masses were observed.

A young painted turtle (Chrysemys picta) was captured in the shallow, vegetated west margin of the pool.

This water body has over 10,000 square feet of surface area and appears to rarely dry out completely. Its jurisdictional status under the Wetlands Protection Act Regulations is likely a pond, though I haven't been asked to comment on its jurisdictional status.



Spotted Salamander (*Ambystoma maculatum*) egg masses were found in low numbers in the pool. Very recently-laid eggs (note white/black polarity in several embryos).

Status as vernal pool habitat is not dependent upon, nor indicative of jurisdictional status. Vernal pool function and wetland jurisdiction are entirely independent. The fact that this wetland may be a pond does not, therefore, preclude its designation as a vernal pool if it holds water for two months, is free of fish, and indicator wildlife use it for breeding.

This may not be a "typical" vernal pool in that it may not dry out on a regular basis, but the jurisdictional wetland does provide vernal pool habitat function and is eligible for official certification through the state.

If you have any questions or would like to discuss my observations or conclusions, please don't hesitate to contact me.

Thank you for requesting an evaluation of this habitat from me, it is my pleasure to help the Commission in better understanding this important wildlife habitat resource.

Sincerely,

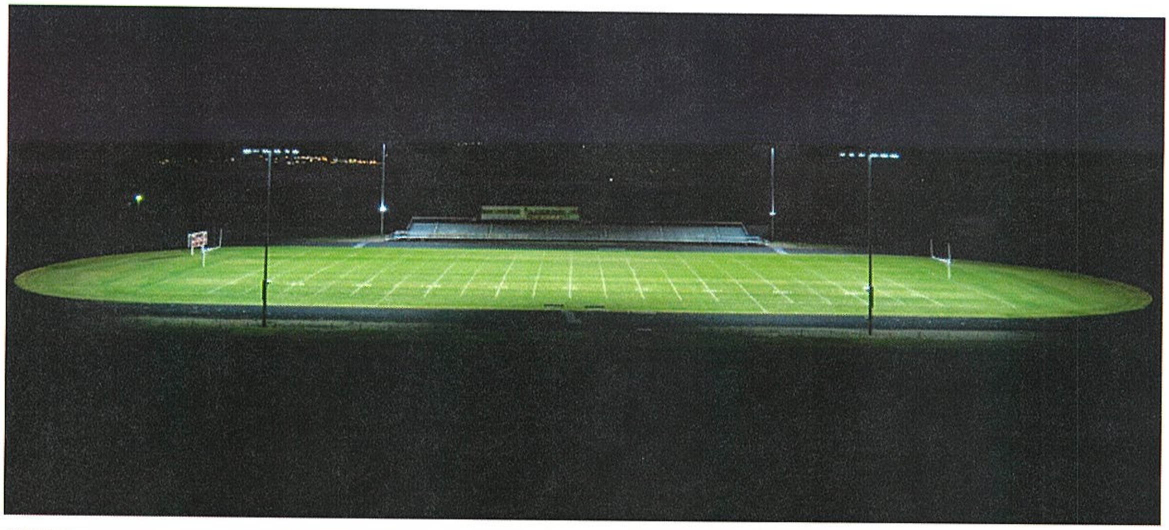
Matthew R. Burne

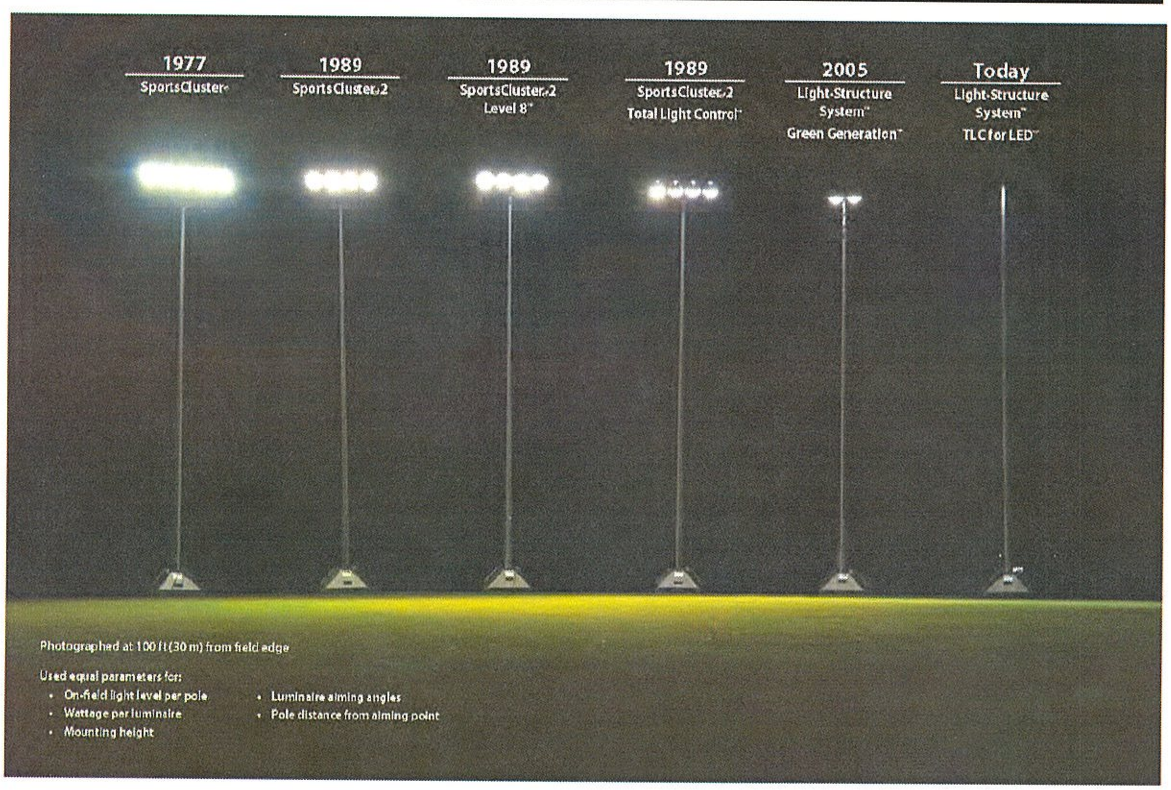
APPENDIX N:
Sports Lighting Photometric Plan

Will the sports lighting impact the area?

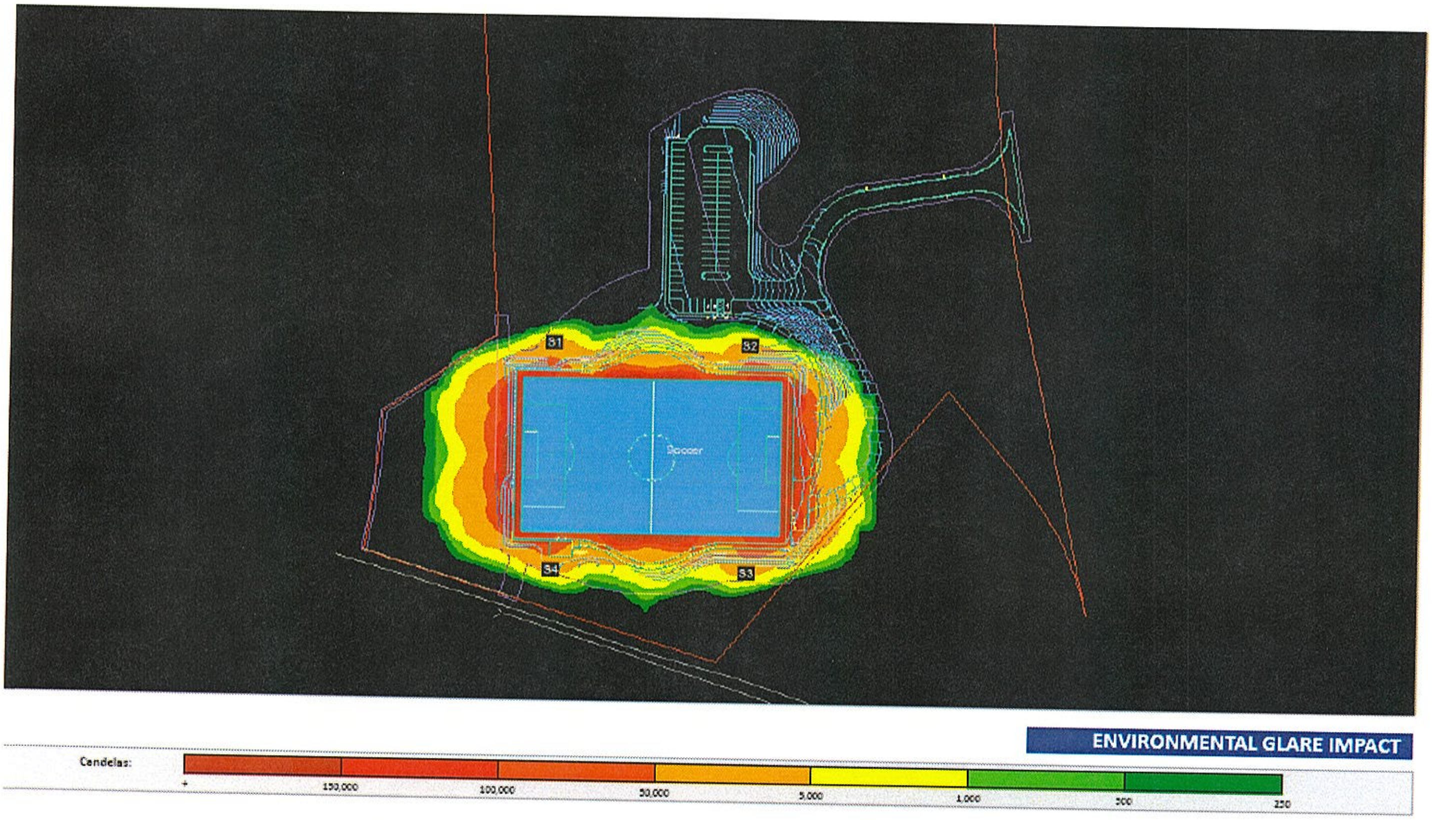
New technology in sports lighting allows the playing field to be lit for player safety, without spillage or glare reaching the surrounding roadways or residences.

Lighting Photometrics (Musco Sports Lighting, LLC)





LIGHTING – TECHNOLOGICAL IMPROVEMENTS


S1
S2
Soccer
S4
S3
ENVIRONMENTAL GLARE IMPACT
Candelas:
+
150,000
100,000
50,000
5,000
1,000
500
250

Loker Soccer Field
Wayland,MA

Lighting System

Pole / Fixture Summary

Pole ID	Pole Height	Mtg Height	Fixture Qty	Luminaire Type	Load	Circuit
S1-S4	70'	70'	6	TLC-LED-1150	6.90 kW	A
4			*24*		*27.60 kW*	

Circuit Summary

Circuit	Description	Load	Fixture Qty
A	Soccer	27.6 kW	24

Fixture Type Summary

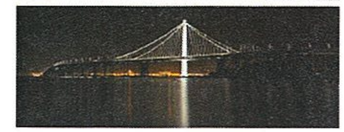
Type	Source	Wattage	Lumens	L90	L80	L70	Quantity
TLC-LED-1150	LED 5700K - 75 CRI	1150W	121,000	>81,000	>81,000	>81,000	24

Light Level Summary

Calculation Grid Summary

Grid Name	Calculation Metric	Illumination					Circuits	Fixture Qty
		Ave	Min	Max	Max/Min	Ave/Min		
Property Line	Horizontal	0.01	0	0.46	0.00		A	24
Property Line	Max Candela (by Fixture)	330	0	15109	0.00		A	24
Property Line	Max Vertical Illuminance Metric	0.02	0	0.95	0.00		A	24
Soccer	Horizontal Illuminance	36.6	23	45	1.99	1.59	A	24
Zero Grid	Horizontal	0.04	0	3	0.00		A	24
Zero Grid	Max Candela (by Fixture)	1111	0	72360	0.00		A	24
Zero Grid	Max Vert Illuminance (by Light Bank)	0.06	0	4	0.00		A	24

From Hometown to Professional



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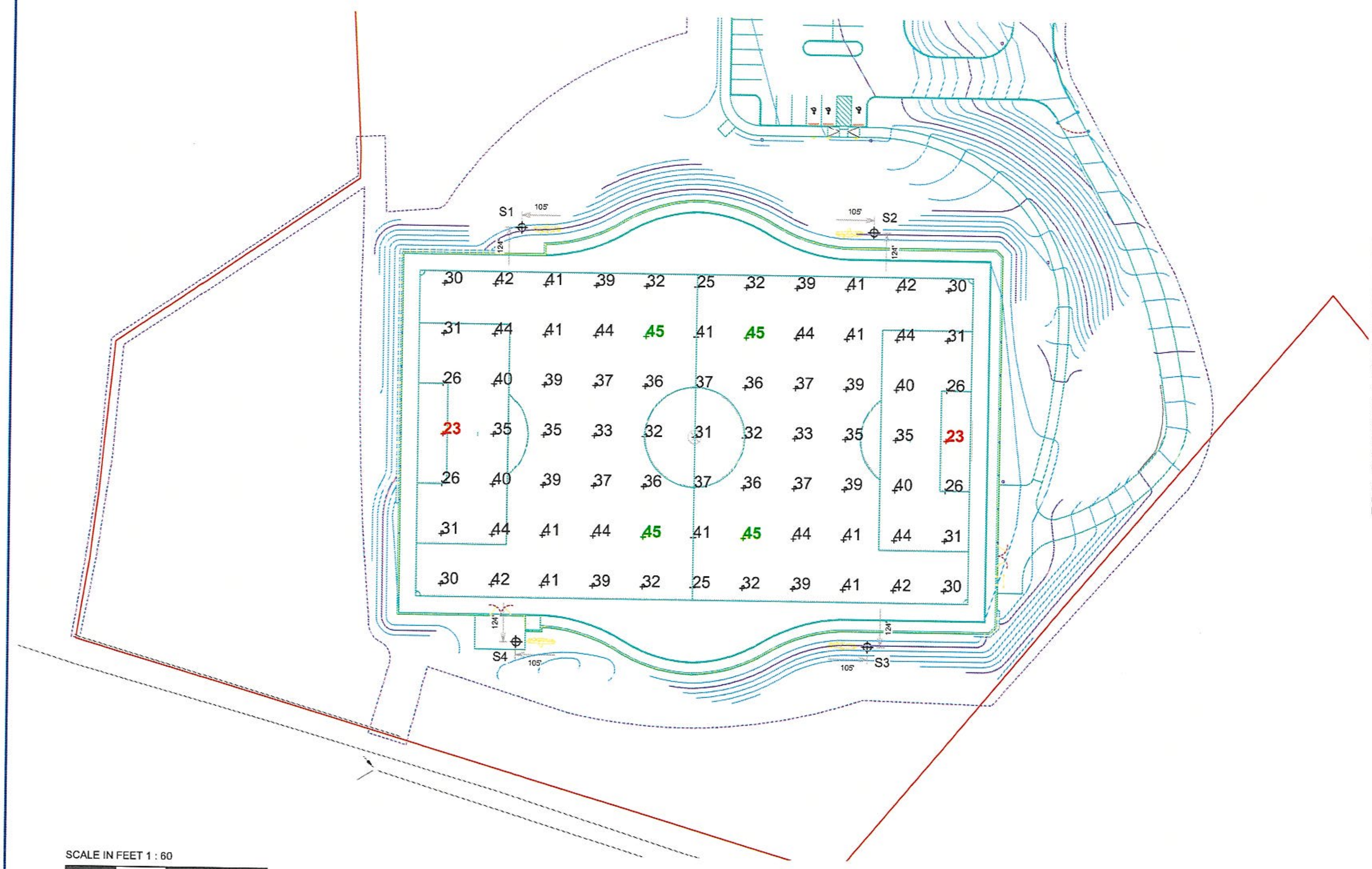
Loker Soccer Field
Wayland,MA

EQUIPMENT LIST FOR AREAS SHOWN

Pole					Luminaires			
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LUMINAIRE TYPE	QTY / POLE	THIS GRID	OTHER GRIDS
4	S1-S4	70'	-4'	66'	TLC-LED-1150	6	6	0
4	TOTALS					24	24	0



GRID SUMMARY

Name:	Soccer
Size:	330' x 195'
Spacing:	30.0' x 30.0'
Height:	3.0' above grade

ILLUMINATION SUMMARY

MAINTAINED HORIZONTAL FOOTCANDLES

	Entire Grid
Guaranteed Average:	30
Scan Average:	36.64
Maximum:	45
Minimum:	23
Avg / Min:	1.61
Guaranteed Max / Min:	2.5
Max / Min:	1.99
UG (adjacent pts):	1.67
CU:	0.88
No. of Points:	77

LUMINAIRE INFORMATION

Color / CRI:	5700K - 75 CRI
Luminaire Output:	121,000 lumens
No. of Luminaires:	24
Total Load:	27.6 kW

Lumen Maintenance

Luminaire Type	L90 hrs	L80 hrs	L70 hrs
TLC-LED-1150	>81,000	>81,000	>81,000

Reported per TM-21-11. See luminaire datasheet for details.

Guaranteed Performance: The ILLUMINATION described above is guaranteed per your Musco Warranty document and includes a 0.95 dirt depreciation factor.

Field Measurements: Individual field measurements may vary from computer-calculated predictions and should be taken in accordance with IESNA RP-6-15.

Electrical System Requirements: Refer to Amperage Draw Chart and/or the **"Musco Control System Summary"** for electrical sizing.

Installation Requirements: Results assume ± 3% nominal voltage at line side of the driver and structures located within 3 feet (1m) of design locations.

Pole location(s) ⊕ dimensions are relative to 0,0 reference point(s) ⊗

ENGINEERED DESIGN By: Markie Roake • File #191248AR1 • 21-Jan-19

musco Lighting

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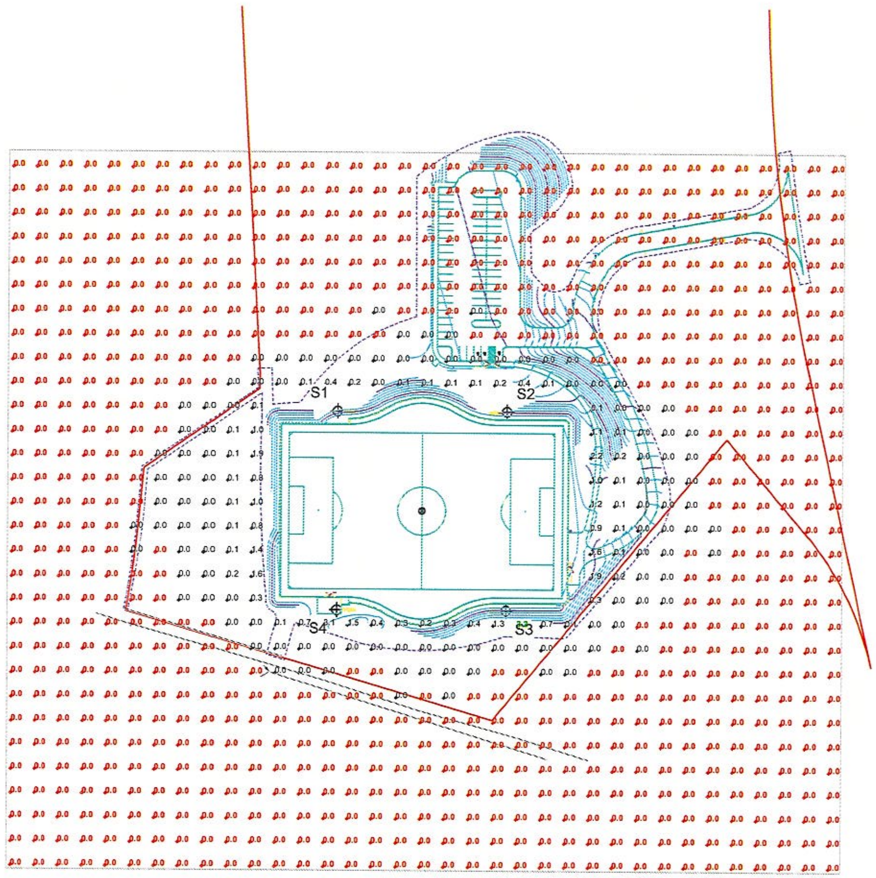
ILLUMINATION SUMMARY

EQUIPMENT LIST FOR AREAS SHOWN								
Pole				Luminaires				
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LUMINAIRE TYPE	QTY / POLE	THIS GRID	OTHER GRIDS
4	S1-S4	70'	-4'	66'	TLC-LED-1150	6	6	0
4		TOTALS				24	24	0



Loker Soccer Field

Wayland,MA

GRID SUMMARY	
Name:	Zero Grid
Spacing:	30.0' x 30.0'
Height:	3.0' above grade

ILLUMINATION SUMMARY	
MAINTAINED HORIZONTAL FOOTCANDLES	
	Entire Grid
Scan Average:	0.04
Maximum:	3
Minimum:	0
Avg / Min:	-
Max / Min:	-
UG (adjacent pts):	2391.19
CU:	0.01
No. of Points:	933
LUMINAIRE INFORMATION	
Color / CRI:	5700K - 75 CRI
Luminaire Output:	121,000 lumens
No. of Luminaires:	24
Total Load:	27.6 kW

Luminaire Type	L90 hrs	L80 hrs	L70 hrs
			Lumen Maintenance
TLC-LED-1150	>81,000	>81,000	>81,000

Reported per TM-21-11. See luminaire datasheet for details.

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SCALE IN FEET 1 : 150

0' 150' 300'

Pole location(s) ⊕ dimensions are relative to 0,0 reference point(s) ⊗

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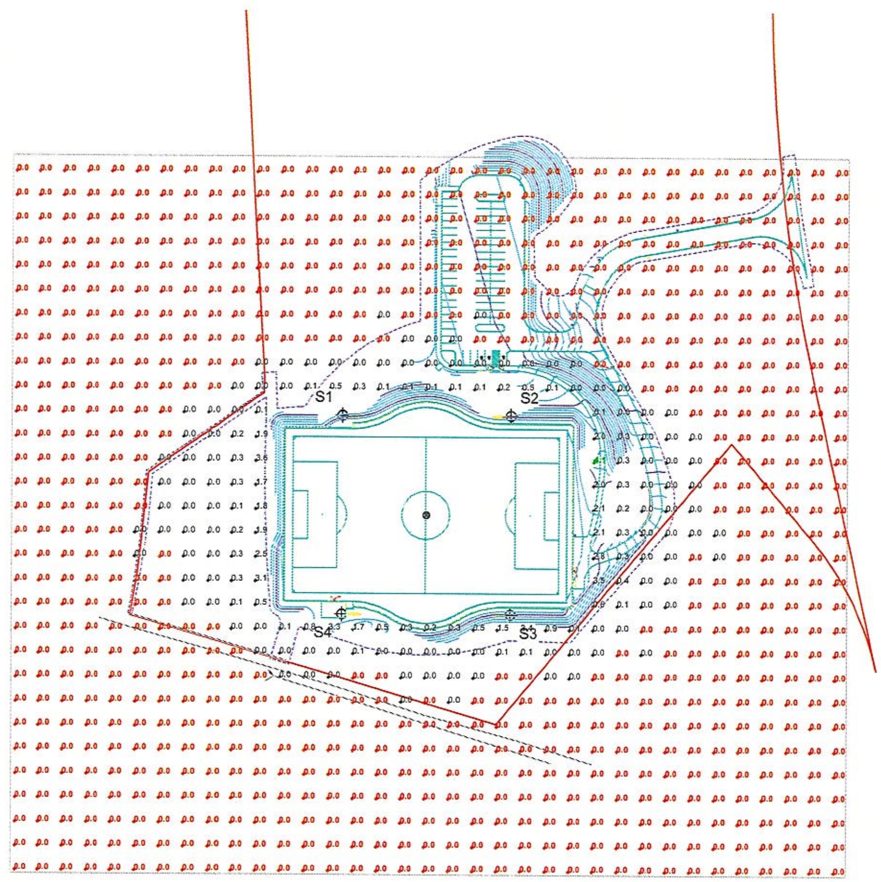
EQUIPMENT LIST FOR AREAS SHOWN

Pole				Luminaires				
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LUMINAIRE TYPE	QTY / POLE	THIS GRID	OTHER GRIDS
4	S1-S4	70'	-4'	66'	TLC-LED-1150	6	6	0
4			TOTALS			24	24	0



Loker Soccer Field

Wayland,MA

GRID SUMMARY

Name:	Zero Grid
Spacing:	30.0' x 30.0'
Height:	3.0' above grade

ILLUMINATION SUMMARY

MAINTAINED MAX VERTICAL FOOTCANDLES

	Entire Grid
Scan Average:	0.06
Maximum:	4
Minimum:	0
Avg / Min:	-
Max / Min:	-
UG (adjacent pts):	1928.78
CU:	0.01
No. of Points:	933

LUMINAIRE INFORMATION

Color / CRI:	5700K - 75 CRI
Luminaire Output:	121,000 lumens
No. of Luminaires:	**24**
Total Load:	27.6 kW

	Lumen Maintenance		
Luminaire Type	L90 hrs	L80 hrs	L70 hrs
TLC-LED-1150	>81,000	>81,000	>81,000

Reported per TM-21-11. See luminaire datasheet for details.

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SCALE IN FEET 1 : 150

0' 150' 300'

Pole location(s) ⊕ dimensions are relative to 0,0 reference point(s) ⊗

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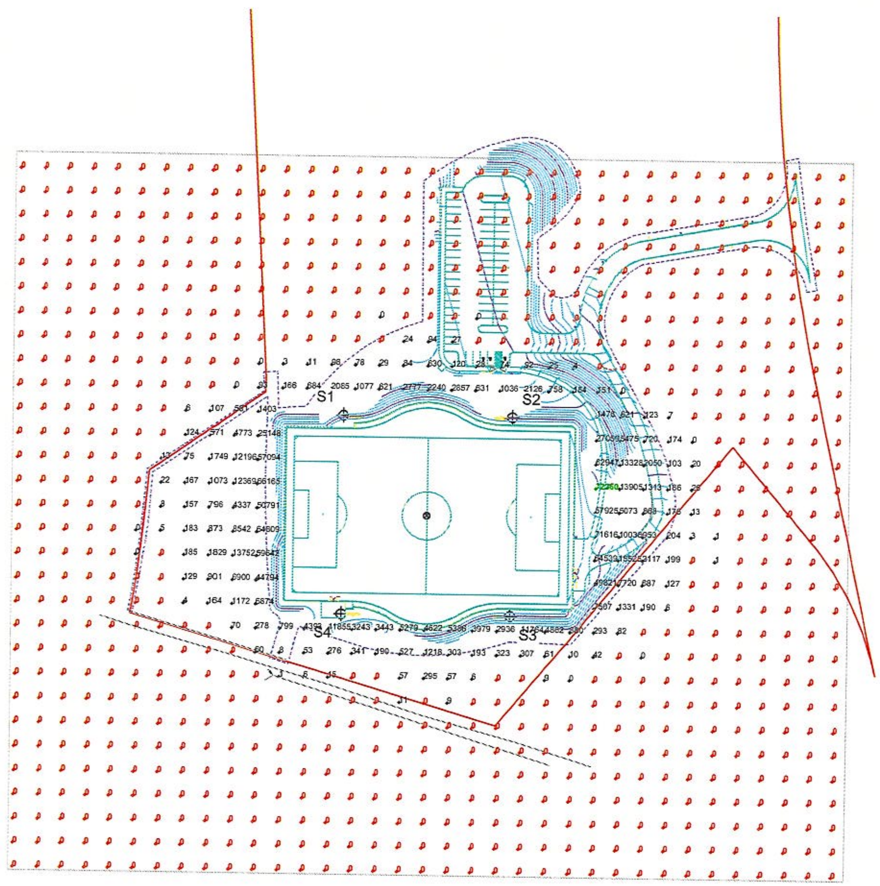
EQUIPMENT LIST FOR AREAS SHOWN

Pole				Luminaires				
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LUMINAIRE TYPE	QTY / POLE	THIS GRID	OTHER GRIDS
4	S1-S4	70'	-4'	66'	TLC-LED-1150	6	6	0
4	TOTALS					24	24	0



SCALE IN FEET 1 : 150

0' 150' 300'

ENGINEERED DESIGN By: Markie Roake • File #191248AR1 • 21-Jan-19

Pole location(s) ⊕ dimensions are relative to 0,0 reference point(s) ⊗

Loker Soccer Field

Wayland, MA

GRID SUMMARY

Name:	Zero Grid
Spacing:	30.0' x 30.0'
Height:	3.0' above grade

ILLUMINATION SUMMARY

MAINTAINED CANDELA (PER FIXTURE)

	Entire Grid
Scan Average:	1110.90
Maximum:	72360
Minimum:	0
Avg / Min:	-
Max / Min:	-
UG (adjacent pts):	6264.35
CU:	0.01
No. of Points:	933

LUMINAIRE INFORMATION

Color / CRI:	5700K - 75 CRI
Luminaire Output:	121,000 lumens
No. of Luminaires:	24
Total Load:	27.6 kW

Lumen Maintenance

Luminaire Type	L90 hrs	L80 hrs	L70 hrs
TLC-LED-1150	>81,000	>81,000	>81,000

Reported per TM-21-11. See luminaire datasheet for details.

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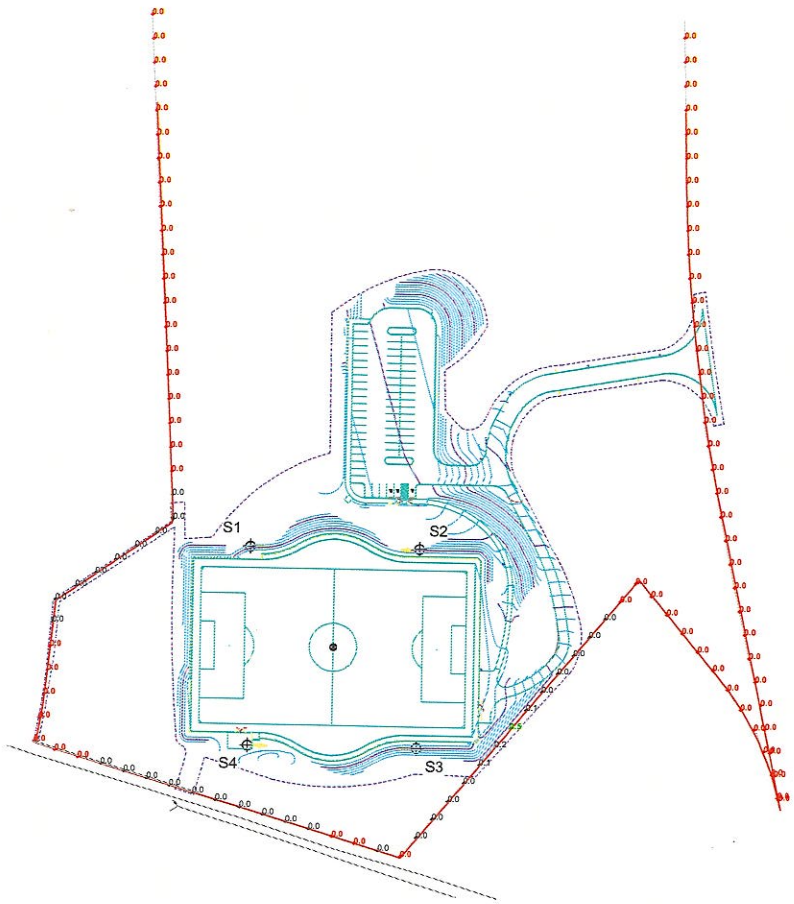
ILLUMINATION SUMMARY

EQUIPMENT LIST FOR AREAS SHOWN

	Pole				Luminaires			
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LUMINAIRE TYPE	QTY / POLE	THIS GRID	OTHER GRIDS
4	S1-S4	70'	-4'	66'	TLC-LED-1150	6	6	0
4	TOTALS					24	24	0



SCALE IN FEET 1 : 150
0' 150' 300'

Loker Soccer Field
Wayland,MA

GRID SUMMARY
Name: Property Line
Spacing: 30.0'
Height: 3.0' above grade

ILLUMINATION SUMMARY
MAINTAINED HORIZONTAL FOOTCANDLES

	Entire Grid
Scan Average:	0.0085
Maximum:	0.46
Minimum:	0.00
No. of Points:	109

LUMINAIRE INFORMATION

Color / CRI: 5700K - 75 CRI
Luminaire Output: 121,000 lumens
No. of Luminaires: 24
Total Load: 27.6 kW

Lumen Maintenance

Luminaire Type	L90 hrs	L80 hrs	L70 hrs
TLC-LED-1150	>81,000	>81,000	>81,000

Reported per TM-21-11. See luminaire datasheet for details.

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Installation Requirements: Results assume ± 3% nominal voltage at line side of the driver and structures located within 3 feet (1m) of design locations.

Pole location(s) ⊕ dimensions are relative to 0,0 reference point(s) ⊗

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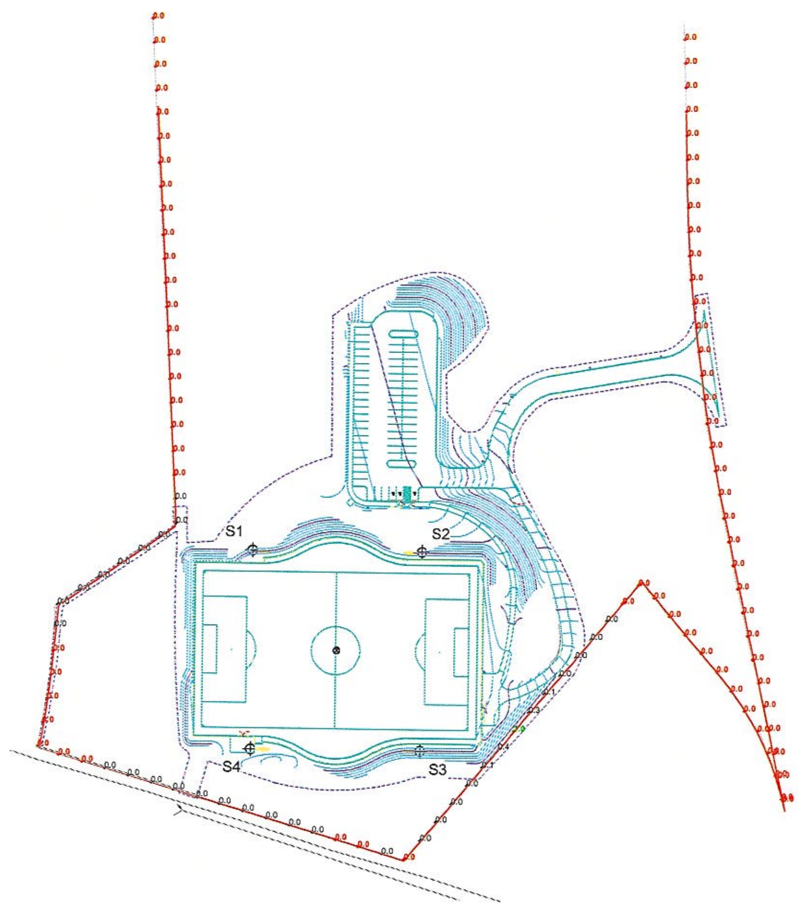
EQUIPMENT LIST FOR AREAS SHOWN

QTY	Pole: LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	Luminaires: LUMINAIRE TYPE	QTY / POLE	THIS GRID	OTHER GRIDS
4	S1-S4	70'	-4'	66'	TLC-LED-1150	6	6	0
4	TOTALS					24	24	0



SCALE IN FEET 1 : 150

0' 150' 300'

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Loker Soccer Field

Wayland,MA

GRID SUMMARY

Name: Property Line
Spacing: 30.0'
Height: 3.0' above grade

ILLUMINATION SUMMARY

MAINTAINED MAX VERTICAL FOOTCANDLES

	Entire Grid
Scan Average:	0.0172
Maximum:	0.95
Minimum:	0.00
No. of Points:	109

LUMINAIRE INFORMATION

Color / CRI: 5700K - 75 CRI
Luminaire Output: 121,000 lumens
No. of Luminaires: 24
Total Load: 27.6 kW

Lumen Maintenance

Luminaire Type	L90 hrs	L80 hrs	L70 hrs
TLC-LED-1150	>81,000	>81,000	>81,000

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Pole location(s) ⊕ dimensions are relative to 0,0 reference point(s) ⊗

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EQUIPMENT LIST FOR AREAS SHOWN

Pole				Luminaires				
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LUMINAIRE TYPE	QTY / POLE	THIS GRID	OTHER GRIDS
4	S1-S4	70'	-4'	66'	TLC-LED-1150	6	6	0
4			TOTALS			24	24	0

Loker Soccer Field

Wayland,MA

GRID SUMMARY

Name: Property Line
Spacing: 30.0'
Height: 3.0' above grade

ILLUMINATION SUMMARY

MAINTAINED CANDELA (PER FIXTURE)

	Entire Grid
Scan Average:	330.0715
Maximum:	15108.77
Minimum:	0.00
No. of Points:	109

LUMINAIRE INFORMATION

Color / CRI:	5700K - 75 CRI
Luminaire Output:	121,000 lumens
No. of Luminaires:	24
Total Load:	27.6 kW

Lumen Maintenance

Luminaire Type	L90 hrs	L80 hrs	L70 hrs
TLC-LED-1150	>81,000	>81,000	>81,000

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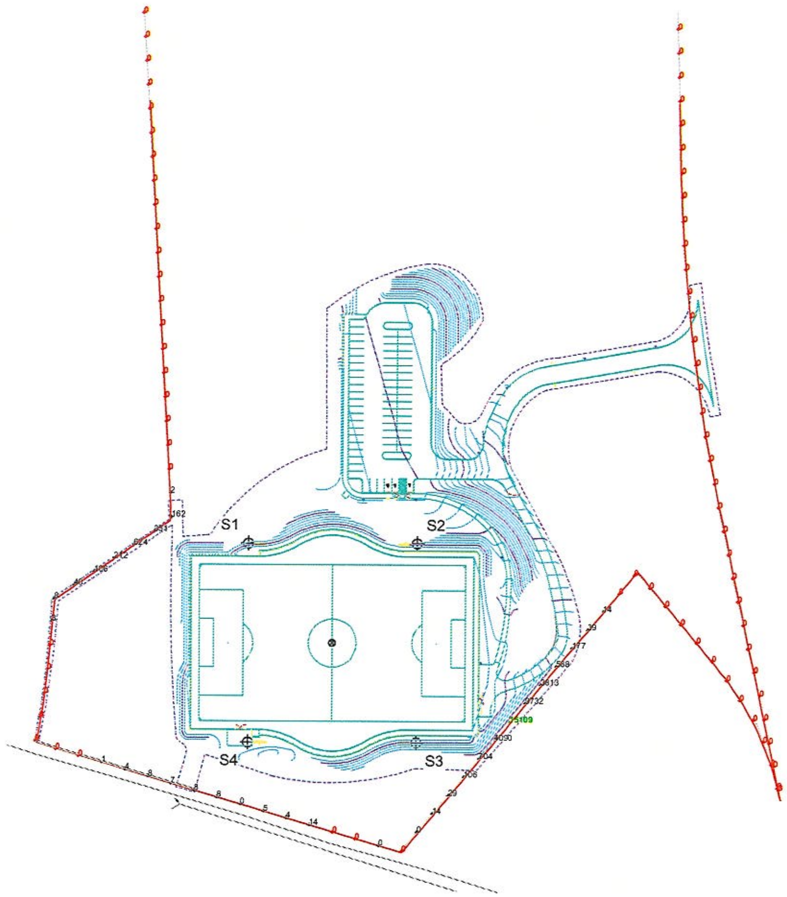

SCALE IN FEET 1 : 150

0' 150' 300'

Pole location(s) ⊕ dimensions are relative to 0,0 reference point(s) ⊗

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Loker Soccer Field

Wayland,MA

EQUIPMENT LAYOUT

INCLUDES:
- Soccer

Electrical System Requirements: Refer to Amperage Draw Chart and/or the **"Musco Control System Summary"** for electrical sizing.

Installation Requirements: Results assume ± 3% nominal voltage at line side of the driver and structures located within 3 feet (1m) of design locations.

EQUIPMENT LIST FOR AREAS SHOWN

Pole				Luminaires		
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LUMINAIRE TYPE	QTY / POLE
4	S1-S4	70'	-4'	66'	TLC-LED-1150	6
4				TOTALS		24

SINGLE LUMINAIRE AMPERAGE DRAW CHART

Ballast Specifications (.90 min power factor)	Line Amperage Per Luminaire (max draw)						
Single Phase Voltage	208 (60)	220 (60)	240 (60)	277 (60)	347 (60)	380 (60)	480 (60)
TLC-LED-1150	6.8	6.5	5.9	5.1	4.1	3.7	3.0

Pole location(s) ⊕ dimensions are relative to 0,0 reference point(s) ⊗

MUSCO Lighting

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Loker Soccer Field

Wayland,MA

GLARE IMPACT

Summary

Map indicates the maximum candela an observer would see when facing the brightest light source from any direction.

A well-designed lighting system controls light to provide maximum useful on-field illumination with minimal destructive off-site glare.

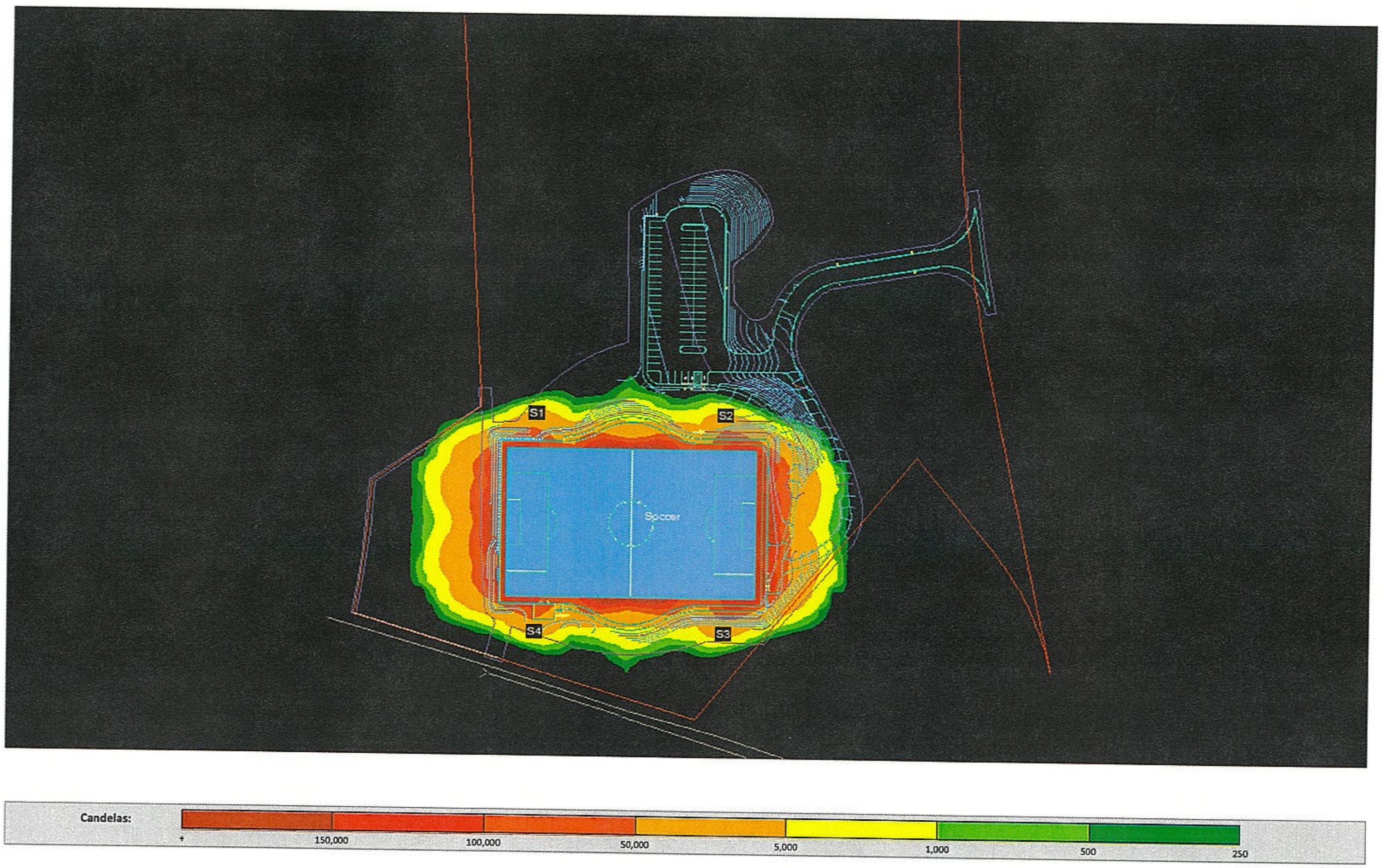
GLARE

Candela Levels

High Glare: 150,000 or more candela
Should only occur on or very near the lit area where the light source is in direct view. Care must be taken to minimize high glare zones.

Significant Glare: 25,000 to 75,000 candela
Equivalent to high beam headlights of a car.

Minimal to No Glare: 500 or less candela
Equivalent to 100W incandescent light bulb.



MUSCO Lighting

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