



Notice of Intent
River Street Lofts Condominium
Haverhill, Massachusetts

Prepared for

Vincent O'Rourke
400 Chadwick Road
Bradford, MA. 01835

May 11, 2006

Prepared by



MERRIMACK ENGINEERING SERVICES, Inc.
66 Park Street
Andover, Massachusetts 01810
planners • engineers • surveyors

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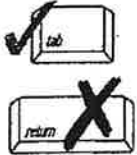
**Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands**

WPA Form 3 – Notice of Intent

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

Provided by DEP:
DEP File Number _____
Document Transaction Number _____
Haverhill
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.



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

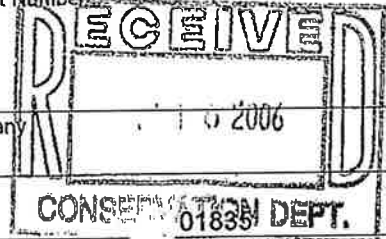
A. General Information

1. Project Location (Note: electronic filers will click on button for GIS locator):

#88 River Street
a. Street Address
Haverhill
b. City/Town
01832
c. Zip Code
42°-46'-13"
d. Latitude
71°-05'-21"
e. Longitude
Map-501, Bk. 227
f. Assessors Map/Plat Number
Lot 4 & 5
g. Parcel /Lot Number

2. Applicant:

Vincent
a. First Name
O'Rourke
b. Last Name
c. Company
400 Chadwick Road
d. Mailing Address
Bradford
e. City/Town
MA.
f. State
617-839-2070
h. Phone Number
617-303-3812
i. Fax Number
j. Email address
g. Zip Code 01835
DEPT.



3. Property owner (if different from applicant):

Check if more than one owner

Same
a. First Name
b. Last Name
c. Company
d. Mailing Address
e. City/Town
f. State
g. Zip Code
h. Phone Number
i. Fax Number
j. Email address

4. Representative (if any):

Merrimack Engineering Services, Inc.
a. Firm
John
b. Contact Person First Name
Murphy
c. Contact Person Last Name
66 Park Street
d. Mailing Address
Andover
e. City/Town
MA.
f. State
978)475-3555
h. Phone Number
(978)475-1448
i. Fax Number
merreng@aol.com
j. Email address
01810
g. Zip Code

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

\$1,575.00
a. Total Fee Paid
\$775.00
b. State Fee Paid
\$1,627.50
c. City/Town Fee Paid

6. General Project Description:

Construction of one (1) Residential 7-story building with infrastructure and parking within the 100-year flood plain (Redevelopment Project).



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A. General Information (continued)

7. Project Type Checklist:

- a. Single Family Home
- b. Residential Subdivision
- c. Limited Project Driveway Crossing
- d. Commercial/Industrial
- e. Dock/Pier
- f. Utilities
- g. Coastal Engineering Structure
- h. Agriculture – cranberries, forestry
- i. Transportation
- j. Other

8. Property recorded at the Registry of Deeds for:

ESDRD _____

a. County

11878 _____

c. Book

34 _____

b. Page Number

d. Certificate # (if registered land)

9. Has work been performed on the property under an Order of Resource Area Delineation involving Simplified Review within 3 years of the date of this application?

- a. Yes b. No

If yes, no Notice of Intent or Request for Determination of Applicability may be filed for work within the 50-foot-wide area in the Buffer Zone along the resource area during the three-year term of an Order of Resource Area Delineation, or any Extended Order, or until the applicant receives a Certificate of Compliance, whichever is later.

10. Buffer Zone Only - Is the project located only in the Buffer Zone of a bordering vegetated wetland, inland bank, or coastal resource area?

- a. Yes - answer 11 below, then skip to Section C.
 b. No - skip to Section B.

11. Buffer Zone Setback – For projects that involve work only in the buffer zone, select the applicable adjacent resource area (check one):

- a. BVW b. inland bank c. coastal resource area

The distance between the closest project disturbance and the associated resource area is:

5 _____

d. linear feet



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B. Resource Area Effects

1. Inland 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.

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

<u>Resource Area</u>	<u>Size of Proposed Alteration</u>	<u>Proposed Replacement (if any)</u>
a. <input checked="" type="checkbox"/> Bank	0 1. linear feet	0 2. linear feet
b. <input type="checkbox"/> Bordering Vegetated Wetland	1. square feet	2. square feet
c. <input type="checkbox"/> Land Under Waterbodies and Waterways	1. square feet 3. cubic yards dredged	2. square feet
d. <input checked="" type="checkbox"/> Bordering Land Subject to Flooding	6,136 1. square feet 1,346.24 3. cubic feet of flood storage lost	6,136 2. square feet 2,010.32 4. cubic feet of flood storage replaced
e. <input type="checkbox"/> Isolated Land Subject to Flooding	1. square feet 2. cubic feet of flood storage lost	3. cubic feet of flood storage replaced
f. <input checked="" type="checkbox"/> Riverfront area	Merrimack River 1. Name of Waterway (if available)	

For projects impacted by the riverfront area and a buffer zone of another resource area, add 50% to the total fee.

1. Width of Riverfront Area (check one):

- 25 ft. - Designated Densely Developed Areas only
- 100 ft. - New agricultural projects only
- 200 ft. - All other projects

2. Total area of Riverfront Area on the site of the proposed project:

6,349
Square Feet

3. Proposed alteration of the Riverfront Area:

6,349	6,349	0
a. Total Square Feet	b. Square Feet within 100 ft.	c. Square Feet between 100 ft. and 200 ft.

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

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



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Provided by DEP:

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 City/Town

B. Resource Area Effects

2. Coastal Resource Areas:

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.

<u>Resource Area</u>	<u>Size of Proposed Alteration</u>	<u>Proposed Replacement (if any)</u>
a. <input type="checkbox"/> Designated Port Areas	Indicate size under Land Under the Ocean, below	
b. <input type="checkbox"/> Land Under the Ocean	1. Square feet _____ 2. Cubic yards dredged _____	
c. <input type="checkbox"/> Barrier Beach	Indicate size under Coastal Beaches and/or Coastal Dunes below	
d. <input type="checkbox"/> Coastal Beaches	1. Square feet _____	2. Cubic yards beach nourishment _____
e. <input type="checkbox"/> Coastal Dunes	1. Square feet _____	2. Cubic yards dune nourishment _____
f. <input type="checkbox"/> Coastal Banks	1. Linear feet _____	
g. <input type="checkbox"/> Rocky Intertidal Shores	1. Square feet _____	
h. <input type="checkbox"/> Salt Marshes	1. Square feet _____	2. Sq ft restoration, rehab., or creation _____
i. <input type="checkbox"/> Land Under Salt Ponds	1. Square feet _____ 2. Cubic yards dredged _____	
j. <input type="checkbox"/> Land Containing Shellfish	1. Square feet _____	2. Square feet restoration, rehab. _____
k. <input type="checkbox"/> 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. <input type="checkbox"/> Land Subject to Coastal Storm Flowage	1. Square feet _____	

3. Limited Project:

Is any portion of the proposed activity eligible to be treated as a limited project subject to 310 CMR 10.24 or 310 CMR 10.53?

a. Yes No If yes, describe which limited project applies to this project:

b. Limited Project



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C. Bordering Vegetated Wetland Delineation Methodology

Check all methods used to delineate the Bordering Vegetated Wetland (BWW) boundary:

1. Final Order of Resource Area Delineation issued by Conservation Commission or DEP (attached)
2. DEP BWW Field Data Form (attached)
3. Final Determination of Applicability issued by Conservation Commission or DEP (attached)
4. Other Methods for Determining the BWW Boundary (attach documentation):
 - a. 50% or more wetland indicator plants
 - b. Saturated/inundated conditions exist
 - c. Groundwater indicators
 - d. Direct observation
 - e. Hydric soil indicators
 - f. Credible evidence of conditions prior to disturbance
5. Other resource areas delineated: Top of Bank (Riverfront)/Flood plain

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

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

D. Other Applicable Standards and Requirements

1. Is any portion of the proposed project located in estimated habitat as indicated on the most recent Estimated Habitat Map of State-Listed Rare Wetland Wildlife published by the Natural Heritage and Endangered Species Program?
 - 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
 Route 135, North Drive
 Westborough, MA 01581
2. For coastal projects only, is any portion of the proposed project located below the mean high water line or in a fish run?
 - a. Yes No If yes, include proof of mailing or hand delivery of NOI to:
 Division of Marine Fisheries - Southeast Marine Fisheries Station
 50A Portside Drive
 Pocasset, MA 02559
 - b. Not applicable - project is in inland resource area only
3. 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 DEP Website for ACEC locations). Note: electronic filers click on Website.

b. ACEC



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D. Other Applicable Standards and Requirements

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 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

5. Is any activity within any Resource Area or Buffer Zone exempt from performance standards of the wetlands regulations, 310 CMR 10.00.
- a. Yes No If yes, describe which exemption applies to this project:

b. Exemption

6. Is this project subject to the DEP Stormwater Policy? a. Yes No
- If yes, stormwater management measures are required. Applicants should complete the Stormwater Management Form and submit it with this form.

b. If no, explain why the project is exempt:

Redevelopment Project

E. Additional Information

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.
3. Other material identifying and explaining the determination of resource area boundaries shown on plans (e.g., a DEP BVW Field Data Form).
4. List the titles and dates for all plans and other materials submitted with this NOI.
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 Management Form, if needed.



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F. Fees

The fees for work proposed under each Notice of Intent must be calculated and submitted to the Conservation Commission and the Department (see Instructions and NOI Wetland Fee Transmittal Form).

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:

1. Municipal Check Number	<u>605</u>	2. Check date	<u>5/10/06</u>
3. State Check Number	<u>606</u>	4. Check date	<u>5/10/06</u>
5. Payor name on check: First Name	<u>Vincent</u>	6. Payor name on check: Last Name	<u>O'Rourke</u>

G. 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 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.

Signature of Applicant	<u>[Signature]</u>	Date	<u>5/12/06</u>
Signature of Property Owner (if different)	<u>[Signature]</u>	Date	<u>5/12/06</u>
Signature of Representative (if any)	<u>[Signature]</u>	Date	<u>May 11, 2006</u>

For Conservation Commission:

Two copies of the completed Notice of Intent (Form 3), including supporting plans and documents; two copies of pages 1 and 2 of the NOI Wetland Fee Transmittal Form; and the city/town fee payment must be sent to the Conservation Commission by certified mail or hand delivery.

For DEP:

One copy of the completed Notice of Intent (Form 3), including supporting plans and documents; one copy of pages 1 and 2 of the NOI Wetland Fee Transmittal Form; and a copy of the state fee payment must be sent to the DEP Regional Office (see Instructions) by certified mail or hand delivery. (E-filers may submit these electronically.)

Other:

If the applicant has checked the "yes" box in any part of Section D, 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.

VINCENT P. O'RORKE
 48 DUNDON ROAD
 SANDFORD, MA 01888


606
 65-0883/2115
 BRANCH 1 LC

5/25/06
date

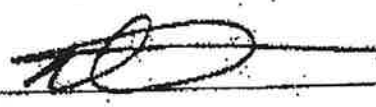
Pay to the order of Commonwealth of Mass. \$ 775.00

SEVEN HUNDRED SEVENTY FIVE Dollars

NOT VALID UNDER \$500.00

 100 Liberty Drive, Lowell, MA 01850

For RIVER ST.



⑆211385358⑆ 34311655⑆ 0606

VINCENT P. O'RORKE
 48 DUNDON ROAD
 SANDFORD, MA 01888


606
 65-0883/2115
 BRANCH 1 LC

5/20/06
date

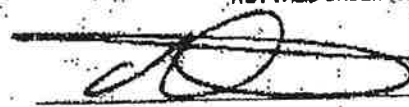
Pay to the order of CITY OF MAUNTSVILLE \$ 1627.50

ONE THOUSAND TWENTY SEVEN Dollars

NOT VALID UNDER \$500.00

 100 Liberty Drive, Lowell, MA 01850

For RIVER ST.



⑆211385358⑆ 34311655⑆ 0606



Massachusetts Department of Environmental Protection
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NOI Wetland Fee Transmittal Form
 Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

A. Applicant Information

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



1. Applicant:

Vincent O'Rourke _____
 a. First Name b. Last Name c. Company
400 Chadwick Road
 d. Mailing Address
Bradford MA. 01835
 e. City/Town f. State g. Zip Code
617-839-2070
 h. Phone Number

2. Property Owner (if different):

Same _____
 a. First Name b. Last Name c. Company

 d. Mailing Address

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

 h. Phone Number

3. Project Location:

#88 River Street Haverhill
 a. Street Address b. City/Town

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

B. Fees

Notice of Intent (Form 3) or Abbreviated Notice of Intent (Form 4):

The fee should be calculated using the following six-step process and 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.



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

A. Property Information

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



Note:
This November 2000 version of the Stormwater Management Form supersedes earlier versions including those contained in DEP's Stormwater Handbooks.

1. The proposed project is:

- a. New development Yes No
- b. Redevelopment Yes No
- c. Combination Yes No (If yes, distinguish redevelopment components from new development components on plans).

2. Stormwater runoff to be treated for water quality is based on the following calculations:

- a. 1 inch of runoff x total impervious area of post-development site for discharge to **critical areas** (Outstanding Resource Waters, recharge areas of public water supplies, shellfish growing areas, swimming beaches, cold water fisheries).
- b. 0.5 inches of runoff x total impervious area of post-development site for other resource areas.

B. Stormwater Management Standards

DEP's Stormwater Management Policy (March 1997) includes nine standards that are listed on the following pages. Check the appropriate boxes for each standard and provide documentation and additional information when applicable.

Standard #1: Untreated stormwater

- a. The project is designed so that new stormwater point discharges do not discharge untreated stormwater into, or cause erosion to, wetlands and waters.

Standard #2: Post-development peak discharges rates

- a. Not applicable – project site contains waters subject to tidal action.

Post-development peak discharge does not exceed pre-development rates on the site at the point of discharge or downgradient property boundary for the 2-yr, 10-yr, and 100-yr, 24-hr storm.

- b. Without stormwater controls
- c. With stormwater controls designed for the 2-yr, and 10-yr storm, 24-hr storm.
- d. The project as designed will not increase off-site flooding impacts from the 100-yr, 24-hr storm.



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B. Stormwater Management Standards (cont.)

Standard #3: Recharge to groundwater

Amount of impervious area (sq. ft.) to be infiltrated: 5,029
 a. square feet

Volume to be recharged is based on:

b. The following Natural Resources Conservation Service hydrologic soils groups (e.g. A, B, C, D, or UA) or any combination of groups:

<u>100</u>	<u>A</u>		
1. % of impervious area	2. Hydrologic soil group	3. % of impervious area	4. Hydrologic soil group
<u> </u>	<u> </u>	<u> </u>	<u> </u>
5. % of impervious area	6. Hydrologic soil group	7. % of impervious area	8. Hydrologic soil group

c. Site specific pre-development conditions: 1. Recharge rate 2. Volume

d. Describe how the calculations were determined:

See Appendices

e. List each BMP or nonstructural measure used to meet Standard #3 (e.g. dry well, infiltration trench).

See Plans and Appendices

Does the annual groundwater recharge for the post-development site approximate the annual recharge from existing site conditions?

f. Yes No

Standard #4: 80% TSS Removal

a. The proposed stormwater management system will remove 80% of the post-development site's average annual Total Suspended Solids (TSS) load.

b. Identify the BMP's proposed for the project and describe how the 80% TSS removal will be achieved.

Grass Swale, catch basins w/ deep sump, gas-oil trap, parking lot sweeping



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B. Stormwater Management Standards (cont.)

c. If the project is redevelopment, explain how much TSS will be removed and briefly explain why 80% removal cannot be achieved.
 88.75% See TSS Appendix

Standard #5: Higher potential pollutant loads

See Stormwater Policy Handbook Vol. I, page I-23, for land uses of high pollutant loading (see Instructions).

Does the project site contain land uses with higher potential pollutant loads

a. Yes No b. If yes, describe land uses:

Parking Lot

c. Identify the BMPs selected to treat stormwater runoff. If infiltration measures are proposed, describe the pretreatment. (Note: If the area of higher potential pollutant loading is upgradient of a critical area, infiltration is not allowed.)

Infiltration system, deep sump catch basins with hoods, grass swale and parking lot sweeping.

Standard #6: Protection of critical areas

See Stormwater Policy Handbook Vol. I, page I-25, for critical areas (see Instructions).

Will the project discharge to or affect a critical area?

a. Yes No b. If yes, describe areas:

c. Identify the BMPs selected for stormwater discharges in these areas and describe how BMPs meet restrictions listed on pages I-27 and I-28 of the Stormwater Policy Handbook – Vol. I:



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B. Stormwater Management Standards (cont.)

Note: components of redevelopment projects which plan to develop previously undeveloped areas do not fall under the scope of Standard 7.

Standard #7: Redevelopment projects

Is the proposed activity a redevelopment project?

a. Yes No

b. If yes, the following stormwater management standards have been met:

Stormwater control devices have been provided on the site, such that standards #1,2,3,7,8 & 9 have been met.

c. The following stormwater standards have not been met for the following reasons:

whereas the previous developed site did not have any pollution mitigation, this redevelopment will treat stormwater, prior to discharge.

d. The proposed project will reduce the annual pollutant load on the site with new or improved stormwater control.

Standard #8: Erosion/sediment control

a. Erosion and sediment controls are incorporated into the project design to prevent erosion, control sediments, and stabilize exposed soils during construction or land disturbance.

Standard #9: Operation/maintenance plan

a. An operation and maintenance plan for the post-development stormwater controls have been developed. The plan includes ownership of the stormwater BMPs, parties responsible for operation and maintenance, schedule for inspection and maintenance, routine and long-term maintenance responsibilities, and provision for appropriate access and maintenance easements extending from a public right-of-way to the stormwater controls.

Operation and Maintenance Plan

b. Plan/Title

May 11, 2006

c. Date

d. Plan/Title

e. Date



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C. Submittal Requirements

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

DEP recommends that applicants submit this form, as well as, supporting documentation and plans, with the Notice of Intent to provide stormwater management information for Commission review consistent with the wetland regulations (310 CMR 10.05 (6)(b)) and DEP's Stormwater Management Policy (March 1997). If a particular stormwater management standard cannot be met, information should be provided to demonstrate how equivalent water quality and water quantity protection will be provided. DEP encourages engineers to use this form to certify that the project meets the stormwater management standards as well as acceptable engineering standards. For more information, consult the Stormwater Management Policy.

D. Signatures

Vincent O'Rourke
Applicant Name

5/17/06
Date

Signature

John R. Murphy
Representative (if any)

May 11, 2006
Date

Signature

May 11, 2006

CITY OF HAVERHILL
MASSACHUSETTS 01830-5882

CONSERVATION COMMISSION
City Hall, 4 Summer Street
Room 205
Tel: (978) 374-2334
Fax: (978) 374-2315

LOCAL FILING FEE CALCULATION FORM

TOTAL STATE FEE REQUIRED FOR PROJECT:

Total State Fee required for project (following Riverfront Area adjustment) \$1,575.00

State share of State Fee \$775.00

Local share of State Fee \$800.00

TOTAL ADDITIONAL LOCAL FEE REQUIRED FOR PROJECT:

Local Fee = $0.50 \times$ Total State Fee required for project (following Riverfront Area adjustment)

Local Fee = \$787.50

Local Advertising Fee (if applicable*) = \$40.00

Total Local Fee required for project = Local Fee + Local Advertising Fee

Total Local Fee required for project = $\$800.00 + \$787.50 + \$40.00 = \$1,627.50$

CUMULATIVE TOTAL OF FEES REQUIRED FOR PROJECT:

Cumulative total of fees required for project = Total State Fee + Total Local Fee

Cumulative total of fees = \$2,402.50

Cumulative total fees paid to City of Haverhill \$1,627.50

Cumulative total fees paid to Commonwealth of Massachusetts \$775.00

* Local Advertising Fee is applicable to Requests for Determinations of Applicability, Abbreviated Notices of Resource Area Delineation, Notices of Intent, and Requests for Modifications. For continued items this fee must be paid at the time of submittal of all requests to be returned to agendas (see Policy 2000-01 for application and submittal deadline information).

May 11, 2006

CITY OF HAVERHILL
MASSACHUSETTS 01830-5882

CONSERVATION COMMISSION
City Hall, 4 Summer Street
Room 205
Tel: (978) 374-2334
Fax: (978) 374-2315

MUNICIPAL ORDINANCE - CHAPTER 253
APPLICATION CHECKLIST
NOTICE OF INTENT

APPLICANT Vincent O'Rourke, 400 Chadwick Road, Bradford, MA. 01835.

PROPERTY OWNER Same

REPRESENTATIVE Merrimack Engineering Services, Inc. - 66 Park Street - Andover, Ma. 01810

LOCATION (STREET ADDRESS)

ASSESSOR'S MAP 501 BLOCK 227 LOT 4 & 5

A completed Form 3 - revised July 13, 2004

An 8 1/2" x 11" section of the USGS quadrangle (topo) sufficiently identifying the location of the property

An appropriately sized section of the Assessor's map sufficiently identifying the property and all other properties within 300' of the property

Plans and calculations clearly describing the location and nature of the work

Plans showing compliance with Title 5 of the state Environmental Code for the proposed septic system, if applicable (i.e., if any work is proposed in the buffer zone or land subject to flooding)

Confirmation that a copy of the NOI was sent to the Massachusetts Natural Heritage and Endangered Species Program (one copy)

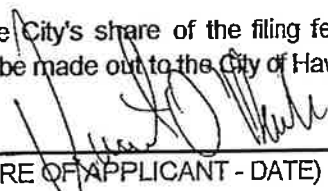
Affidavit of Service for Abutter Notification (one copy)

Application Agreement

_____ Other: _____

I, Vincent O'Rourke hereby certify that eleven (11) copies
(NAME OF APPLICANT)

(except as noted) of the above information and the City's share of the filing fee have been submitted to the Haverhill Conservation Commission. (Checks should be made out to the City of Haverhill).



SIGNATURE OF APPLICANT - DATE

5/12/06

May 11, 2006

CITY OF HAVERHILL

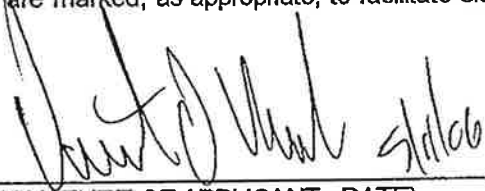
MASSACHUSETTS 01830-5882

CONSERVATION COMMISSION
City Hall, 4 Summer Street
Room 205
Tel: (978) 374-2334
Fax: (978) 374-2315

MUNICIPAL ORDINANCE-CHAPTER 253
APPLICATION AGREEMENT
NOTICE OF INTENT

I, Vincent O'Rourke have read the Department of Environmental
(NAME OF APPLICANT)

Protection's "Instructions for Completing Application" and the City's Municipal Ordinance under Chapter 253, with all applicable regulations and policies, for the filing of a Notice of Intent with the Haverhill Conservation Commission and agree to its terms and conditions, as amended. As required by the Commission, the wetland resource area(s) are flagged, the corners of proposed structures and leaching systems are staked, and the centerline of proposed roadway(s) and/or driveway(s) are marked, as appropriate, to facilitate site inspections by Commissioners and Conservation Staff.



(SIGNATURE OF APPLICANT - DATE)

I, Vincent O'Rourke hereby grant the Haverhill Conservation Commission
(NAME OF PROPERTY OWNER)

and it's officials' permission to enter upon my property at #88 River Street
(STREET ADDRESS AND

Map 501, Blk. 227, Lot 4 & 5 to review the filed Notice of Intent and future site
ASSESSOR'S MAP, BLOCK, LOT)

conditions for compliance with the issued Order of Conditions. The sole purpose of this document is to allow Commissioners and their officials to perform their duties under the Wetlands Protection Act (M.G.L. c. 131 s. 40) and the City's Municipal Ordinance under Chapter 253.



(SIGNATURE OF APPLICANT - DATE)

Client/Location: Vincent O'Rourke, 400 Chadwick Road, Bradford, MA 01835

#88 River Street - Haverhill

ABUTTERS LIST

Job No: 5047 Page 1 of 2

Map	Block	Lot	NAME	ADDRESS
500	228	2A	William H. Ryan	16 Concord Street-Haverhill, MA, 01830
500	228	6	City of Haverhill	4 Summer Street-Haverhill, MA 01830
500	228	6A	Michael Paszko	232 Salem Street-Bradford, MA. 01835
500	228	5	Daher Group Inc.	235 East Street-Methuen, MA 01844
500	229	4A	Richard J. Hamel, etux	61 Pollard Road-Plaistow, N.H. 03865
500	229	5	WHP, Inc.	290 Vanderbilt Avenue-Norwood MA. 02062
500	229	7	Antidio Vargas	12 Seventh Avenue-Haverhill, 01830
501	228	1	Academy Realty Trust	110 Market Street-Amesbury, MA. 01913
501	228	10-1	Krystal Baudin	119 River Street-Haverhill, MA. 01832
501	228	10-2	Robin Simmons	119 River Street-Haverhill, MA. 01832
501	228	10-3	Thomas J. Michal, Jr.	119 River Street Unit C-Haverhill, MA. 01832
501	228	11	Rice Exchange Trust-Exchange Trust Author LLP	427 East Broadway-Haverhill, MA. 01830
501	228	26	Carde Phillips-et al	246 Washington Street-Haverhill, MA. 01832
501	228	25	Leoncio Gonzalez	252 Washington Street-Haverhill, MA. 01832
501	228	24A	Juan Pascual	29 Crescent Street-Lawrence, MA. 01841
501	228	24	LEM Realty Co-Inc.	P.O Box 230-Haverhill, MA. 01831
501	228	26A	Gustavo Jose Garcia	3 Avon Place-Haverhill, MA. 01832
501	228	27	Gustavo Jose Garcia	3 Avon Place-Haverhill, MA. 01832
501	228	28	Jacksinkis Yapor-etux	4 Avon Place-Haverhill, MA. 01832
501	228	29	First National Realty Trust Of Haverhill	P.O. Box 923-Haverhill, MA. 01831
501	228	3-1	Walcare Realty Trust	77 River Street Unit #8-Haverhill, MA. 01832
501	228	3-2	Walcare Realty Trust	77 River Street Unit #8-Haverhill, MA. 01832
501	228	3-3	Mary Lou Bean	77 River Street Unit #3-Haverhill, MA. 01832
501	228	3-4	Arthur W. Lyons, III	167 Lowell Street-Andover, MA. 01810
501	228	3-5	John G. Everett	75 River Street Unit #5-Haverhill, MA. 01832
501	228	3-6	Walter Fortier	75 River Street Unit #6-Haverhill, MA. 01832
501	228	3-7	Jennifer Meserve	75 River Street Unit #7-Haverhill, MA. 01832
501	228	3-8	Daniel M. Fasulo, Jr.-etal	77 River Street Unit #8-Haverhill, MA. 01832
501	228	30	Robert J. Lapiere	P.O. Box 14-Haverhill, MA. 01831
501	228	31	Lepido Vasques-et al	230 Washington Street-Haverhill, MA. 01832
501	228	32	Paszko Family Realty Trust	232 Salem Street-Bradford, MA. 01835
501	228	33	Stephen Santoro-et al	P.O. Box 535-Haverhill, MA. 01831
501	228	4	Joseph P. DiBurro	3 Williams Street-Salem, N.H. 03079
501	228	5	Leo R. Curtin	27 Casablanca Court-Haverhill, MA. 01832
501	228	8-1	Kevin V. Larocco	109 River Street Unit #1-Haverhill, MA. 01832
501	228	8-2	Robinette Woolridge	109-111 River Street Unit #2-Haverhill, MA. 01832
501	228	8-3	Carey L. Leathers-et al	109-111 River Street Unit #3-Haverhill, MA. 01832
501	228	9-1	Mathew Legner	113-115 River Street Unit #1-Haverhill, MA. 01832
501	228	9-2	Christopher Crowley	113 River Street-Haverhill, MA. 01832
501	228	9-3	Beth Holweger	113 River Street-Haverhill, MA. 01832

May 11, 2006

CITY OF HAVERHILL
MASSACHUSETTS 01830-5882

CONSERVATION COMMISSION
City Hall, 4 Summer Street
Room 205
Tel: (978) 374-2334
Fax: (978) 374-2315

MUNICIPAL ORDINANCE - CHAPTER 253
ABUTTER NOTIFICATION FORM
NOTICE OF INTENT

In accordance with the second paragraph of Massachusetts General Laws Chapter 131, Section 40 (the Wetlands Protection Act) and Haverhill Municipal Ordinance Chapter 253, section 5, you are hereby notified of the following.

- A. The name of the applicant is Vincent O'Rourke, 400 Chadwick Road, Bradford, MA 01835.
- B. Brief Project Description: Construction of one (1) Residential 7-story building with infrastructure and parking within the 100-year flood plain (Redevelopment Project).
- C. The applicant has filed a Notice of Intent with the Haverhill Conservation Commission seeking permission to remove, fill, dredge or alter an Area Subject to Protection Under the Wetlands Protection Act and/or Haverhill Municipal Ordinance Chapter 253 and/or to perform work within the buffer zone of such an Area.

- D. The address of the lot where the activity is proposed is #88 River Street
(INCLUDE STREET ADDRESS AND
Map 501, Blk. 227, Lot 4 & 5
ASSESSOR'S INFORMATION)

- E. Copies of the Notice of Intent may be examined at the Haverhill Conservation Department Office between the hours of 8 am and 4 pm from Monday through Friday.
For more information, call: (978) 374-2334.
Copies of the Notice of Intent may be obtained from either (check one) the applicant _____
or the applicant's representative X, by calling this telephone number (978)
475-3555 between the hours of 8am and 4pm on the following days of
the week: Monday - Friday.

- F. Information regarding the date, time, and place of the public hearing may be obtained from the Haverhill Conservation Department Office by calling this telephone number (978) 374-2334 between the hours of 8 am and 4 pm from Monday through Friday.

NOTE: Notice of the public hearing, including its date, time and place, will be published at least five (5) days in advance in the Haverhill Gazette newspaper.

NOTE: Notice of the public hearing, including its date, time, and place, will be posted in Haverhill City Hall not less than forty-eight (48) hours in advance.

NOTE: You may contact the Haverhill Conservation Commission or the Department of Environmental Protection Northeast Regional Office for more information about this application, the Wetlands Protection Act, or Haverhill Municipal Ordinance Chapter 253. To contact DEP, call (617) 654-6500.

May 11, 2006

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 Vincent O'Rourke, 400 Chadwick Road, Bradford, MA 01835.

B. The applicant has filed a Notice of Intent with the Conservation Commission for the municipality of Haverhill seeking permission to remove, fill, dredge or alter an Area Subject to Protection Under the Wetlands Protection Act (General Laws Chapter 131, Section 40).

C. The address of the lot where the activity is proposed is #88 River Street - Map 501, Blk. 227, Lot 4 & 5, Haverhill, Ma.

D. Copies of the Notice of Intent may be examined at Haverhill Conservation Commission City Hall, 4 Summer Street, Room 205 between the hours of 9:00 am and 4:00 pm on the following days of the week: Monday-Friday For more information, call (978) 374-2334 Check One: This is the applicant _____, representative _____ or other (specify): Approving Authority.

E. Copies of the Notice of Intent may be obtained from either (check one) the applicant _____, or the applicant's representative , by calling this telephone number (978) 475-3555 between the hours of 9:00 am and 4:00 pm on the following days of the week: Monday-Friday

F. Information regarding the date, time, and place of the public hearing may be obtained from: Haverhill Conservation Commission by calling this telephone number (978) 374-2334 between the hour's of 9:00 am and 4:00 pm on the following days of the week: Monday-Friday. This is the applicant _____, representative _____, or other (specify): Approving Authority

NOTE: Notice of the public hearing, including its date, time, and place, will be published at least five (5) days in advance in the Haverhill Gazette.
(name of newspaper)

NOTE: Notice of the public hearing, including its date, time, and place will be posted in the City or Town Hall not less than forty-eight (48) hours in advance.

NOTE: You also may contact your local Conservation Commission or the nearest Department of Environmental Protection Regional Office for more information about this application or the Wetland Protection Act. To contact DEP, call:

Central Region: (508) 792-7650

Northeast Region: (978) 694-3200

Southeast Region: (508) 946-2700

Western Region: (413) 784-1100

May 11, 2006

CITY OF HAVERHILL
MASSACHUSETTS 01830-5882

CONSERVATION COMMISSION
City Hall, 4 Summer Street
Room 205
Tel: (978) 374-2334
Fax: (978) 374-2315

MUNICIPAL ORDINANCE - CHAPTER 253
AFFIDAVIT OF SERVICE FOR ABUTTER NOTIFICATION
NOTICE OF INTENT

I, John R. Murphy hereby certify under the pains and
(NAME OF PERSON MAKING AFFIDAVIT)

penalties of perjury that on 05/11/06 I gave notification to all
(DATE)

abutters pursuant to the requirements of the second paragraph of Massachusetts General Laws Chapter 131,
Section 40 and Haverhill Municipal Ordinance Chapter 253, Section 5 in connection with the following matter:

A Notice of Intent filed under the Massachusetts Wetlands Protection Act and said ordinance by
Vincent O'Rourke, 400 Chadwick Road, Bradford, MA 01835 with the Haverhill
(NAME OF APPLICANT)

Conservation Commission on 05/11/06 for property
(DATE)
located #88 River Street - Map 501, Blk. 227, Lot 4 & 5
(STREET ADDRESS and ASSESSOR'S MAP, BLOCK, LOT)

A copy of the Abutter Notification Form sent and a list of the abutters to whom it was given, with their addresses
and Assessor's map information that corresponds with the submitted map section, are attached to this Affidavit of
Service.


NAME

Date: 05/11/06

May 11, 2006

AFFIDAVIT OF SERVICE

Under the Massachusetts Wetlands Protection Act

(To be submitted to the Massachusetts Department of Environmental Protection and the Conservation Commission when filing a Notice of Intent)

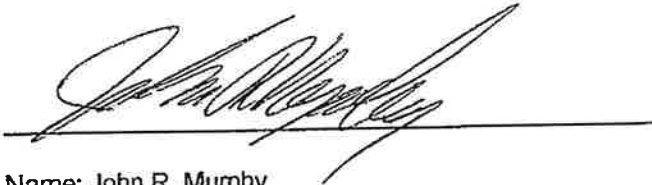
I, John R. Murphy hereby certify under the pains and penalties of perjury that on 05/11/06 I gave notification to abutters in compliance with the second paragraph of Massachusetts General Laws Chapter 131, Section 40, and the DEP Guide to Abutter Notification dated April 8, 1994, in connection with the following matter:

A Notice of Intent filed under the Massachusetts Wetlands Protection Act by Merimack Engineering Services, Inc. with the Haverhill Conservation Commission on 05/11/06 for the property located at

#88 River Street - City of Haverhill

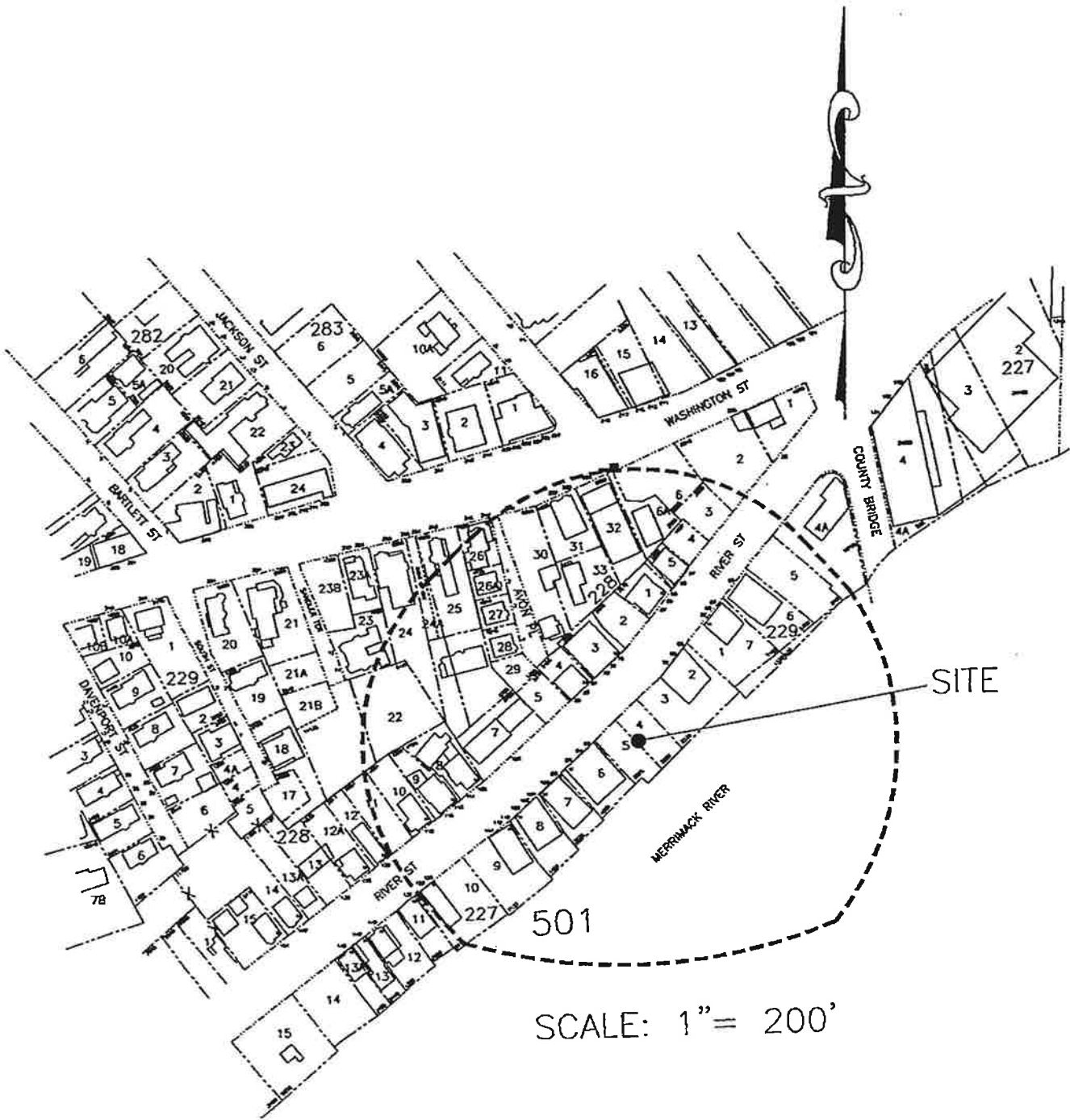
Map 501, Blk. 227, Lot 4 & 5

The form of the notification, and a list of the abutters to whom it was given and their addresses, are attached to this Affidavit of Service.



Name: John R. Murphy

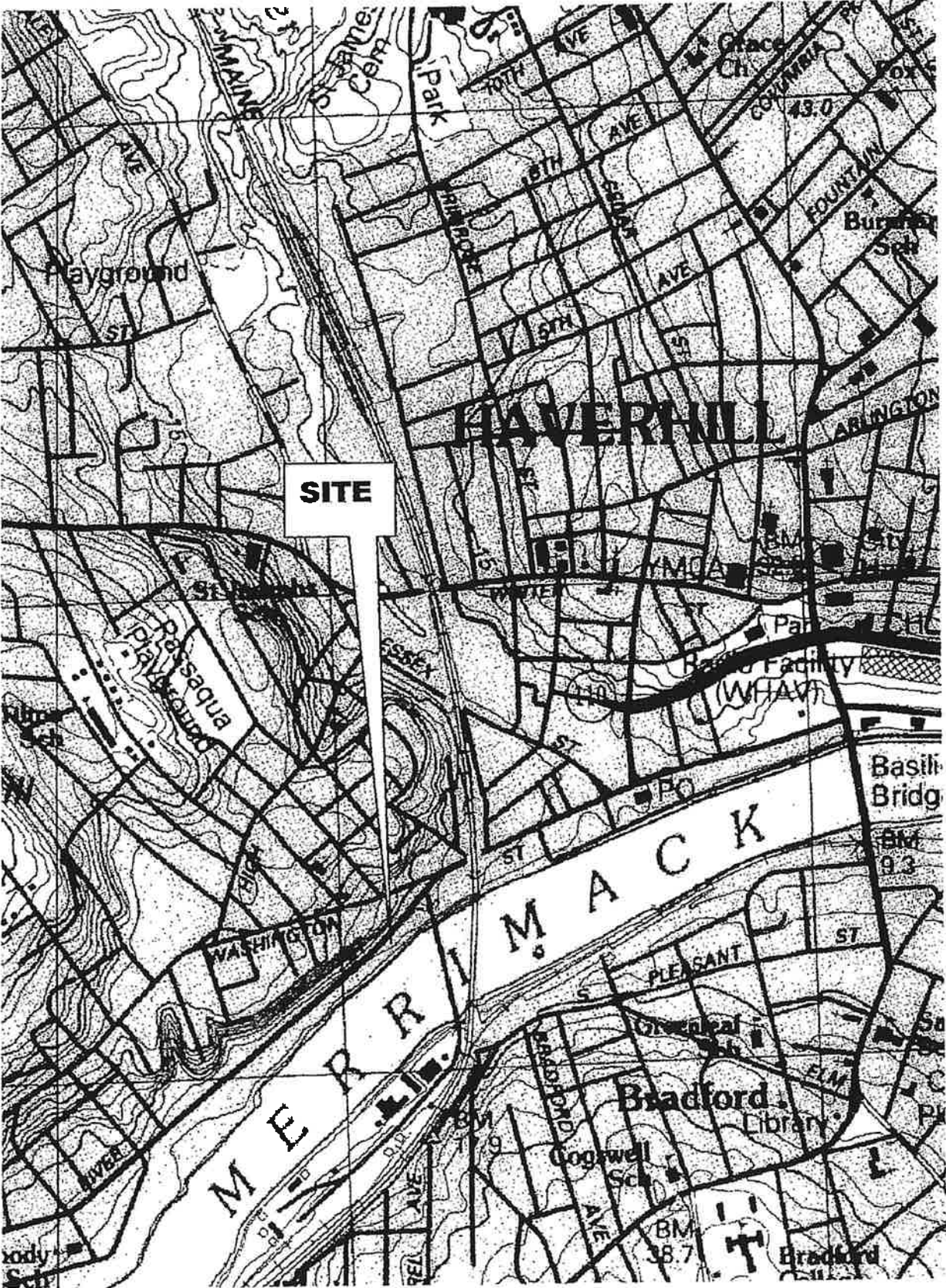
Date: 05/11/06



SITE

501

SCALE: 1" = 200'



USGS LOCUS MAP

May 11, 2006

Appendix A:
Project Narrative and Summary

Project Narrative Summary:

The project proponent intends to start construction of one (1) seven (7) story residential condominium building at the current location of #88 River Street in the fall of 2006. The site locus is further delineated as being westerly of the Upper County Bridge (under construction), and north of the Merrimack River. The parcel is 0.15 acres, of which 0.12 is currently developed or disturbed.

The site currently consists of a vacant lot with foundations and a significant amount of debris covering a significant portion of the site. The existing foundations and debris will be removed and replaced by a 7-story 5,029± s.f. building. Access to the new building (lower level parking) will make use of the existing driveway to the east of the site via an easement off River Street. The upper level parking area will have direct access from River Street. The proposed development will alter approximately 0.12 acres, and the remaining 0.03 acres will remain undeveloped. All parking will be proposed to conform to the Haverhill Zoning Code requirements.

The prior development and demolition of the previous structure has left the property completely degraded. The property is littered with debris, including metals, concrete, trash, and carpet. Redevelopment of the project as provided for in 310 CMR 10.58(5) will result in significant improvement over existing conditions. Stormwater management will be in compliance with the Stormwater Management Policy. Redevelopment will increase infiltration and improve runoff water quality.

Topographic elevations at the site range from a high of 29± feet at the northeasterly corner of the parcel to a low of 13± feet in the southeasterly corner of the parcel, a difference of 16± feet. The elevation datum base is U.S.G.S. M.S.L. The parcel is entirely located within the 100-year flood plain as depicted on Flood Insurance Rate Map, Community Panel 250085 0007B, dated February 16, 1983. The parcel is also entirely located within the 200' Riverfront Area of the Merrimack River. There are no perennial streams as defined on the U.S.G.S. plan of the parcel.

Research indicates the initial development of the property occurred prior to 1944. Assessor's records and deed references indicate the superstructure of the building was demolished in 1973. Portions of the original building foundations remain. Over the years the site has re-established vegetation and large areas of the property contain significant debris. A retaining wall at the southern most portion of the property delineates the bank of the River.

The applicant is proposing to remove the existing foundation walls and debris to construct the building and parking for the proposed housing units. The existing property on the east side of the site is currently under construction and has received an Order of Conditions from the Haverhill Conservation Commission. The drainage from the parking lot on the lower level of the proposed building will be collected in catch basins and directed to a proposed drain manhole on the adjacent property. The water will then be directed through an existing conduit and discharged into the Merrimack River. The proposed Recharge and Detention facility will discharge clean water and maintain the integrity and hydrologic function to the Merrimack River.

Soils within the vicinity of the project have been mapped by the USDA-NRCS (formerly SCS) and consist of Ur-Urban land series soils. This soil series are classified as being within the SCS-Hydrological Soils Group A. For the purposes of this report, cover conditions for each use are considered "good" based on an actual field investigation.

Project Description:

Municipal utilities are present in River Street. Available utilities include electricity, cable, telephone, sanitary sewer, stormwater drainage and municipal water. The utilities in the surrounding area exist in a sufficient capacity to support the construction of the residential condominium building with infrastructure and parking.

Water service for the new building will be provided by a connection to the city water system. The sewage generated in the building will be disposed of through a connection to the Municipal sanitary sewer system. The proposed stormwater management system for the project includes the installation of deep-sump, hooded catch basins, and a drainage channel that will collect runoff and direct it into a recharge/detention facility. Roof Runoff will be recharged into the groundwater through the use of the same recharge/detention facility. The proposed recharge/detention facility areas will mitigate the peak runoff rates from the project so that they will be equal to or less than the peak runoff rates under existing conditions for the 10-year storm event. Water quality will be further enhanced by the installation of a Stormceptor®.

Existing Conditions Hydrologic Analysis:

The analysis was performed using USDA Natural Resources Conservation Service (NRCS - formerly the Soil Conservation Service) Technical Release #20 (TR-20) methodologies within the HydroCad® computer program. This method is an industry standard. The analysis was performed for the 10-year storm event to develop peak discharges for the design point at the downstream limits of the property.

The Existing Conditions Analysis is the baseline for design. The proposed project will require mitigation measures to ensure that post-development peak discharge from the property do not exceed existing conditions.

Proposed Conditions Hydrologic Analysis:

The proposed system of drainage incorporates a subsurface closed system with conveyance from deep sump catch basins with gas traps to manholes to a recharge/detention facility. The catch basins will be used to catch and convey the stormwater runoff from all of the paved surfaces. By using deep sump catch basins, more sediment can be removed from the stormwater runoff prior to entering the recharge/detention facility and Stormceptor®. The recharge/detention facility is located on the bottom level parking area in the middle of the parking area. The outflow from the recharge/detention facility will lead to the a proposed drain manhole on the east side of the property, which eventually leads via conduit to the Merrimack River. The recharge/detention facility combined with deep sump catch basins and Stormceptor® will remove more than 80% of the total suspended solids from the stormwater.

Under post-development conditions, new impervious surfaces (i.e. rooftops and pavement) and new open spaces (i.e. landscaped areas) will increase stormwater runoff. This additional runoff will be mitigated in several ways.

Proposed Conditions Hydrologic Analysis (cont'd):

Runoff from roof tops will be directed to the recharge/detention facility; this will help reduce runoff volume, peak flows and will help recharge groundwater. Surface water from landscaping areas/parking lot areas will be collected into a closed drainage system through deep sump catch basins (with hoods) and directed to the recharge/detention facility. The system being proposed is a typical configuration for this type of development and is acceptable for mitigating peak discharges pursuant to the Massachusetts Storm Water Management Policy (SWAP).

(3)

May 11, 2006

Appendix B:

Rainfall Data Maps/Runoff Curves Numbers

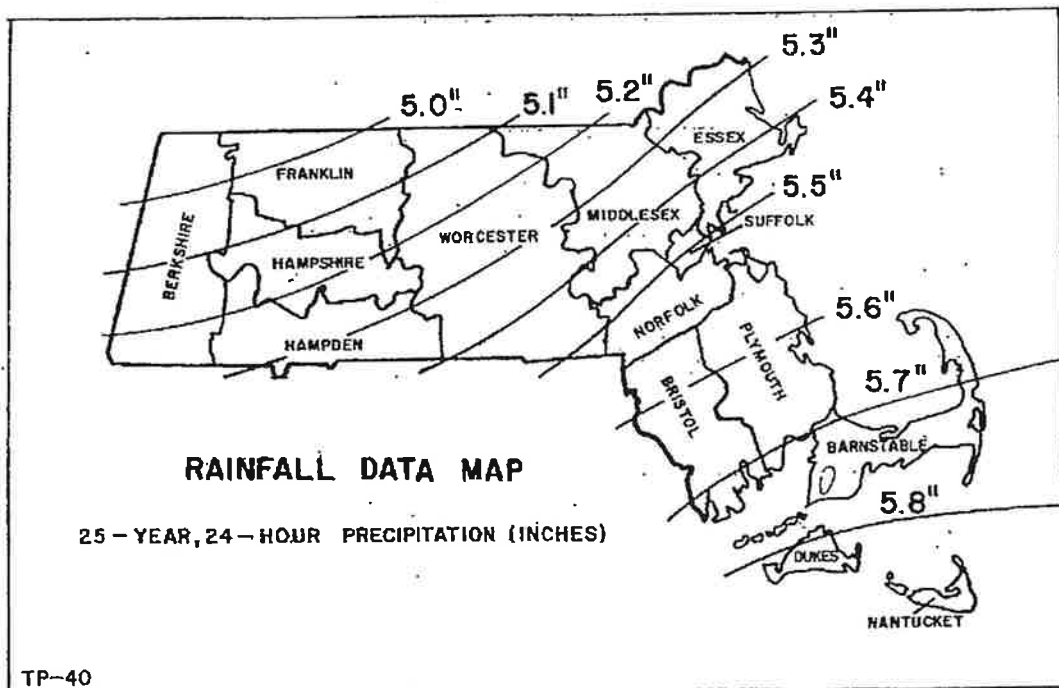
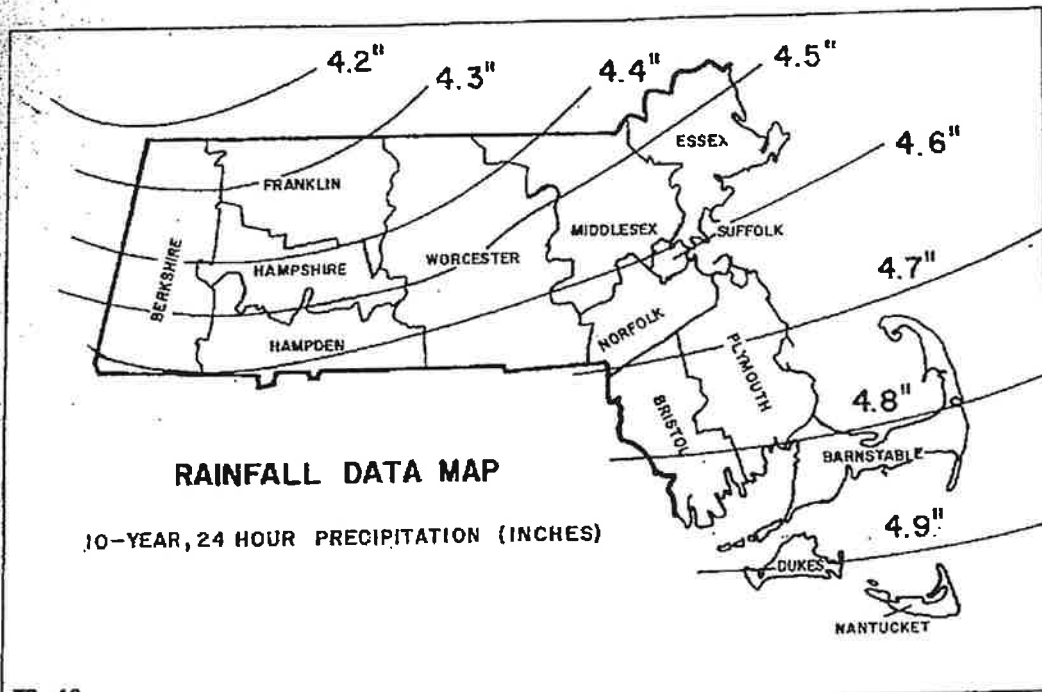


FIGURE B-1, SHEET 2 OF 3

May 11, 2006

Appendix C:

Soil Conservation Service (SCS) Soil Description with Classification and Map

May 11, 2006

Soils Analysis:

S.C.S. Soils Map shows the Soil Conservation Service soil types found in the area of the project site. The S.C.S. soil types found on the project site are:

Ur – Urban Land consists of nearly level to moderately steep areas where the soils have been altered or obscured by urban works and structures.

Hydrologic Soil Group A

Ur-Urban land. Urban land consists of nearly level to moderately steep areas where the soils have been altered or obscured by urban works and structures. Buildings, industrial areas, paved areas, and railroad yards cover more than 75 percent of the land surface. The areas are irregular in shape and range from 2 acres to more than 1,000 acres.

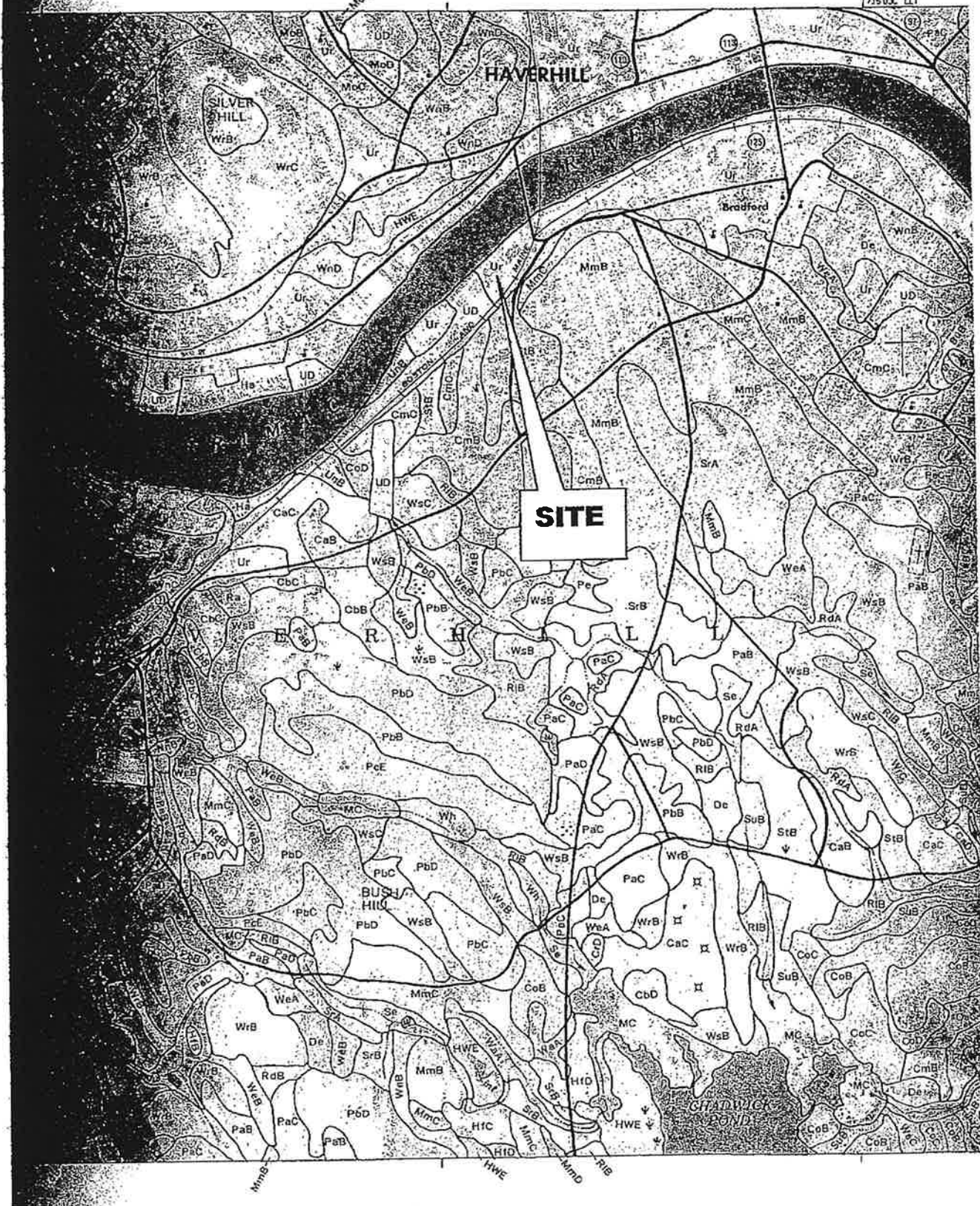
Included with this unit in mapping are numerous small areas of Udorthents, smoothed. Also included are small areas of Paxton, Charlton, Hinckley, Windsor, and Merimac soils. Included areas make up about 20 percent of the map unit.

The properties and characteristics of this unit are so variable that onsite investigation is needed to determine the limitations and suitabilities for specified uses.

This unit is not assigned to a capability subclass.

National Cooperative Soil Survey, U.S.A.

ESSEX COUNTY, MASSACHUSETTS, NORTHERN PART — SHEET NUMBER 16



U.S.G.S. Soils

May 11, 2006

Appendix D: Alternative Analysis

Site Alternative Analysis

The final layout of "River Street Lofts Condominium" was based on several factors. The first and foremost factor was to design a plan that meets all Massachusetts Department of Environmental Protection performance standards and the Haverhill Wetland by law. The alternatives (Massachusetts Wetland Protection Act 310 CMR 10.58(4) (c)) discuss a "Practicable and Substantial Equivalent Economic Alternatives" analysis, taking into account costs, technology, proposed use and logistics. The second factor was to design a plan that is economically feasible. The development of a plan that appeals to all parties of interest is considered optimum.

Introduction

The Property at 80 and 88 River Street was formally a part of a group of mill style buildings originally built along this section of the Merrimack River in the River and Washington Street neighborhood. The building, which formerly occupied the site, like neighboring buildings, was converted to business and residential uses as their manufacturing function declined. The conversion of these structures into residential uses continues as buildings adjacent to the site are converted into loft style condominiums and apartments.

Currently the site is blighted with remnants of foundations, floors and debris from the burning and demolition of the previous structure. The site continues to be fully serviced by municipal utilities and was zoned by the Haverhill City Council and Planning Board with a Special Permit to promote redevelopment of the Property.

The project site is part of the Haverhill Smart Growth Initiative and is in a designated Smart Growth area, Route 110 is a major collector and a State numbered Highway. The site has direct bus service via the Merrimack Valley Transit Authority and is within easy walking distance of the Haverhill MBTA station and ½ mile from the Bradford MBTA station as well as the Haverhill commuter bus station

Alternative Development Programs

Several different development programs were considered for this project prior to the preferred site plan being prepared. The development team explored various site plan options in an effort to address the following design considerations:

- a) Minimize land disturbances in or near wetlands and other resource and sensitive areas.
- b) Incorporate recommendations received from City staff and neighboring abutters and based on comments received during meetings with both parties.
- c) Appropriately and adequately address all Owner criteria.

To achieve these goals, the development team explored various building configurations and placement within the 0.15-acre site. Four (4) conceptual site plans have been provided that illustrate the effect on potential parking and typical floor plans of rear buffers of 10', 18', and 26' as well as the no build alternative. The alternative schemes and illustrations are as follows:

Preferred Site Plan

- 1) Alternative with 10' buffer plan approved by ZBA and City Council
- Site Plans with reduced typical floor area and increasing rear buffers
- 2) Alternative with 18' buffer

- 3) Alternative with 26' buffer
- 4) Alternative – No Build

Alternative #1 - Preferred Site Plan

The Preferred Site Plan, alternative #1 shown in Figure 1, provides a building footprint accommodating the following

- 1) Lower level parking Twenty (20) off street parking access by easement
- 2) River Street parking and entrance Twelve (12) off street parking access by curb cut from River Street.
- 3) Six typical floors with three (3) two (2) bedroom and one (1) one (1) bedroom unit for a total of twenty (24) Units.

The plan makes provision for a buffer zone at the rear of 10', which is consistent with the existing adjacent properties. This building and site plan was unanimously approved by the Haverhill ZBA and City Council and sited as an asset to both the neighborhood and city by both bodies.

The Preferred Site Plan has been designed to address the concerns raised by its abutters as well as to be compatible with and enhance the surrounding area by providing a high quality, professionally designed project. The program will benefit the residents of the region, by providing twenty-four (24) additional housing units with off-street parking, which add to the housing stock with no impact on parking and with a buffer zone consistent with both adjacent existing properties while having minimal impact on the environment and infrastructure.

Alternative #2 - Site Plan with 18' rear buffer

Since the lower level and River Street levels of the building consist of off street parking the logical increment of reduction in building footprint and consequent increase in rear buffer is the eight-foot width of a parking stall. By reducing the depth of the building by eight feet the rear buffer is increased to 18' with significant loss of Unit size in both of the Units which face the river.

This alternative building footprint shown in Figure 2 provides a building accommodating the following:

- 1) Lower level parking Eighteen (18) off street parking access by easement
- 2) River Street parking and entrance Thirteen (13) off street parking (including one (1) handicapped) access by curb cut from River Street.
- 3) Six typical floors with one (1) two (2) bedrooms and three (3) one (1) bedroom units for a total of twenty-four (24) Units.

Because the core building requirements include an elevator, two (2) means of egress and common corridors remain the same this reduction in floor plan results in a reduction of 10% in gross floor area but nearly 15% in saleable space and the loss of twelve (12) two (2) bedroom Units, which become one (1) Bedroom Units.

Alternative 2 produces a plan which provides four (4) fewer off street parking spaces, a reduction in efficiency of the typical floor plan and the substitution of one hundred and twenty-one (121) bedroom Units for twelve (12) two (2) bedroom Units.

Alternative #3 - Site Plan with 24' rear buffer

As with Alternative 2, the lower level and River Street levels of the building consist of off street parking and therefore the logical increment of reduction in building footprint and consequent increase in rear buffer is the eight-foot width of a parking stall. By reducing the depth of the building by sixteen feet the rear buffer is increased to 24' with even more significant loss of total number of Units. More important because the easement for access to the lower level parking is no longer available with this option, all parking at the lower level is lost.

This alternative building footprint shown in Figure 3 provides a building accommodating the following:

- 1) Lower level parking no access by easement therefore no parking
- 2) River Street parking and entrance Ten (10) off street parking (including one (1) handicapped) access by curb cut from River Street
- 4) Six typical floors with two (2) two bedroom or three (3) one (1) bedroom unit for a total of twelve (12) or eighteen (18) Units.

Because the core building requirements include an elevator, two (2) means of egress and common corridors remain the same this reduction in floor plan results in a reduction of 20% in gross floor area but nearly 65% in saleable space, the reduction in number of Units by as much as 50% and the loss of twenty (20) off street parking spaces.

Alternative 3 is a plan which provides twenty (20) fewer off street parking spaces, a greater reduction in efficiency of the typical floor plan and the loss of as much as 50% of the total Units. Alternative 3 is not a viable structural solution since the building has a much reduced footprint and the same seven story height.

Alternative #4 - No Build

The "No Build" alternative would maintain the project site in its current deteriorated site condition. The vacant lot contains portions of the original wood frame building. The remaining masonry foundations can be found on the east, west and north sides of the property. Currently the lot contains a significant amount of debris and vegetation common to a vacant urban lot. If the site remains in its current state over time, it will continue to be a nuisance to the adjacent properties and to the City, all of which would result in a continued degraded appearance. The No Build alternative also does not address any long-range goals for economic growth envisioned by the City and does not contribute toward increasing the City's tax revenue, and ignores the mandate of Smart Growth.

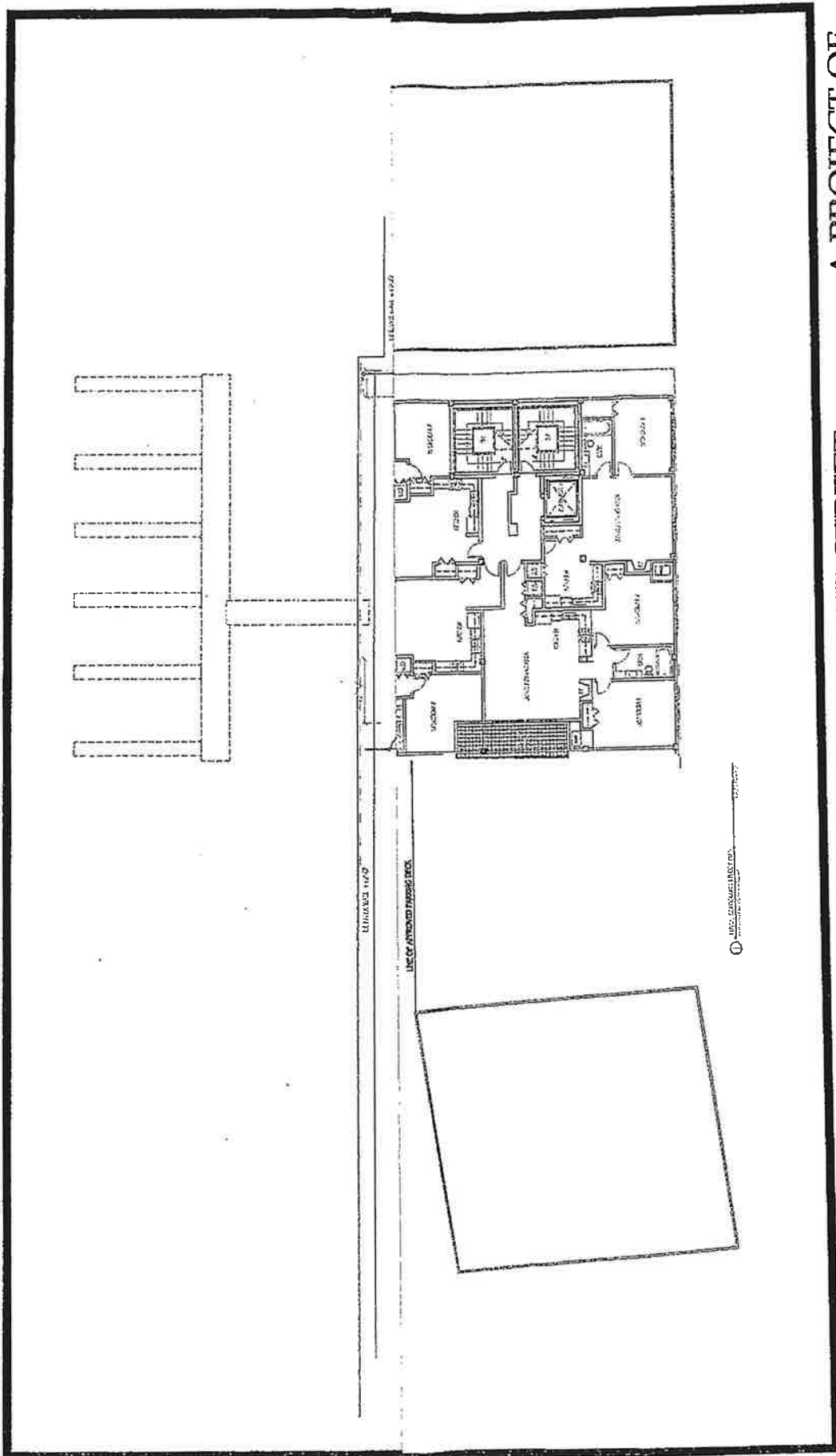
The No-Build alternative is considered only to establish baseline conditions for the purpose of identifying and characterizing project impacts.

Conclusion

The final layout of "River Street Lofts Condominium" is designed to meet all Massachusetts Department of Environmental Protection performance standards within a plan that is economically feasible. The site is the only remaining vacant site along the Merrimack River within close proximity that is available for sale and for redevelopment. For this reason it provides a unique opportunity to provide taxable income to the City without any negative environmental impact to the resource areas that are adjacent to the site, and for implementation of the City and State Smart Growth initiatives.

ALTERNATIVE 1 THE PREFERRED PLAN

APRIL 27, 2006

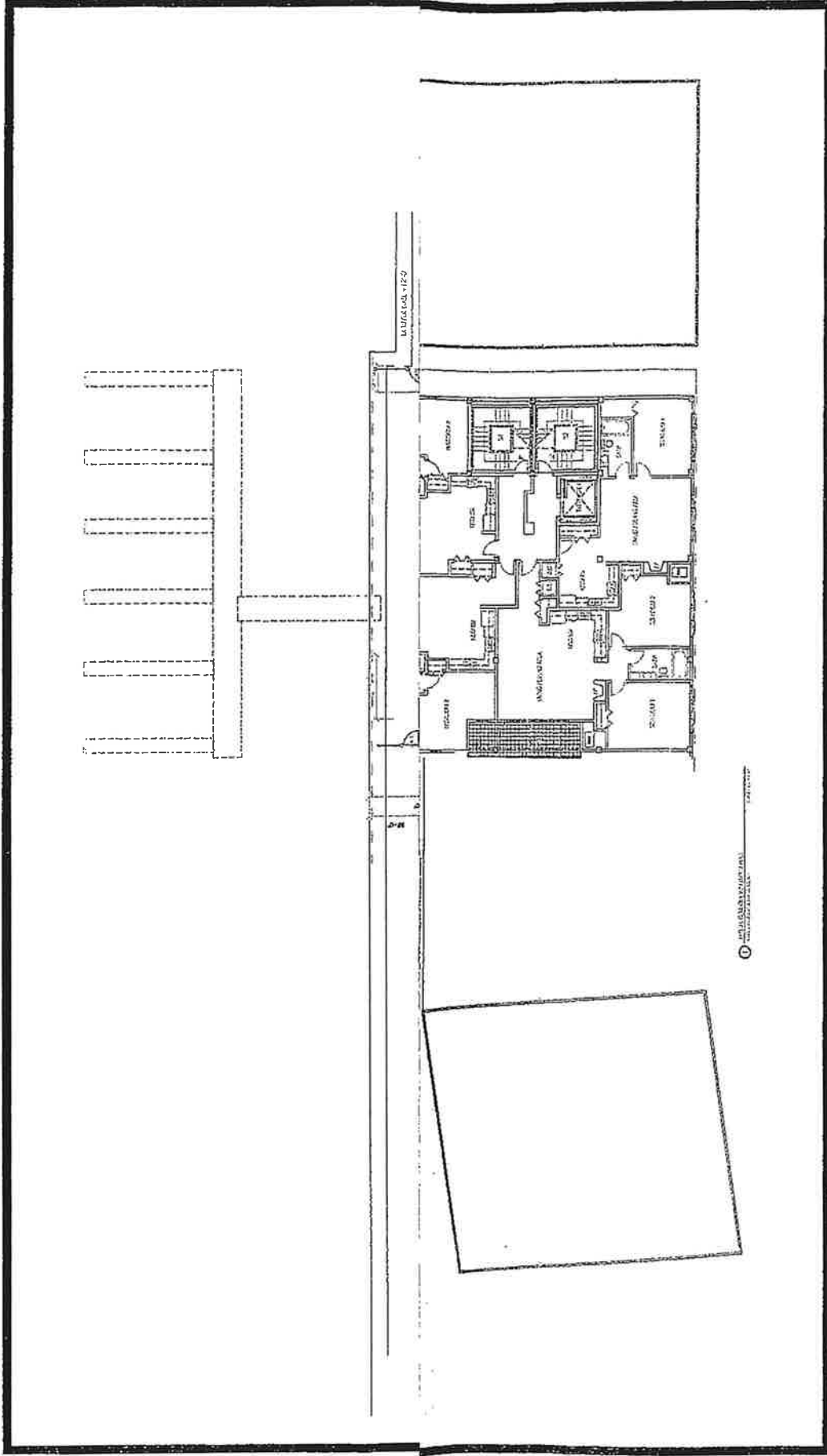


24 CONDOMINIUM RESIDENCES AT #80 - 88 RIVER STREET
 HAVERHILL, MASSACHUSETTS

A PROJECT OF
 VINCENT O'RORKE
 SDA Schopf Design Associates, Salem, Massachusetts 01970

ALTERNATIVE 2

APRIL 27, 2006

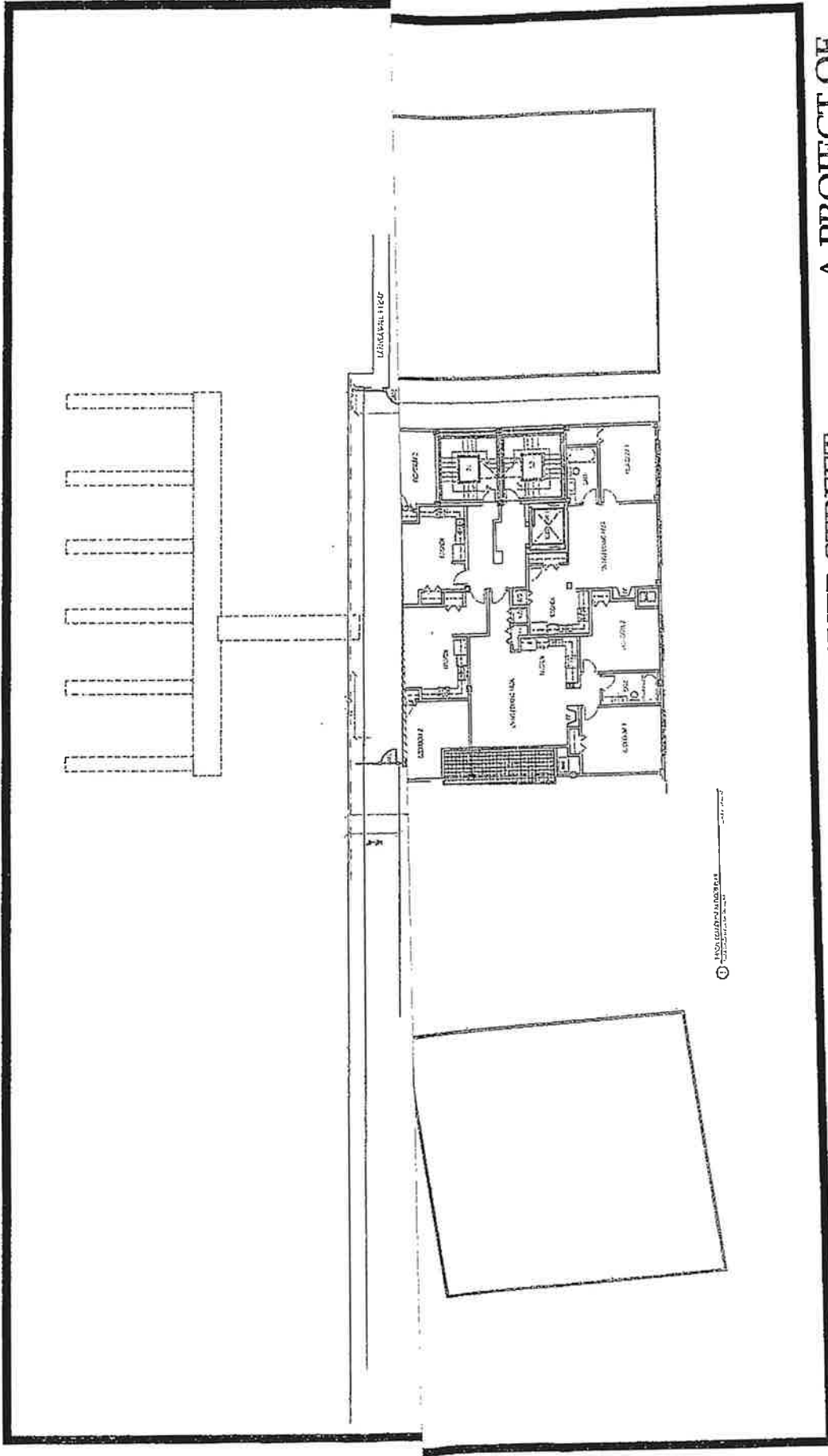


24 CONDOMINIUM RESIDENCES AT #80 - 88 RIVER STREET
HAVERHILL, MASSACHUSETTS

A PROJECT OF
VINCENT O'RORKE
SDA Schopf Design Associates, Salem, Massachusetts 01970

ALTERNATIVE 3

APRIL 27, 2006



12 CONDOMINIUM RESIDENCES AT #80 - 88 RIVER STREET
HAVERHILL, MASSACHUSETTS

A PROJECT OF
VINCENT O'RORKE
SDA Schopf Design Associates, Salem, Massachusetts 01970

May 11, 2006

Appendix E:
Mitigating Measures

Mitigating Measures:

Provided that the Construction Sequence is followed and the Sediment and Erosion Control devices are implemented, the resource area in question will remain free of sediment. In order to meet the requirements of the Stormwater Management Policy, some Best Management Practices (BMP's) shall be implemented. The BMP's to be used for this project include catch basins with deep sumps, stormwater recharge through the use of recharge/detention facility, grassed lined swale and a Stormceptor Model 900®.

To minimize possible adverse impacts to the wetlands, the following sequence of work shall be utilized:

1. At least 72 hours prior to the onset of construction, dig safe will be contacted (at 888-344-7233) to locate any and all subsurface utilities.
2. The contractor will stake the siltation fencing and haybale/siltation fencing in the locations shown on the *Site Plan - River Street Lofts Condominium*. These measures are to be installed prior to any site alteration. The location of this line is to be verified and approved by the City of Haverhill Conservation Commission prior to any alteration.
3. The site access will be from the east side of the property on existing asphalt driveway. If the driveway can not be used or is inadequate then a stabilized construction entrance must be created for the first 50 feet of the construction site. The crushed stone filter berm entrance is to consist of 12 inches of $\frac{3}{4}$ " to 1 $\frac{1}{2}$ " of crushed stone and compacted gravel. The berm must be kept damp to prevent excessive dust.
4. The remaining areas for the access driveway and drainage facilities will be cleared and grubbed. Excavate from the proposed work shall be stockpiled outside the 100 foot buffer zone wherever possible and encircled with siltation fencing.
5. Site Sediment Control System

Before being discharged from the construction site, sediment-contaminated storm water will be processed in the storm water treatment system. Clean water bypassing the site will be routed directly to the receiving stream. Sediment ponds and traps, vegetated buffer strips, sediment barriers or filters, dikes, and other BMP's intended to trap sediment on site will be constructed as one of the first steps in grading. These BMP's will be installed before other land-disturbing activities take place.

Selected BMP's

- Straw Bale Barrier
- Brush Barrier
- Silt Fence
- Vegetative Strip
- Sediment Trap
- Temporary Sediment Pond
- Stone Check Dams

6. Any necessary blasting of refusal for both subgrade construction and underground utility

Mitigating Measures (cont'd):

installation must begin once the silt fence and hay bales are in place. Any blasting will be conducted in accordance with all state and local regulations and requirements.

7. The drainage channel must be graded to the lines shown on the plans and used as temporary sedimentation basin during the construction phase of the project. Throughout construction the adjacent catch basin will have no outlet.

8. As construction proceeds, permanent seeding will be implemented on all finished graded areas; loam base must be a minimum of 4". Mulching will be utilized on all slopes in excess of 10%. Geotextile fabric will be used on all slopes in excess of 15%, or where mulching proves ineffective.

9. The subsurface utilities including drainage, water, electric, telephone, cable and gas will be installed at this time.

10. The proposed driveway must be graded to subgrade. A Minimum of twelve inches of compacted gravel fill must be placed on top of the sub grade.

11. Construction of the residential structure may begin.

12. Upon completion of work, the contractor will immediately stabilize by loam and seed, mulching or geotextile fabric all areas, which have not already been stabilized.

13. At this time, the sedimentation basin must be completed and the outlet structures installed. The outlet, at its nearest point to the resource area, is to be surrounded by haybales and siltation fencing to further reduce sedimentation flow to the wetlands.

14. The proposed driveway and site may now be paved to its final grade.

15. Upon stabilization of all areas and satisfactory completion of work, the engineer will certify to the work and request that the local Conservation Commission issue a certificate of compliance.

Once the Commission gives final approval, the siltation fencing and haybales may be removed. Any sediment deposits found at the haybale line must be removed.

May 11, 2006

Appendix F:
Summary of Drainage Calculations

Summary of Drainage Calculations:

The underground infiltration and detention pond has been designed to store run-off from the proposed impervious areas of the site (i.e., rooftops), slowly releasing the stormwater at a rate so as not to exceed predevelopment rates. The proposed outlet for the detention pond is connected as an 8" overflow pipe to D.M.H. #1 located approximately 4 feet from the underground system. The proposed infiltration and detention facilities have been designed so that there is no increase of run-off for the 10 year storm event and no alteration of the direction of flow. Therefore, no negative impacts on the downstream properties can be expected.

The following chart is a summary of peak flow rates of the "Design Point", as shown on the accompanying drainage plans (DP-1).

PRE-DEVELOPMENT VS. POST-DEVELOPMENT DRAINAGE SUMMARY TABLES

STORM EVENT	PRE-DEVELOPMENT	POST - DEVELOPMENT	NET DIFFERENCE
	DP-I Merrimack River	DP-I Merrimack River	DP-I Merrimack River
10 Year - 4.5 in.	0.56	0.52	-0.04

These Storm Drainage calculations were prepared in accordance with the applicable City of Haverhill Subdivision Rules and Regulations. All drainage pipes and other structures were designed according to generally accepted engineering principles and in accordance with the stated regulations.

May 11, 2006

Appendix G:
Drainage Calculations – Pre-Development
(10-Year Storm)



Design point
exist. 12" outfall
at Merrimack
River



Site Runoff
Southeasterly
toward
Merrimack River



Drainage Diagram for 88 River Street - Pre-development
Prepared by Merrimack Engineering Services, Inc. 5/9/2006
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88 River Street - Pre-development

Type III 24-hr 10-Year Storm Rainfall=4.50"

Prepared by Merrimack Engineering Services, Inc.

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Time span=10.00-20.00 hrs, dt=0.10 hrs, 101 points

Runoff by SCS TR-20 method, UH=SCS

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Site Runoff Southeasterly toward Merrimack Ri Runoff Area=6,349 sf Runoff Depth=3.06"
Flow Length=105' Tc=0.8 min CN=91 Runoff=0.56 cfs 0.037 af

Reach 1R: Design point exist. 12" outfall at Merrimack River

Inflow=0.56 cfs 0.037 af
Outflow=0.56 cfs 0.037 af

Total Runoff Area = 0.146 ac Runoff Volume = 0.037 af Average Runoff Depth = 3.06"

88 River Street - Pre-development

Type III 24-hr 10-Year Storm Rainfall=4.50"

Prepared by Merrimack Engineering Services, Inc.

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Subcatchment 1S: Site Runoff Southeasterly toward Merrimack River

Onsite southeasterly toward Merrimack River.

Runoff = 0.56 cfs @ 11.98 hrs, Volume= 0.037 af, Depth= 3.06"

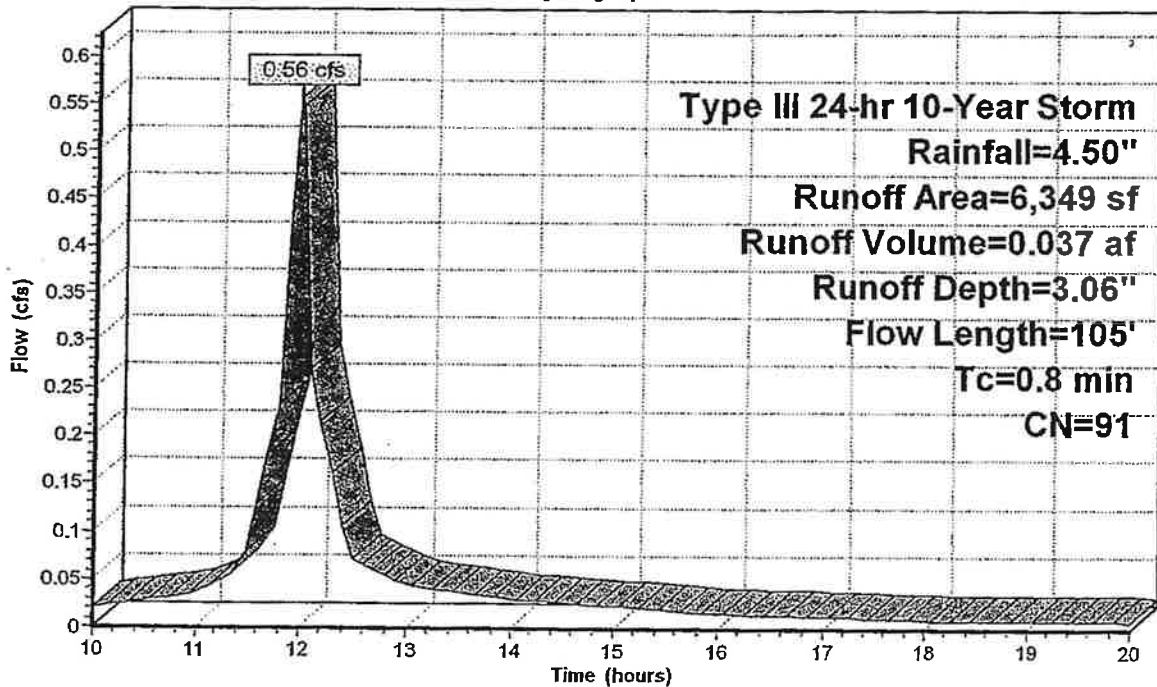
Runoff by SCS TR-20 method, UH=SCS, Time Span= 10.00-20.00 hrs, dt= 0.10 hrs
Type III 24-hr 10-Year Storm Rainfall=4.50"

Area (sf)	CN	Description
6,349	91	Newly graded area, HSG C

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0460	1.6		Sheet Flow, Flow from site to the southeast Smooth surfaces n= 0.011 P2= 3.10"
0.3	55	0.0460	3.5		Shallow Concentrated Flow, Flow from site to property to the eas Unpaved Kv= 16.1 fps
0.8	105	Total			

Subcatchment 1S: Site Runoff Southeasterly toward Merrimack River

Hydrograph



Runoff

Type III 24-hr 10-Year Storm
Rainfall=4.50"
Runoff Area=6,349 sf
Runoff Volume=0.037 af
Runoff Depth=3.06"
Flow Length=105'
Tc=0.8 min
CN=91

88 River Street - Pre-development

Type III 24-hr 10-Year Storm Rainfall=4.50"

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Reach 1R: Design point exist. 12" outfall at Merrimack River

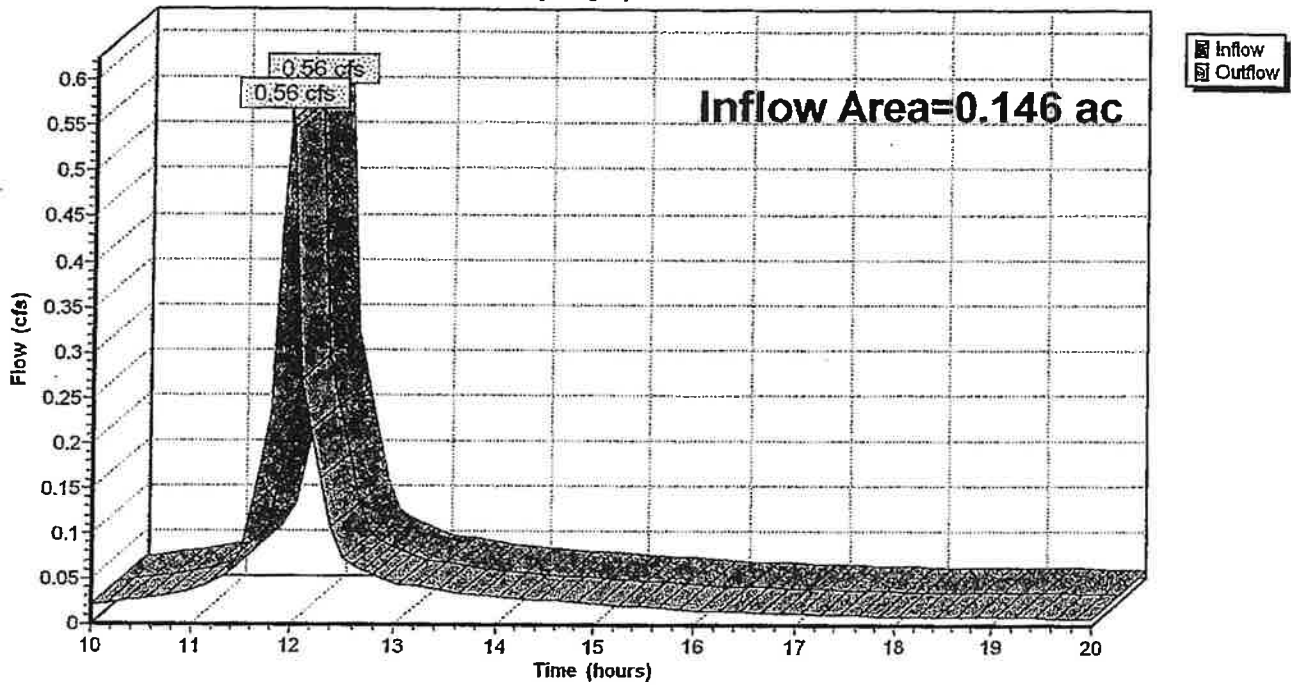
Design point towards property to the east and to an existing 12" RCP outfall at the Merrimack River.

Inflow Area = 0.146 ac, Inflow Depth = 3.06" for 10-Year Storm event
Inflow = 0.56 cfs @ 11.98 hrs, Volume= 0.037 af
Outflow = 0.56 cfs @ 11.98 hrs, Volume= 0.037 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 10.00-20.00 hrs, dt= 0.10 hrs

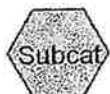
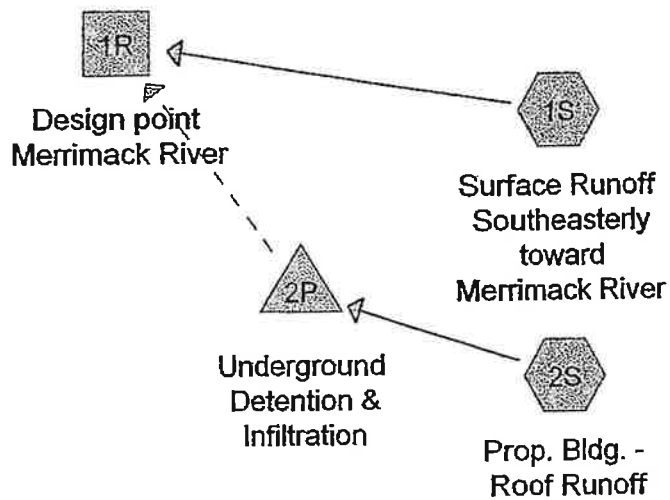
Reach 1R: Design point exist. 12" outfall at Merrimack River

Hydrograph



May 11, 2006

Appendix H:
Drainage Calculations – Post-Development
(10-Year Storm)



Drainage Diagram for 88 River Street - Post-development
 Prepared by Merrimack Engineering Services, Inc. 5/9/2006
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88 River Street - Post-development

Type III 24-hr 10-Year Storm Rainfall=4.50"

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Time span=1.00-24.00 hrs, dt=0.01 hrs, 2301 points

Runoff by SCS TR-20 method, UH=SCS

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Surface Runoff Southeasterly toward Merrimack Runoff Area=1,329 sf Runoff Depth=0.54"
Flow Length=105' Tc=8.5 min CN=51 Runoff=0.01 cfs 0.001 af

Subcatchment 2S: Prop. Bldg. - Roof Runoff Runoff Area=5,020 sf Runoff Depth=4.26"
Flow Length=90' Tc=0.1 min CN=98 Runoff=0.62 cfs 0.041 af

Reach 1R: Design point Merrimack River Inflow=0.52 cfs 0.014 af
Outflow=0.52 cfs 0.014 af

Pond 2P: Underground Detention & Infiltration Peak Elev=13.03' Storage=173 cf Inflow=0.62 cfs 0.041 af
Discarded=0.05 cfs 0.028 af Secondary=0.52 cfs 0.013 af Outflow=0.58 cfs 0.041 af

Total Runoff Area = 0.146 ac Runoff Volume = 0.042 af Average Runoff Depth = 3.49"

Subcatchment 1S: Surface Runoff Southeasterly toward Merrimack River

Onsite southeasterly toward Merrimack River

Runoff = 0.01 cfs @ 12.17 hrs, Volume= 0.001 af, Depth= 0.54"

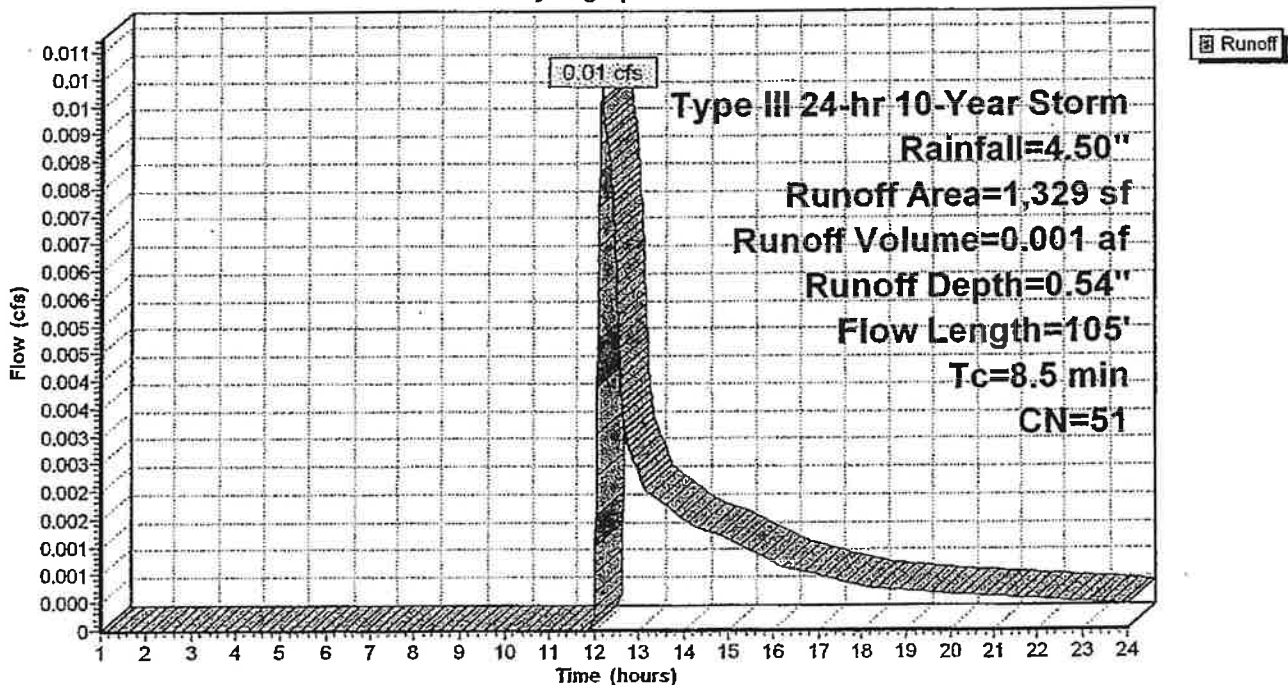
Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10-Year Storm Rainfall=4.50"

Area (sf)	CN	Description
1,329	51	1 acre lots, 20% imp, HSG A

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.9	50	0.0090	0.1		Sheet Flow, Flow to the southeast Grass: Short n= 0.150 P2= 3.10"
0.6	55	0.0090	1.4		Shallow Concentrated Flow, Flow to the southeast Grassed Waterway Kv= 15.0 fps
8.5	105	Total			

Subcatchment 1S: Surface Runoff Southeasterly toward Merrimack River

Hydrograph



88 River Street - Post-development

Type III 24-hr 10-Year Storm Rainfall=4.50"

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Subcatchment 2S: Prop. Bldg. - Roof Runoff

Prop. 7 Story Condominium at 88 River Street.

Runoff = 0.62 cfs @ 12.00 hrs, Volume= 0.041 af, Depth= 4.26"

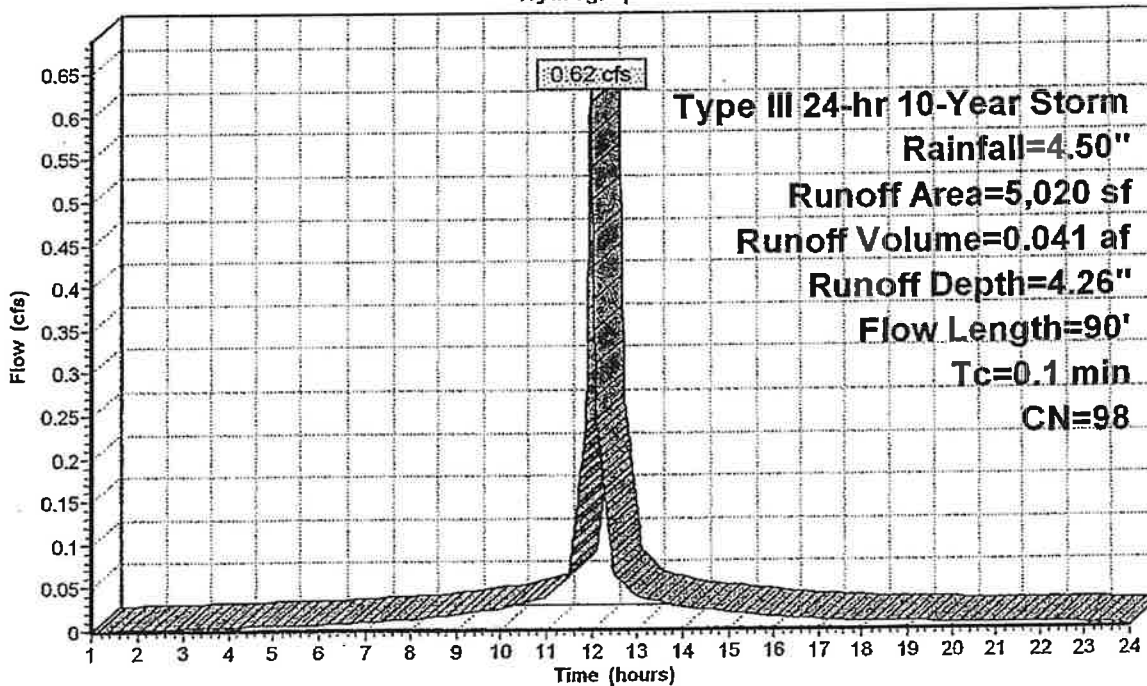
Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Storm Rainfall=4.50"

Area (sf)	CN	Description
5,020	98	Paved parking & roofs

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.1	90		15.0		Direct Entry, 88 River Street Prop. Bldg.

Subcatchment 2S: Prop. Bldg. - Roof Runoff

Hydrograph



88 River Street - Post-development

Type III 24-hr 10-Year Storm Rainfall=4.50"

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Reach 1R: Design point Merrimack River

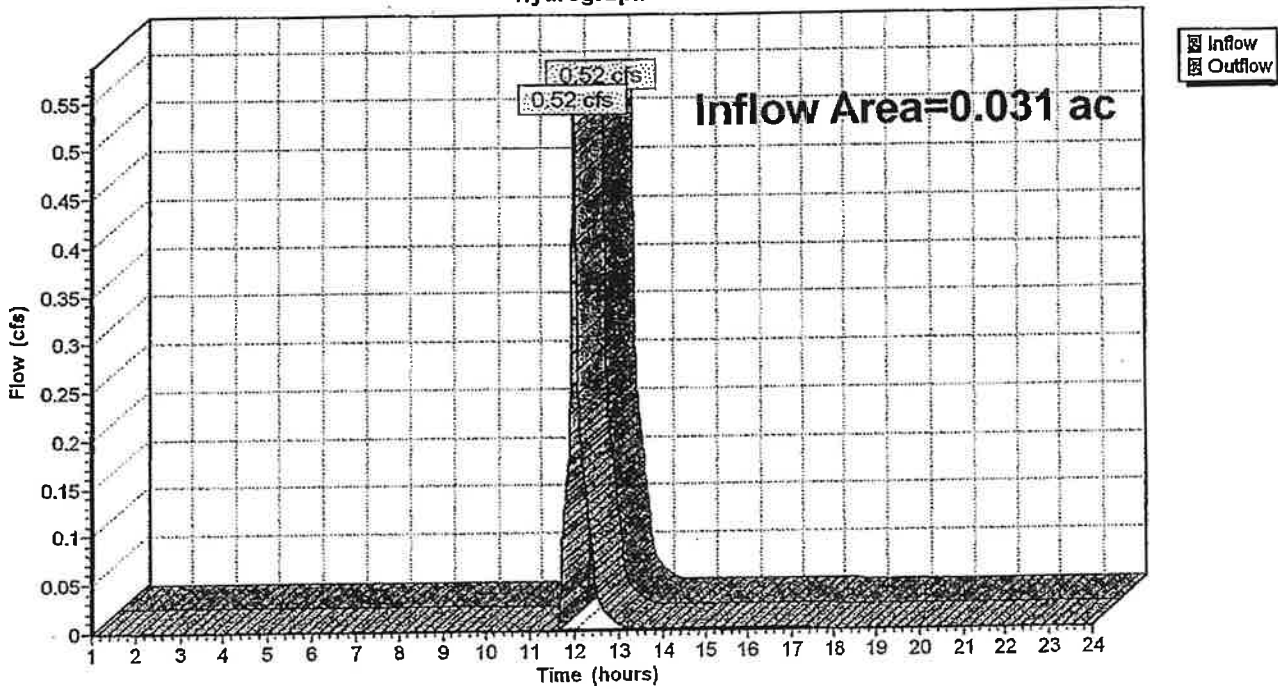
Design point below Prop. Pool area.

Inflow Area = 0.031 ac, Inflow Depth = 5.65" for 10-Year Storm event
Inflow = 0.52 cfs @ 12.01 hrs, Volume= 0.014 af
Outflow = 0.52 cfs @ 12.01 hrs, Volume= 0.014 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs

Reach 1R: Design point Merrimack River

Hydrograph



Pond 2P: Underground Detention & Infiltration

Primary pond storage is provided by a stone-filled excavation which contains 2 pre-fab storage chambers.

Pond outflow is primarily by exfiltration, which is calculated as a flow velocity applied over the wetted area of stone-filled excavation. An overflow culvert is also provided for supplemental discharge of larger storm events.

Inflow Area =	0.115 ac,	Inflow Depth =	4.26"	for 10-Year Storm event
Inflow =	0.62 cfs @	12.00 hrs,	Volume=	0.041 af
Outflow =	0.58 cfs @	12.01 hrs,	Volume=	0.041 af, Atten= 6%, Lag= 0.8 min
Discarded =	0.05 cfs @	12.01 hrs,	Volume=	0.028 af
Secondary =	0.52 cfs @	12.01 hrs,	Volume=	0.013 af

Routing by Stor-Ind method, Time Span= 1.00-24.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 13.03' @ 12.01 hrs Surf.Area= 294 sf Storage= 173 cf
 Flood Elev= 14.70' Surf.Area= 299 sf Storage= 178 cf
 Plug-Flow detention time= 18.1 min calculated for 0.041 af (100% of inflow)
 Center-of-Mass det. time= 17.9 min (762.0 - 744.1)

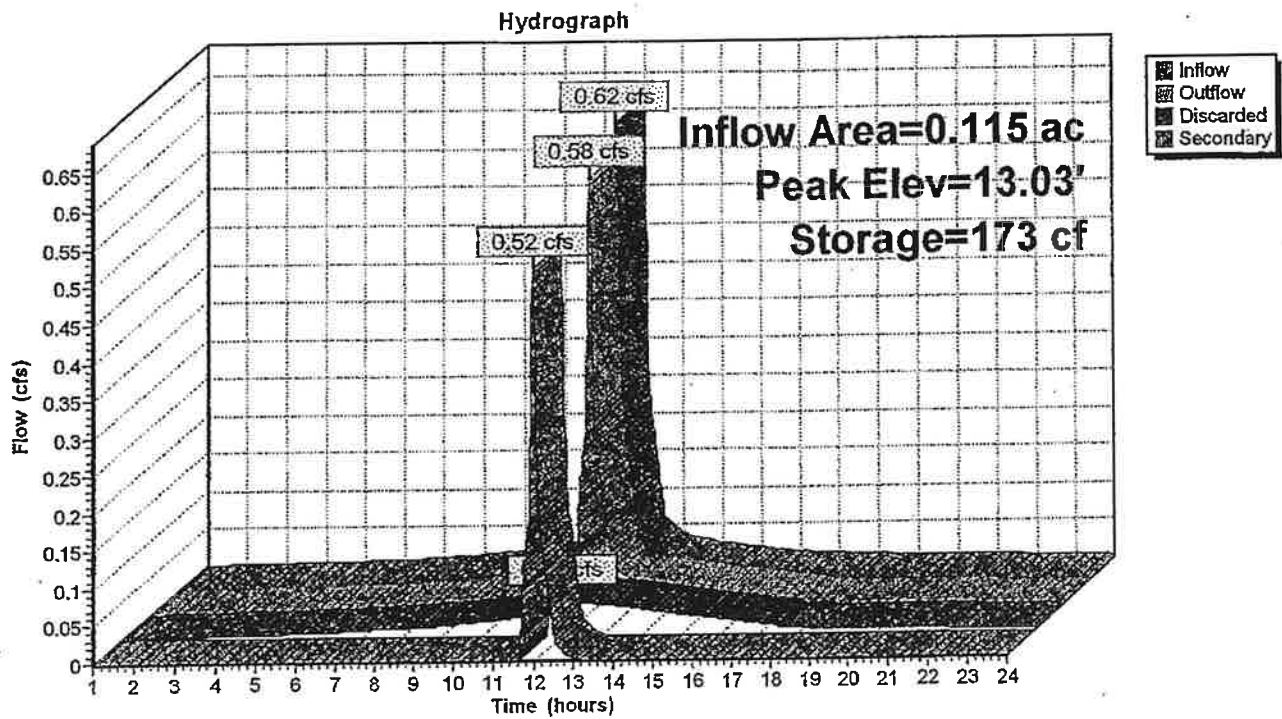
#	Invert	Avail.Storage	Storage Description
1	11.37'	44 cf	33.6"W x 20.0"H x 6.33'L Cultec R-180 x 2 Inside #2
2	10.87'	135 cf	8.50"W x 8.50"L x 2.20"H Excavation w/stone backfill Z=2.0
			380 cf Overall - 44 cf Embedded = 337 cf x 40.0% Voids
			178 cf Total Available Storage

#	Routing	Invert	Outlet Devices
1	Secondary	12.54'	8.0" x 4.0' long Off-site discharge Culvert RCP, groove end projecting, Ke= 0.200 Outlet Invert= 12.48' S= 0.0150 '/' n= 0.020 Cc= 0.900
2	Discarded	0.00'	0.010000 fpm Exfiltration over entire Wetted area

Discarded OutFlow Max=0.05 cfs @ 12.01 hrs HW=13.03' (Free Discharge)
 ↑2=Exfiltration (Exfiltration Controls 0.05 cfs)

Secondary OutFlow Max=0.52 cfs @ 12.01 hrs HW=13.03' (Free Discharge)
 ↑1=Off-site discharge Culvert (Barrel Controls 0.52 cfs @ 2.6 fps)

Pond 2P: Underground Detention & Infiltration



May 11, 2006

Appendix I:

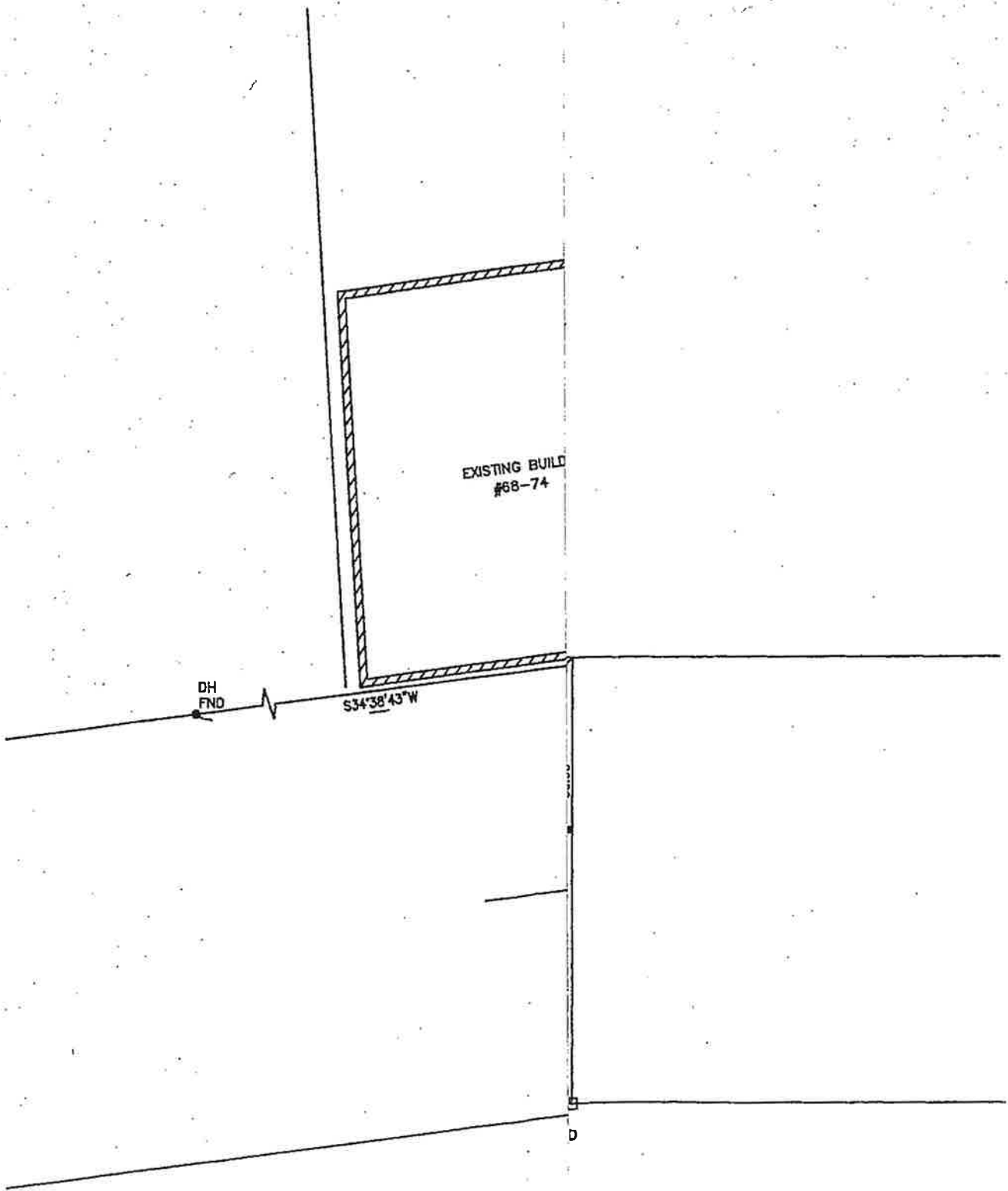
Pre-and Post Development Drainage Areas

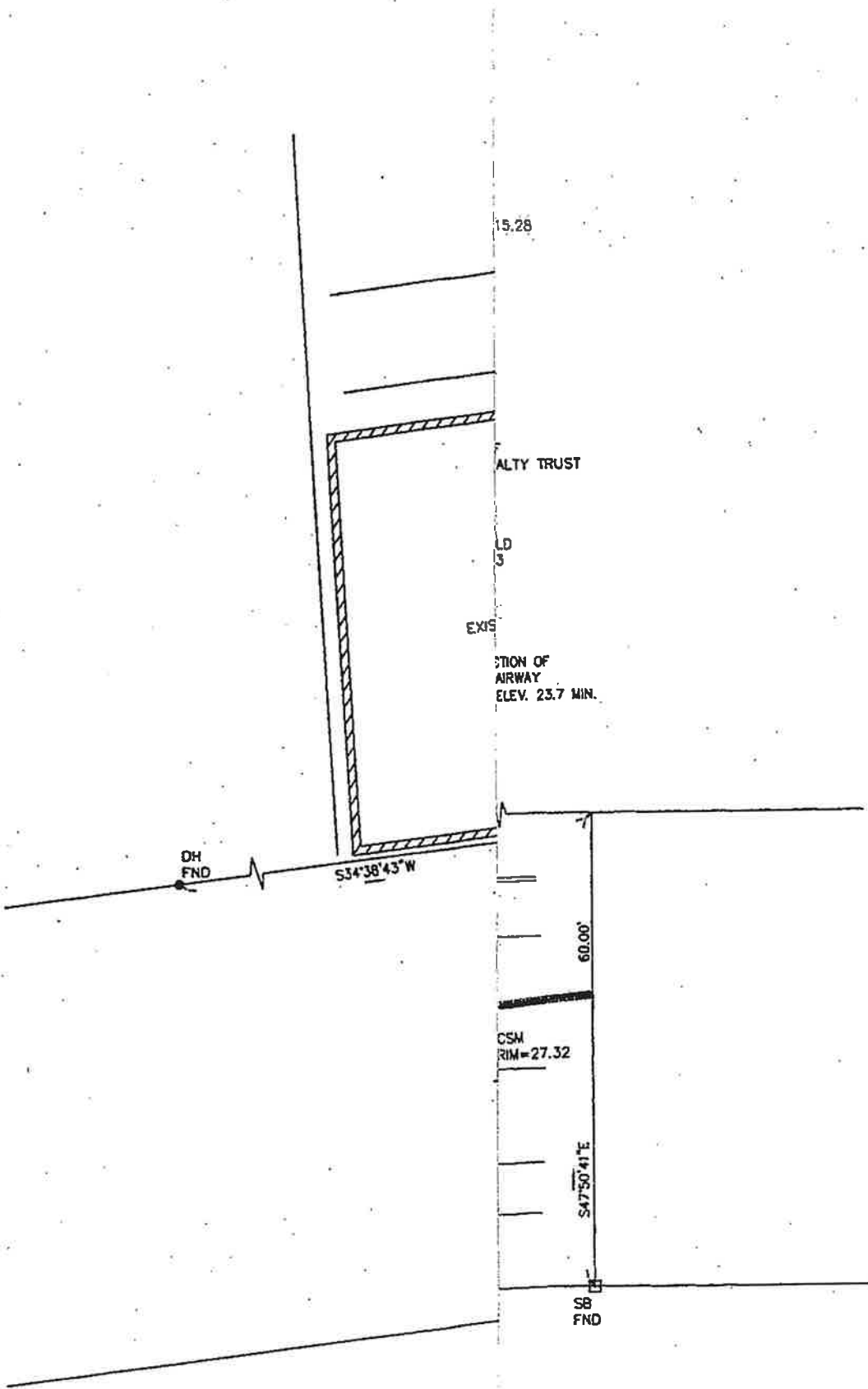
EXISTING BUILD
#68-74

DH
FND

S34°38'43"W

D





15.28

PROPERTY TRUST

EXISTING

AIRWAY
ELEV. 23.7 MIN.

DH
FND

S34°38'43" W

60.00'

CSM
RIM = 27.32

S47°50'41" E

SB
FND

May 11, 2006

Appendix J: Pre & Post-100year Flood Plain Calculations

Average end Area Method - Stations - X's
 exist. conditions - Available Head Main

0+0 — 0+6

14 To 15 $\frac{0 + 6.75}{2} \times 6 = 20.25/27 = 0.75 \text{ cy}$

15 To 16 $\frac{15.1 + 24.5}{2} \times 6 = 105.8/27 = 3.84 \text{ cy}$

16 To 17 $\frac{46.15 + 42.75}{2} \times 6 = 266.7/27 = 9.88 \text{ cy}$

17 To 18 $\frac{47 + 47}{2} \times 6 = 282/27 = 10.44 \text{ cy}$

18 To 19 $\frac{47 + 47}{2} \times 6 = \text{''} = 10.44 \text{ cy}$

19 To 20 $\frac{47 + 47}{2} \times 6 = \text{''} = 10.44 \text{ cy}$

20 To 21 $\frac{47 + 47}{2} \times 6 = \text{''} = 10.44 \text{ cy}$

21 To 22 $\frac{47 + 47}{2} \times 6 = \text{''} = 10.44 \text{ cy}$

22 To 23 $\frac{47 + 47}{2} \times 6 = \text{''} = 10.44 \text{ cy}$

23 To 23.7 $\frac{32.9 + 32.9}{2} \times 6 = 197.46/27 = 7.31 \text{ cy}$

0+6 — 0+20

14 To 15 $\frac{6.75 + 4}{2} \times 14 = 75.25/27 = 2.79 \text{ cy}$

15 To 16 $\frac{21.57 + 1.2}{2} \times 14 = 239.5/27 = 8.69 \text{ cy}$

16 To 17 $\frac{42.75 + 29.5}{2} \times 14 = 505.25/27 = 18.73 \text{ cy}$

17 To 18 $\frac{47 + 56}{2} \times 14 = 721/27 = 26.70 \text{ cy}$

18 To 19 $\frac{47 + 69.75}{2} \times 14 = 817.25/27 = 30.27 \text{ cy}$

19 To 20 $\frac{47 + 81}{2} \times 14 = 896/27 = 33.19 \text{ cy}$

20 To 21 $\frac{47 + 81}{2} \times 14 = 896/27 = 33.19 \text{ cy}$

21 To 22 $\frac{47 + 81}{2} \times 14 = 896/27 = 33.19 \text{ cy}$

22 To 23 $\frac{47 + 81}{2} \times 14 = 896/27 = 33.19 \text{ cy}$

23 To 23.7 $\frac{32.9 + 56.7}{2} \times 14 = 607.2/27 = 23.23 \text{ cy}$

MERRIMACK ENGINEERING SERVICES
PROFESSIONAL ENGINEERS • LAND SURVEYORS • PLANNERS
66 PARK STREET ANDOVER, MA 01810
TEL: 978-475-3555 FAX: 978-475-1448

JOB Flood Plain Calcs.
SHEET No. 2 OF 7 JOB No. 5047
DATE: 4/19/06

EXIST. CONDITIONS

0+20 - 0+40

14 TO 15 $\frac{4+11}{2} \times 20 = 150/27 = 5.56 \text{cy}$

15 TO 16 $\frac{12+39.5}{2} \times 20 = 465/27 = 17.22 \text{cy}$

16 TO 17 $\frac{29.5+53.5}{2} \times 20 = 830/27 = 30.74 \text{cy}$

17 TO 18 $\frac{51+66.5}{2} \times 20 = 1225/27 = 45.37 \text{cy}$

18 TO 19 $\frac{80.1+81}{2} \times 20 = 1611/27 = 59.67 \text{cy}$

19 TO 20 $\frac{81+81}{2} \times 20 = 1620/27 = 60 \text{cy}$

20 TO 21 $\frac{81+81}{2} \times 20 = 1620/27 = 60 \text{cy}$

21 TO 22 $\frac{81+81}{2} \times 20 = 1620/27 = 60 \text{cy}$

22 TO 23 $\frac{81+81}{2} \times 20 = 1620/27 = 60 \text{cy}$

23 TO 23.7 $\frac{56.7+56.7}{2} \times 20 = 1134/27 = 42 \text{cy}$

0+40 - 0+60

14 TO 15 $\frac{11+15.6}{2} \times 20 = 266/27 = 9.85 \text{cy}$

15 TO 16 $\frac{34.5+36}{2} \times 20 = 705/27 = 26.11 \text{cy}$

16 TO 17 $\frac{53.5+50}{2} \times 20 = 1035/27 = 38.33 \text{cy}$

17 TO 18 $\frac{66.5+58}{2} \times 20 = 1245/27 = 46.11 \text{cy}$

18 TO 19 $\frac{81+71.5}{2} \times 20 = 1525/27 = 56.48 \text{cy}$

19 TO 20 $\frac{81+81}{2} \times 20 = 1620/27 = 60 \text{cy}$

20 TO 21 $\frac{81+81}{2} \times 20 = 1620/27 = 60 \text{cy}$

21 TO 22 $\frac{81+81}{2} \times 20 = 1620/27 = 60 \text{cy}$

22 TO 23 $\frac{81+81}{2} \times 20 = 1620/27 = 60 \text{cy}$

23 TO 23.7 $\frac{56.7+56.7}{2} \times 20 = 1134/27 = 42 \text{cy}$

EXIST. CONDITIONS

0+60 - 0+69

14 TO 15 $\frac{156 + 19.5}{2} \times 9 = 159.98/27 = 5.85 \text{ cy}$

15 TO 16 $\frac{36 + 35.5}{2} \times 9 = 32.75/27 = 11.92 \text{ cy}$

16 TO 17 $\frac{50 + 50.5}{2} \times 9 = 452.05/27 = 16.75 \text{ cy}$

17 TO 18 $\frac{58 + 61.5}{2} \times 9 = 537.75/27 = 19.92 \text{ cy}$

18 TO 19 $\frac{71.5 + 70.75}{2} \times 9 = 649.13/27 = 24.04 \text{ cy}$

19 TO 20 $\frac{81 + 79.76}{2} \times 9 = 725.46/27 = 26.79 \text{ cy}$

20 TO 21 $\frac{81 + 81}{2} \times 9 = 729/27 = 27 \text{ cy}$

21 TO 22 $\frac{81 + 81}{2} \times 9 = 729/27 = 27 \text{ cy}$

22 TO 23 $\frac{81 + 81}{2} \times 9 = 729/27 = 27 \text{ cy}$

23 TO 23.7 $\frac{56.7 + 56.2}{2} \times 9 = 510.3/27 = 18.9 \text{ cy}$

* wall 0+69 to 0+75.7

* STAKES removed by Abuser 14 TO 15 $\frac{19.5 + 16}{2} \times 6.7 = 118.93/27 = 4.4 \text{ cy}$

15 TO 16 $\frac{35.5 + 36.5}{2} \times 6.7 = 241.2/27 = 8.93 \text{ cy}$

16 TO 17 $\frac{50.5 + 54.5}{2} \times 6.7 = 351.25/27 = 13.03 \text{ cy}$

* 17 TO 18 $\frac{61.5 + 67}{2} \times 4.7 = 301.98/27 = 11.18 \text{ cy}$

* 18 TO 19 $\frac{72.75 + 85}{2} \times 4.7 = 370.71/27 = 13.73 \text{ cy}$

* 19 TO 20 $\frac{79.76 + 85}{2} \times 4.7 = 387.19/27 = 14.34 \text{ cy}$

* 20 TO 21 $\frac{81 + 85}{2} \times 4.7 = 390.1/27 = 14.45 \text{ cy}$

* 21 TO 22 $\frac{81 + 85}{2} \times 4.7 = 390.1/27 = 14.45 \text{ cy}$

* 22 TO 23 $\frac{81 + 85}{2} \times 4.7 = 390.1/27 = 14.45 \text{ cy}$

* 23 TO 23.7 $\frac{56.7 + 59.5}{2} \times 4.7 = 273.07/27 = 10.11 \text{ cy}$

MERRIMACK ENGINEERING SERVICES
 PROFESSIONAL ENGINEERS • LAND SURVEYORS • PLANNERS
 66 PARK STREET ANDOVER, MA 01810
 TEL: 978-475-3555 FAX: 978-475-1448

JOB Flood Plain Calc's.
 SHEET No. 4 OF 7 JOB No. 5047
 DATE: 3/14/06

Average End Area Method - Stations - X's
Prop. Conditions - Available Flood Plain
(Earth only)

0+0 - 0+6

14 To 15	$\frac{0+4.95}{2} \times 6 = 14.85/27 = 0.55cy$
15 To 16	$\frac{62.75+91}{2} \times 6 = 311.25/27 = 11.53cy$
16 To 17	$\frac{85+85}{2} \times 6 = 510/27 = 18.89cy$
17 To 18	$\frac{85+85}{2} \times 6 = 510/27 = 18.89cy$
18 To 19	" " = 18.89cy
19 To 20	" " = 18.89cy
20 To 21	" " = 18.89cy
21 To 22	" " = 18.89cy
22 To 23	" " = 18.89cy
23 To 23.7	$\frac{59.5+59.5}{2} \times 6 = 357/27 = 13.22$

0+6 - 0+20

14 To 15	$\frac{4.95+16}{2} \times 14 = 118.65/27 = 4.39cy$
15 To 16	$\frac{41+61.7}{2} \times 14 = 718.9/27 = 26.63cy$
16 To 17	$\frac{85+85}{2} \times 14 = 1190/27 = 44.07cy$
17 To 18	" " = 44.07cy
18 To 19	" " = 44.07cy
19 To 20	" " = 44.07cy
20 To 21	" " = 44.07cy
21 To 22	" " = 44.07cy
22 To 23	" " = 44.07cy
23 To 23.7	$\frac{59.5+59.5}{2} \times 14 = 833/27 = 30.85cy$

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JOB Flood Plain Calc's.
 SHEET No. 5 OF 7 JOB No. 5047
 DATE: 3/14/06

Prop. Conditions (earth)

0+20 — 0+40

14 To 15	$\frac{12 + 8}{2} \times 20 = 200/27 = 7.40 \text{ cy}$
15 To 16	$\frac{61.7 + 61.7}{2} \times 20 = 1234/27 = 45.7 \text{ cy}$
16 To 17	$\frac{85 + 85}{2} \times 20 = 1700/27 = 62.96 \text{ cy}$
17 To 18	" " = 62.96 cy
18 To 19	" " = 62.96 cy
19 To 20	" " = 62.96 cy
20 To 21	" " = 62.96 cy
21 To 22	" " = 62.96 cy
22 To 23	" " = 62.96 cy
22 To 23.7	$\frac{59.5 + 59.5}{2} \times 20 = 1190/27 = 44.07 \text{ cy}$

0+40 — 0+60

14 To 15	$\frac{8 + 16.2}{2} \times 20 = 247/27 = 9.15 \text{ cy}$
15 To 16	$\frac{66.5 + 68.9}{2} \times 20 = 1354/27 = 50.15 \text{ cy}$
16 To 17	$\frac{85 + 85}{2} \times 20 = 1700/27 = 62.96 \text{ cy}$
17 To 18	" " = 62.96 cy
18 To 19	" " = 62.96 cy
19 To 20	" " = 62.96 cy
20 To 21	" " = 62.96 cy
21 To 22	" " = 62.96 cy
22 To 23	" " = 62.96 cy
23 To 23.7	$\frac{59.5 + 59.5}{2} \times 20 = 1190/27 = 44.07 \text{ cy}$

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 66 PARK STREET ANDOVER, MA 01810
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JOB Flood Plain Calc's.
 SHEET No. 6 OF 7 JOB No. 5047
 DATE: 3/14/06

Prop. Conditions (e.g. 16)

0+60 - 0+69

14 To 15 $\frac{16.07 + 16.14}{2} \times 9 = 149.85 / 07 = 5.55 \text{ cy}$

15 To 16 $\frac{64.9 + 65.7}{2} \times 9 = 587.7 / 27 = 21.77 \text{ cy}$

16 To 17 $\frac{85 + 85}{2} \times 9 = 765 / 27 = 28.33 \text{ cy}$

17 To 18 " " = 28.33 cy

18 To 19 " " = 28.33 cy

19 To 20 " " = 28.33 cy

20 To 21 " " = 28.33 cy

21 To 22 " " = 28.33 cy

22 To 23 " " = 28.33 cy

23 To 23.7 $\frac{59.5 + 59.5}{2} \times 9 = 535.5 / 27 = 19.83 \text{ cy}$

*wall is removed

0+69 - 0+75.7

14 To 15 $\frac{12.8 + 16.6}{2} \times 6.7 = 98.49 / 27 = 3.65$

15 To 16 $\frac{65.7 + 81.1}{2} \times 6.7 = 491.78 / 27 = 18.21 \text{ cy}$

16 To 17 $\frac{85 + 85}{2} \times 6.7 = 569.5 / 27 = 21.09 \text{ cy}$

*17 To 18 " " = 21.09 cy

18 To 19 " " = 21.09 cy

19 To 20 " " = 21.09 cy

20 To 21 " " = 21.09 cy

21 To 22 " " = 21.09 cy

22 To 23 " " = 21.09 cy

23 To 23.7 $\frac{59.5 + 59.5}{2} \times 6.7 = 398.65 / 27 = 14.76 \text{ cy}$

Columns

32 columns @ 1x1 each ELEV = $1/27 = 0.037$ c.y.
Elev. 19.3 To 23.7 = 4.4 Height $(32 \times 4.4 \times 0.037 = 5.21$ c.y.)
32 columns @ 2' Dia. @ Each ELEV = $3.14/27 = 0.116$ c.y.)
Elev. 15.3 To 19.3 = 4 Height $(32 \times 4 \times 0.116 = 14.85$ c.y.)

Wall (East side)

1 wall @ 1.33 width x 10' long = $23.94/27 = 0.89$ c.y.
Elev. 15.3 To 18 = 2.7 Height $(1 \times 2.7 \times 0.89 = 2.40$ c.y.)

Stairway Enclosure

4 walls 15' long 0.53 thick x 1 = $4.89/27 = 0.16$ c.y.
Elev. 19.3 To 23.7 = 4.4 Height $(4 \times 4.4 \times 0.16 = 2.80$ c.y.)
Elev. 15.3 To 19.3 = 4 Height $(4 \times 4 \times 0.16 = 2.56$ c.y.)

Stairs

14 stairs - 1' width x 0.083 thick 4' long = $0.35/27 = 0.01$ c.y.
Elev. 19.3 To 23.7 = 4.4 Height $(14 \times 4.4 \times 0.01 = 0.62$ c.y.)
Elev. 15.3 To 19.3 = 4 Height $(14 \times 4 \times 0.01 = 0.56$ c.y.)

Rail

2 rails - 4" O.D. or 0.33 Dia. @ Each ELEV = $0.52/27 = 0.02$ c.y.
Elev. 19.3 To 23.7 = 4.4 Height $(2 \times 4.4 \times 0.02 = 0.18$ c.y.)
Elev. 15.3 To 19.3 = 4 Height $(2 \times 4 \times 0.02 = 0.16$ c.y.)

Summary of Flood Storage Provided

Existing Conditions Elev. 15.5 To 23.7 = 1,396.24 c.y.
Proposed Conditions Elev. 15.5 To 23.7 = 2,010.52 c.y.
Gain of Available Flood Storage = 664.08 c.y.

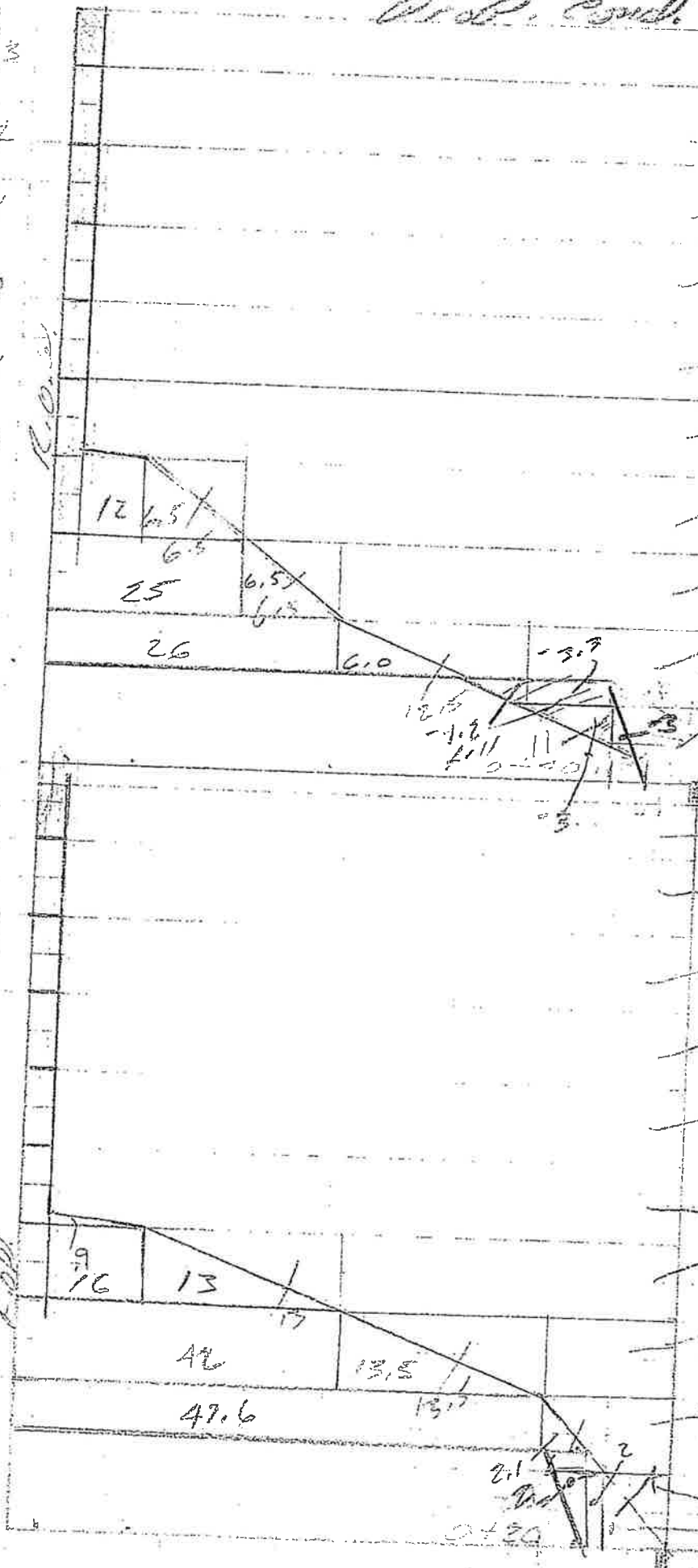
2/23/06
FROM

Scale = 1" = 2' vert.

#5097
R. 11th St.

Prop. Equal.

23
22
21
20
19
18
17
16
15
14
23
22
21
20
19
18
17
16
15
14



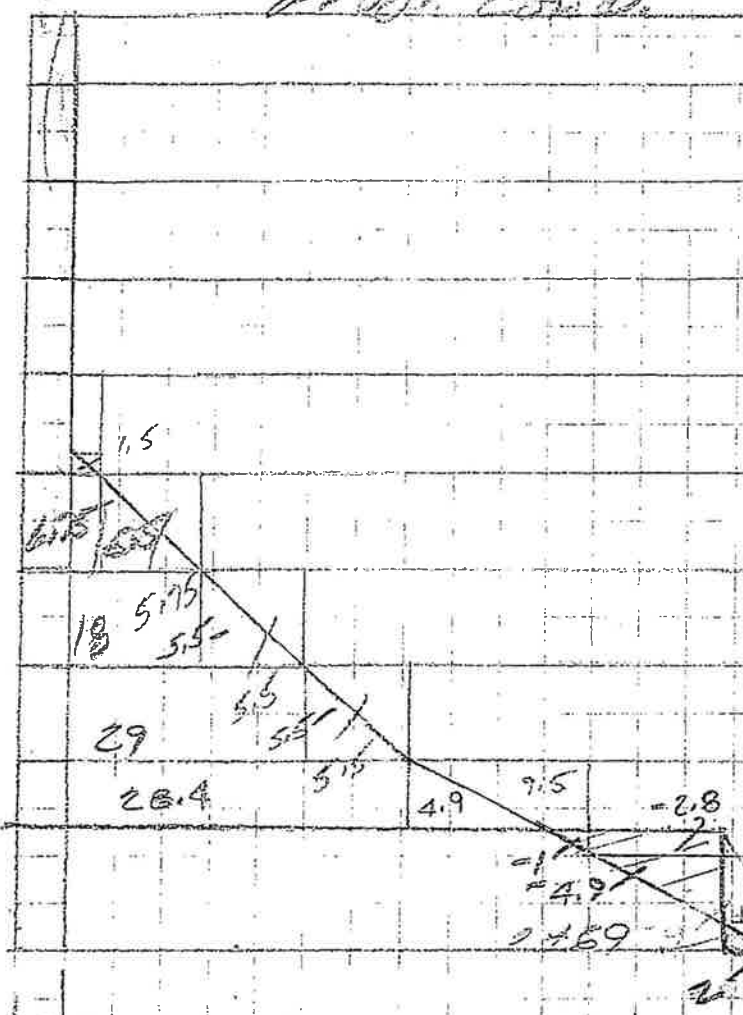
$56.7 + 2.8 = 59.5$
 $41 + 4 = 85$
 $31 + 4 = 85$
 $21 + 4 = 85$
 $11 = 3 = 0$
 $81 + 4 = 85$
 $60 + 6.5 = 66.5$
 $47 + 6.5 = 53.5$
 $22 + 12.5 = 34.5$
 $66.5 - 4.8 = 61.7$
 $56.7 + 2.8 = 59.5$
 $31 + 4 = 85$
 $21 + 4 = 85$
 $11 = 3 = 0$
 $81 + 4 = 85$
 $81 - 1.9 = 80.1$
 $25 + 13 = 38$
 $16 + 13.5 = 29.5$
 $16 + 13.5 + 29.5 + 42 + 13.5 = 85$
 $8 + 4 = 12$
 $4 = 4 + 2 + 2 = 12$
 start
 10/2

2/23/06

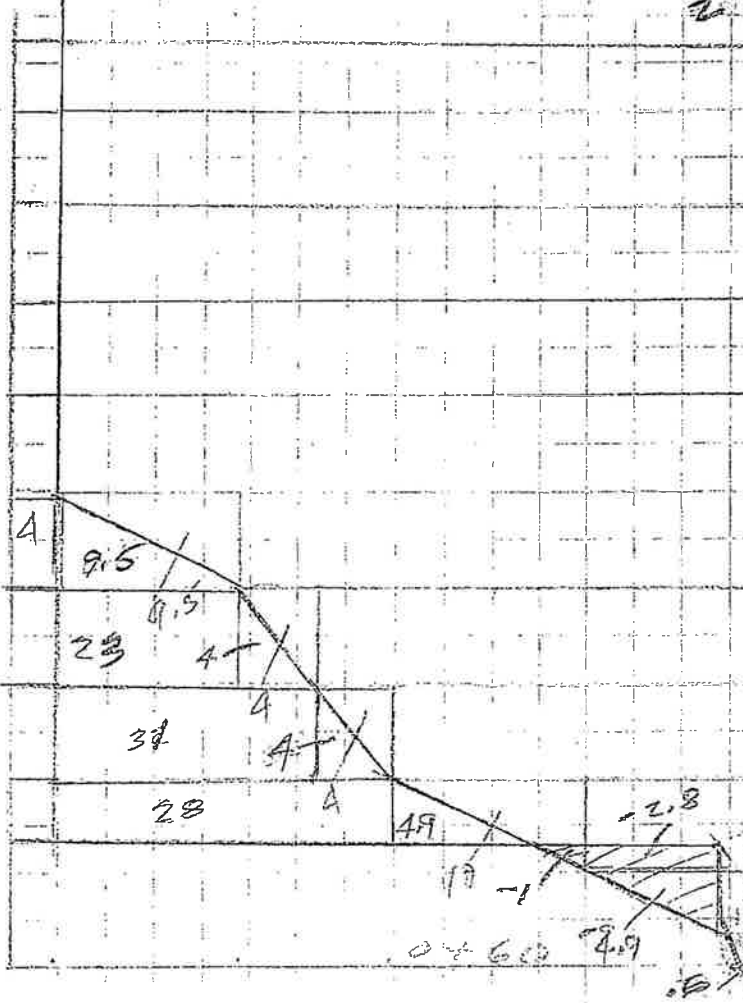
> cold = 1000 ft
PROP. COND.

21304
23.7
59.5
River ST.

23
22
21
20
19
18
17
16
15
14
23
22
21
20
19
18
17
16
15
14



$56.7 + 2.8 = 1000$
 $81 + 4 = 85$
 $81 + 4 = 85$
 $81 + 4 = 85$
 $78 + 2.8 = 79.76 + 3.74 + 1.5 = 85$
 $67 + 5.75 = 72.25 + 6.75 + 5.5 = 85$
 $56 + 5.5 = 61.5 + 18 + 5.5 = 85$
 $45 + 5.5 = 50.5 + 29 + 5.5 = 85$
 $26 + 9.5 = 35.5 + 28.1 + 4.9 = 68.5$
 $68.8 - 2.8 - 2 = 16.6$
 $19.5 - 4.9 + 2 = 16.6$



23.7 **59.5**
 $56.7 + 2.8 = 1000$
 $81 + 4 = 85$
 $81 + 4 = 85$
 $81 + 4 = 85$
 $81 + 4 = 85$
 $62 + 9.5 = 71.5 + 4 + 9.5 = 85$
 $54 + 4 = 58 + 23 + 4 = 85$
 $46 + 4 = 50 + 31 + 4 = 85$
 $66 + 7.0 = 73.6 + 28 + 4.9 = 68.9$
 $68.9 - 1 - 2.8 - 2 = 64.9$
 $15.6 + 0.6 + 2 = 16.7$

5/11/2012

May 11, 2006

Appendix K: Weighted Runoff Coefficient

WEIGHTED RUNOFF COEFFICIENT

River Street - Lofts - Condominium - Haverhill, Ma

Impervious = 0.90
Grass = 0.20

Drainage Structure	Station	Total Area	Imp. Area	CA	Grass Area	CA	Sum CA	CW	CAw
Exist. CB	Off-site	0.21	0.19	0.17	0.02	0.00	0.18	0.83	0.18
CB-1	Garage	0.12	0.12	0.11	0.00	0.00	0.11	0.90	0.11
CB-2	Lawn	0.03	0.00	0.00	0.03	0.01	0.01	0.20	0.01

May 11, 2006

Appendix L:

Rational Method - Pipe Sizing Calculations

River Street Lofts - HAVERHILL

TEN YEAR STORM EVENT - AVERAGE RUN OFF COEFFICIENT = 0.8

Drainage Structure	Station	Cover (ft)	Rim Elev.	Iny. Out.	Struct. to Invert	Drainage Area (CAW)	Sum CAW	Time of Conc. (hr)	Flow/Ga (cfs)	Flow/GT (cfs)	Slope (ft/ft)	Vel. VI Full (fps)	Pipe Length (feet)	Flow Time (min)	Qa/QT	Val/VI	Actual Vel. Va (fps)		
CB-1	Garage	2.50	14.70	11.20	DMH-1	11.14	0.11	5.00	5.30	0.68	12	4.22	0.0100	5.38	6	0.02	0.14	0.65	3.49
UDI	Garage	1.49	14.70	12.54	DMH-1	12.48	0.12	5.00	5.30	0.84	8	1.76	0.0150	5.03	4	0.01	0.36	0.91	4.57
DMH-1	Garage	2.73	14.77	11.04	DMH-2	10.72	0.23	5.00	5.30	1.22	12	4.22	0.0100	5.38	32	0.10	0.29	0.83	4.46
CB-2	Lawn	2.07	13.90	10.83	DMH-2	10.72	0.01	5.00	5.30	0.05	12	4.22	0.0100	5.38	11	0.03	0.01	0.20	1.08
DMH-2	Garage	3.63	15.25	10.62	STC-A	10.54	0.24	5.00	5.30	1.27	12	4.22	0.0100	5.38	8	0.02	0.30	0.85	4.57
STC-A	Garage	3.66	15.10	10.44	E.DMH-1	10.20	0.24	5.00	5.30	1.27	12	4.22	0.0100	5.38	24	0.07	0.30	0.85	4.57
Exist. CB	Deck	3.00	14.25	10.25	E.DMH-1	10.20	0.18	5.00	5.30	0.95	12	4.22	0.0167	5.38	3	0.01	0.23	0.77	4.14
E.DMH-1	Deck	3.05	14.25	10.20	E.DMH-2	10.12	0.42	5.00	5.30	2.23	12	5.45	0.0160	6.94	5	0.01	0.41	0.95	6.59
E.DMH-2	Wall	3.13	14.10	9.97	Exist. Out	9.85	0.42	5.00	5.30	2.23	12	5.34	0.0086	6.80	14	0.03	0.42	0.96	6.53

May 11, 2006

Appendix M: Inlet Capacity Analysis

Inlet Capacity Computation Sheet

10 - Year Design Storm - River Street Lofts

0.02% Traverse Slope
0.016 Manning's Coefficient for Roadway

Drainage Structure	Station	Weighted Drainage Area (CAW)	Sum (CAW)	Intensity (in/hr)	Flow Q (cfs)	Flow + By		Longitudinal Slope (%)	Width of Spread (ft)	Flow Depth (ft)	K Value from Chart	Inlet By-		Comments
						Pass (cfs)	Flow (cfs)					Capacity (cfs)	Pass (cfs)	
CB-1	Garage	0.11	0.11	5.30	0.58	0.00	0.00	1.00	5.90	0.12	27.00	0.77	0.00	OK
CB-2	Lawn	0.01	0.01	5.30	0.05	0.00	0.00	1.00	3.65	0.07	27.00	0.34	0.00	OK

Stormwater Recharge Calculations:

WATER QUALITY VOLUME

According to SCS Soil Survey, site consists of "A" soil type (See Soil Analysis)

WQV = Water Quality Volume

ReV = Recharge Volume

I = Total Impervious Area (including rooftop)
 = 0.12 acres (All buildings) + 0 acres (road)
 = 0.12 acres Total

I_r = Rooftop Impervious Area – 0.12 acres

Total Site Area: 0.15 acres

Find Water Quality Volume using 0.5" rule:

$WQV = (.5" \times I) / 12 = (.5 \times 0.12) / 12 = 0.005 \text{ acre-feet}$

STORM WATER RECHARGE

SOIL GROUP	TOTAL AREA (ac.)	I (ac.)	FACTOR (f)	ReV (ac.-ft.)
A	0.15	0.12	0.40	0.004
B			0.25	
C			0.10	

$ReV = (I \times f) / 12 = (0 \times 0.40) / 12 = 0 \text{ ac.-ft.}$

$Rooftop \text{ Runoff Recharged (RR)} = (I_r \times 0.5) / 12 = (0.12 \text{ ac} \times 0.5) / 12 = 0.004 \text{ a.f.} \times 43,560 = 174.24 \text{ c.f.}$

Recharge volume is achieved by infiltration within the underground infiltration and detention area:

TSS Removal Calculations:

Summary of TSS Removal – River Street – STC "A"					
A	B	C	D	E	F
BMP Used	TSS Removal Rate	Starting TSS Load	TSS Removed BxC	TSS Remaining (C-D)	Cumulative TSS Removal
Drainage Channel	25.00%	100.00%	25.00%	75.00%	25.00%
Hooded Catch Basin	25.00%	75.00%	18.75%	56.25%	43.75%
Stormceptor® *Model 900	80.00%	56.25%	45.00%	11.25%	88.75%

Total TSS Removal = 88.75%

***Based on impervious areas from StormCeptor Sizing Program (Rinker) and UMass Technology Assessment Charts (attached)**

APPENDIX

Table A1. Stormceptor® Capacities*

Model	Maximum Treatment Flowrate (gal/min.)**	Down Riser Pipe / Orifice Diameter (in.)	Sediment Capacity (ft ³)	Oil Capacity (gal)	Total Holding Capacity (gal)
STA/STC 900	285	6	75	280	950
STA/STC 1200	285	6	110	280	1230
STA/STC 1800	285	6	195	280	1830
STA/STC 2400	475	8	180	880	2495
STA/STC 3600	475	8	345	880	3750
STA/STC 4800	800	10	465	1025	5020
STA/STC 6000	800	10	610	1025	6095
STA/STC 7200	1110	12	725	1100	7415

* approximate, ** without by-passing

*** Table A2. Maximum Impervious Drainage Area Guidelines (acres)**

Stormceptor® Model (STA / STC)	Sensitive Area (80% TSS removal)	Standard Area (70% TSS removal)	Degraded Area (60% TSS removal)	Treatment Train (50% TSS removal)
* 900	0.45	0.55	0.70	0.90
1200	0.70	0.85	1.05	1.45
1800	1.25	1.50	1.90	2.55
2400	1.65	2.00	2.50	3.35
3600	2.60	3.15	3.95	5.30
4800	3.60	4.30	5.40	7.25
6000	4.60	5.55	6.95	9.25
7200	5.55	6.70	8.40	11.25

Table 6. Sediment Depths Indicating Required Maintenance* (Table 6. Sediment Depths Indicating Required Maintenance*) Table A3. Sediment Depths Indicating Required Maintenance*

Model	Sediment Depth (feet)
900	0.50
1200	0.75
1800	1.00
2400	1.00
3600	1.25
4800	1.00
6000	1.50
7200	1.25

* based on 15% of the interceptor's sediment storage

Rinker Stormceptor CD Sizing Program
 United States
 Version 4.0.0

Project Details			
Project	River St. Lofts - STC "A"	Project #	5047
Location	River Street - Haverhill	Company	Merrimack Engineering Services
Date	04/03/06	Contact	J. Murphy

Selected Rainfall Station	
State	MASSACHUSETTS
Name	MILTON BLUE HILL OBS
ID #	
Elev. (ft)	630
Latitude	N 42 deg 12 min
Longitude	W 71 deg 6 min

Particle Size Distribution		
Diam. (um)	Percent (%)	Spec. Gravity
20	20	1.30
60	20	1.80
150	20	2.20
400	20	2.65
2000	20	2.65

Site Parameters	
Total Area (ac)	0.15
Imperviousness (%)	82.
Impervious Area (ac)	.12

Stormceptor Sizing Table		
Stormceptor Model	% Runoff Treated	% TSS Removal
STC 450	98	93
STC 900	100	96
STC 1200	100	96
STC 1800	100	96
STC 2400	100	97
STC 3600	100	98
STC 4800	100	98
STC 6000	100	98
STC 7200	100	99
STC 11000	100	99
STC 13000	100	99
STC 16000	100	99

Comments :

Calculations for impervious area includes roof runoff from Multi-family unit.

*Model specified

See attached Table A2 for Sensitive Area (80% TSS removal)

May 11, 2006

DRAINAGE- FACILITIES OPERATIONAL AND MAINTENANCE PLAN

May 11, 2006

RIVER STREET LOFTS CONDOMINIUMS

HAVERTHILL, MASSACHUSETTS

OWNER:

**VINCENT O'ROURKE
400 CHADWICK ROAD
BRADFORD, MA. 01835**

PARTY RESPONSIBLE FOR O & M:

**VINCENT O'ROURKE
400 CHADWICK ROAD
BRADFORD, MA. 01835**

SHORT TERM MAINTENANCE PROGRAM DURING CONSTRUCTION

1. A site inspection shall be performed by a P.E. during the construction of the grading and drainage facilities and those improvements shown on the Site Development Plans, which will have an impact on the wetlands. These inspections shall be done at least once every week during the applicable construction period. Inspections shall not be required during periods of inactivity to these facilities. A report shall be generated and forwarded to the Haverhill Conservation Commission after each inspection.
2. Care shall be taken at all times to control erosion and sediment movement by compaction of disturbed areas and by the use and maintenance of hay bale/silt fences at each drainage structure and at limits of work as shown on the Site Plans. Other than erosion, no pollutant discharges are expected to occur during construction. All exposed soil finish surfaces shall be immediately landscaped and stabilized; or loamed, seeded and mulched with a layer of mulch hay. Outside of the growing season, surfaces shall be covered with a layer of mulch hay until climate conditions allow for seeding.
3. The contractor shall ensure that all runoff is collected in the appropriate structures as they are constructed and that uncontrolled runoff is kept to a minimum. The contractor shall protect the safety of the personnel on site by installing grates or covers on each drainage structure when it is built. The developer of the project will be responsible for the operation and maintenance of the stormwater management systems during construction.
4. During construction, all drainage structures will be cleaned on an as needed basis and/or after heavy rainfalls. Prior to the placement of any impervious materials on site, all drainage structures shall be properly installed and functional. After construction, the inspection of catch basins, including the oil and grease traps and Stormceptor® shall be performed on a four times per year basis. The basins are to be cleaned at least once per year (after spring street

SHORT TERM MAINTENANCE PROGRAM DURING CONSTRUCTION (Cont'd.)

sweeping) to prevent blockage. If it is found at the time of cleaning that the depth of the accumulated sediment is greater than 50% of the depth of the sump, the maintenance schedule will be adjusted to include more frequent cleanings. Disposal of the accumulated sediment and hydrocarbons must be in accordance with applicable local, state, and federal guidelines and regulations. Structural repairs will be performed as needed.

5. The recharge/detention facilities and grass swale shall be constructed first to insure a final settling area is available for the development. Infiltration systems however will be kept off line until contributing areas have been stabilized. The areas specified for rip-rap installation will also be constructed at this time. The owner will maintain the detention basins and forebays on an as needed basis, but at a minimum, the structures must have any and all sediment removed after any significant rain storm event of two inches or more, and the structures are to be inspected on a monthly basis. Sediment accumulated in the detention basins or forebays is to be removed by machine (backhoe), which can work from the stabilized top of berms (6' wide) adjacent to the detention basins. Sediment accumulated at the inlets and outlets of pipes must be removed by shovel, as can sediment accumulated over rip-rapped or swale areas.

6. The deep sump catch basins will also be inspected on a weekly basis to insure that no appreciable amount of sediment remains in the sump for prolonged periods of time. Sediment can be removed by shovel for catch basins with installed oil separator hoods or grease traps. Any sediment overflowing into the discharge pipes from the catch basins is to be flushed to either the next downstream manhole or to the sediment forebay and then removed by machine or shovel.

7. To reduce the amount of sediment entering the catch basins, Stormceptor®, and the drainage system during the construction of each phase of the project, the catch basins will be surrounded by haybales. This will prevent some of the sediment from entering the catch basins during storm events. In addition, being discharged from the construction site, sediment-contaminated storm water will be processed in the storm water treatment system. Clean water bypassing the site will be routed directly to the receiving stream. Sediment ponds and traps, vegetated buffer strips, sediment barriers or filters, dikes, and other BMP's intended to trap sediment on site will be constructed as one of the first steps in grading. These BMP's will be installed before other land-disturbing activities take place.

- Selected BMP's
- Straw Bale Barrier
- Brush Barrier
- Silt Fence
- Vegetative Strip
- Sediment Trap
- Temporary Sediment Pond

8. During and after excavation of the infiltration basin/detention area, all excavated materials shall be removed off-site and protected with siltation fencing until removed or reused on-site, away from the basin, to prevent redeposition during run-off events. Light earth moving equipment shall be used to excavate the infiltration basin/subsurface infiltration area. Use of heavy equipment causes the compaction of the soils beneath the basin floor and side slopes, resulting in reduce infiltration capacity. Since some compaction of the soils will occur during construction, the infiltration basin floor shall be deeply tilled with a rotary tiller or a disc harrow to restore infiltration rates after construction. All excavated materials shall be properly handled and disposed during and after construction.

SHORT TERM MAINTENANCE PROGRAM DURING CONSTRUCTION (Cont'd.)

9. Forty-eight hours prior to construction of the subsurface infiltration system located in the lower level parking area; the contractor must contact the design engineer to coordinate the following inspections during construction.
 - Inspection of the open excavation area prior to any construction
 - Inspection of the 12" mixed sand loam layer
 - Inspection of the completed pipe network prior to backfilling.
10. After construction of the subsurface infiltration area/detention area, the vicinity shall be roped off to all vehicular and construction traffic.
11. Sweeping of tracked soils on public way to be performed weekly, or as necessary. Additional crushed stone to be placed within the filter berm as required to minimize tracking of soils offsite.
12. If storm events occur after the side slopes and other areas that are to be stabilized have been planted, but prior to seed germination, then re-grading and replanting of those areas may be required.
13. Upon completion of the drainage facilities and the successful establishment and stabilization of soils and vegetation, any sediment buildup within each BMP structure is to be removed. In the event the basin has failed to develop vegetation, the following method of reseeding shall occur:
 1. Cut and rake any existing vegetation.
 2. Rotor-till existing soil and rake into soil a grass seed mixture of tall fescue and perennial ryegrass at an 8:3 ratio
 3. Cover with straw mulch netting staked with wooden pegs every 4 feet.
14. During the first year of operation the drainage structures, Stormceptor®, subsurface drainage area & infiltration basin shall be inspected shortly after each storm event greater than 1.5 inches and again 2 to 3 days later to ensure that the systems are functioning properly and the infiltration structures and detention ponds are emptied within three days. Any evidence of erosion within the infiltration basins and catch basins structures shall be repaired as outlined above. Any built-up sediment within the basin, and inlet pipes shall be removed and monitored for any additional built up sediment. Any extraneous shrub or brush from embankment areas shall be removed; any burrow holes or barren spots shall be filled with compacted loam and seeded. In the event that any drainage device is observed not functioning properly or excess sediment build-up is observed, the responsible party shall contact the P.E. within 72 hours.
15. The above referenced maintenance sequence shall also be performed when the drainage system is complete and online after its initial 30 and 60 days.
16. Upon substantial completion of the drainage facilities an inspection shall be performed by the P.E. and a report issued to the Haverhill Conservation Commission.
17. Upon completion of and the successful establishment and stabilization of the site and the landscaped areas, the P.E. shall perform an inspection with an agent of the Haverhill

May 11, 2006

Appendix Q: Boring Logs and Location

BORING LOCATION PLAN

Project **RIVER ST.- CONDO'S
HAVERHILL MA.**

Project No: **05.269 NH** Date: **8-15-05**



MILLER ENGINEERING & TESTING, INC.

100 SHEFFIELD ROAD - PO BOX 4776 / MANCHESTER, NH HAMPSHIRE 03108
TELEPHONE (603) 869-6015 / FAX (603) 869-6641



RIVER



PROPOSED SITE



PARKING LOT

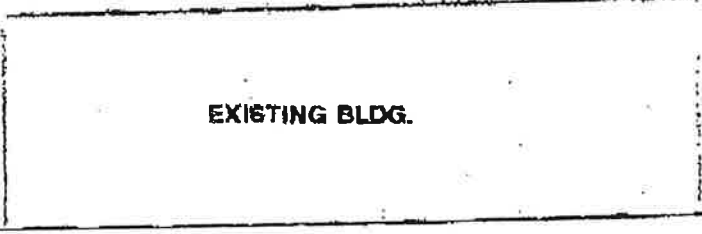
RETAINING WALL

SIDEWALK

RIVER ST.(RT. 110)



STAIRWAY



EXISTING BLDG.

NOT TO SCALE

09:47AM FROM-MILLER ENGINEERING

1-603-668-8641

T-344 P.002/006 F-764

TEST BORING LOG

MILLER ENGINEERING & TESTING, INC. 10 ROAD - PO BOX 4775 / MANCHESTER, NEW HAMPSHIRE 03108 TELEPHONE (603) 668-8216 / FAX (603) 988-9541	Project: <u>RIVER STREET CONDO'S HAVERHILL, MA</u>	Sheet <u>1</u> of <u>1</u>
	Project No: <u>05.269.NH</u>	Boring No: <u>B-1</u>
	Date Start: <u>8/15/05</u> Date End: <u>8/15/05</u>	Location: <u>see plan</u>
	Surface Elev: _____	

GROUNDWATER OBSERVATIONS			
CASING	SAMPLER	DATE	DEPTH
Hollow Stem Auger	Split Spoon	8/15/05	14.5'
2-1/4" ID	1-3/8" ID		
	140 pounds		
	30 inches		

SAMPLE					Strata Change	Sample Description	Notes
No.	Depth	Pen.	Rec.	Blows/6"			
S-1	0.0-2.0'	24"	12"	4-4 9-15	13.0'	S-1: Medium dense, brown, fine to medium sand, silt, wood, brick. (FILL) S-2: Loose, brown, fine to medium sand. (FILL)	
S-2	2.0-4.0'	24"	14"	3-3 4-7		S-3: Loose, light brown, fine sand, trace medium sand.	
S-3	4.0-6.0'	24"	18"	6-5 4-5			
S-4	9.0-11.0'	24"	18"	4-5 29-36		S-4: Dense, brown, silty sand.	
S-5	14.0-14.5'	6"	6"	41-50/0"	20.0'	S-5: Dense, brown, fine to coarse sand, gravel.	
S-6	19.0-20.0'	12"	12"	23-60		S-6: Wet, very dense, brown, fine to coarse sand, gravel.	
Terminated @ 20.0'							

R. Marcoux	COHESIVE CONSISTENCY (Blows/Foot)	CONELESS DENSITY (Blows/Foot)	PROPORTIONS USED
R. Michaud	0-2 VERY SOFT 2-4 SOFT 4-8 MEDIUM STIFF 8-18 STIFF 15-30 HARD	0-4 VERY LOOSE 4-10 LOOSE 10-30 MEDIUM DENSE 30-50 DENSE 50+ VERY DENSE	TRACE: 0-10% LITTLE: 10-20% SOME: 20-35% AND: 35-50%

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES: TRANSITION MAY BE GRADUAL. READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THE BORING LOGS. FLUCTUATIONS IN THE LEVEL OF THE GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS WERE MADE.

2005 09:47AM FROM-MILLER ENGINEERING

1-603-668-8641

T-344 P 003/006 F-784

TEST BORING LOG



100 WINDMILL ROAD - PO BOX 4775 / MANCHESTER, NEW HAMPSHIRE 03106
TELEPHONE (603) 668-6016 / FAX (603) 668-8641

Project: RIVER STREET CONDO'S HAVERHILL, MA
 Project No: 05.269.NH
 Date Start: 8/15/05
 Date End: 8/15/05

Sheet 1 of 1
 Boring No: B-2
 Location: see plan
 Surface Elev: _____

CASING
 Hollow Stem Auger
 2-1/4" ID

SAMPLER
 Split Spoon
 1-3/8" ID
 140 pounds
 30 inches

GROUNDWATER OBSERVATIONS

DATE	DEPTH	CASING AT	STABILIZATION PERIOD
8/15/05	14.5'		upon completion

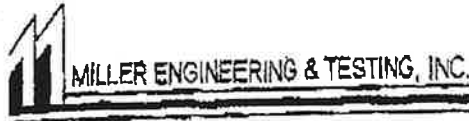
Case bl/ ft.	SAMPLE					Strata Change	Sample Description	Notes
	No.	Depth	Pen.	Ret.	Blow #/6"			
	S-1	0.0-1.0'	12"	6"	3-2 50K		S-1: Medium dense, brown, fine sand, silt, gravel. (FILL)	
	S-2	2.0-4.0'	24"	12"	5-2 3-2		S-2: Loose, brown, fine to medium sand.	
	S-3	4.0-6.0'	24"	16"	3-2 2-2		S-3: Loose, brown, fine to medium sand.	
	S-4	9.0-11.0'	24"	18"	8-1 28-10	10.0'	S-4: Dense, brown, fine to coarse sand, some gravel.	
	S-5	14.0-15.0'	12"	8"	38-55		S-5: Wet, brown, fine to coarse sand, gravel.	
	S-6	19.0-21.0'	24"	16"	14-23 24-39	21.0'	S-6: Wet, very dense, brown, fine to coarse sand, gravel, trace silt.	
							Terminated @ 21.0'	

Client: R. Marcoux
 Engineer: R. Michaud
 Inspector: _____

COHESIVE CONSISTENCY (Blows/Feet)	COHESIONLESS DENSITY (Blows/Feet)	PROPORTIONS USED
0-2 VERY SOFT	0-4 VERY LOOSE	TRACE: 0-10%
1-4 SOFT	4-10 LOOSE	LITTLE: 10-20%
1-8 MEDIUM STIFF	10-30 MEDIUM DENSE	SOME: 20-35%
1-15 STIFF	30-50 DENSE	AND: 35-50%
6-30 HARD	50+ VERY DENSE	

REMARKS:
 THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITION MAY BE GRADUAL. WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL AT TIMES AND UNDER CONDITIONS STATED ON THE BORING LOGS. FLUCTUATIONS IN THE LEVEL OF THE GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS WERE MADE.

TEST BORING LOG



HEFFIELD ROAD - PO BOX 4778 / MANCHESTER, NEW HAMPSHIRE 03108
 TELEPHONE (603) 659-8018 / FAX (603) 659-8941

Project: RIVER STREET
CONDOS
HAVERHILL, MA

Project No: 05.269.NH

Date Start: 8/15/05
 Date End: 8/15/05

Sheet 1 of 1
 Boring No: B-3
 Location: see plan
 Surface Elev: _____

CASING	SAMPLER
Hollow Stem Auger	Split Spoon
2-1/4" ID	1-3/8" ID
	140 pounds
	30 inches

GROUNDWATER OBSERVATIONS			
DATE	DEPTH	CASING AT	STABILIZATION PERIOD
8/15/05	14.5'		upon completion

Cas ht/ ft.	SAMPLE					Strata Change	Sample Description	Notes
	No.	Depth	Pen.	Rec.	Blow /6"			
	S-1	0.0-2.0'	24"	12"	1-3 3-5	8.0'	S-1: Loose, dark brown, fine to medium sand, wood, brick. (FILL)	
	S-2	2.0-4.0'	24"	16"	10- 6-6		S-2: Medium dense, light brown, fine sand, glass. (FILL)	
	S-3	4.0-6.0'	24"	12"	4-4 2-3		S-3: Loose, light brown, fine sand, glass. (FILL)	
	S-4	6.0-8.0'	24"	12"	3-3 4-3		S-4: Same as S-3.	
	S-5	8.0-10.0'	24"	12"	2-1 1-4	13.5'	S-5: Black ash. (FILL)	
	S-6	10.0-12.0'	24"	14"	2-2 5-4		S-6: Loose, dark brown, fine sand, trace silt, black ash. (FILL)	
	S-7	14.0-15.2'	14"	14"	5-8 30-50	21.0'	S-7: Dense, brown, fine to coarse sand, little gravel.	
	S-8	19.0-21.0'	24"	22"	9-11 23-3		S-8: Wet, brown, fine to coarse sand, gravel.	
Terminated @ 21.0'								

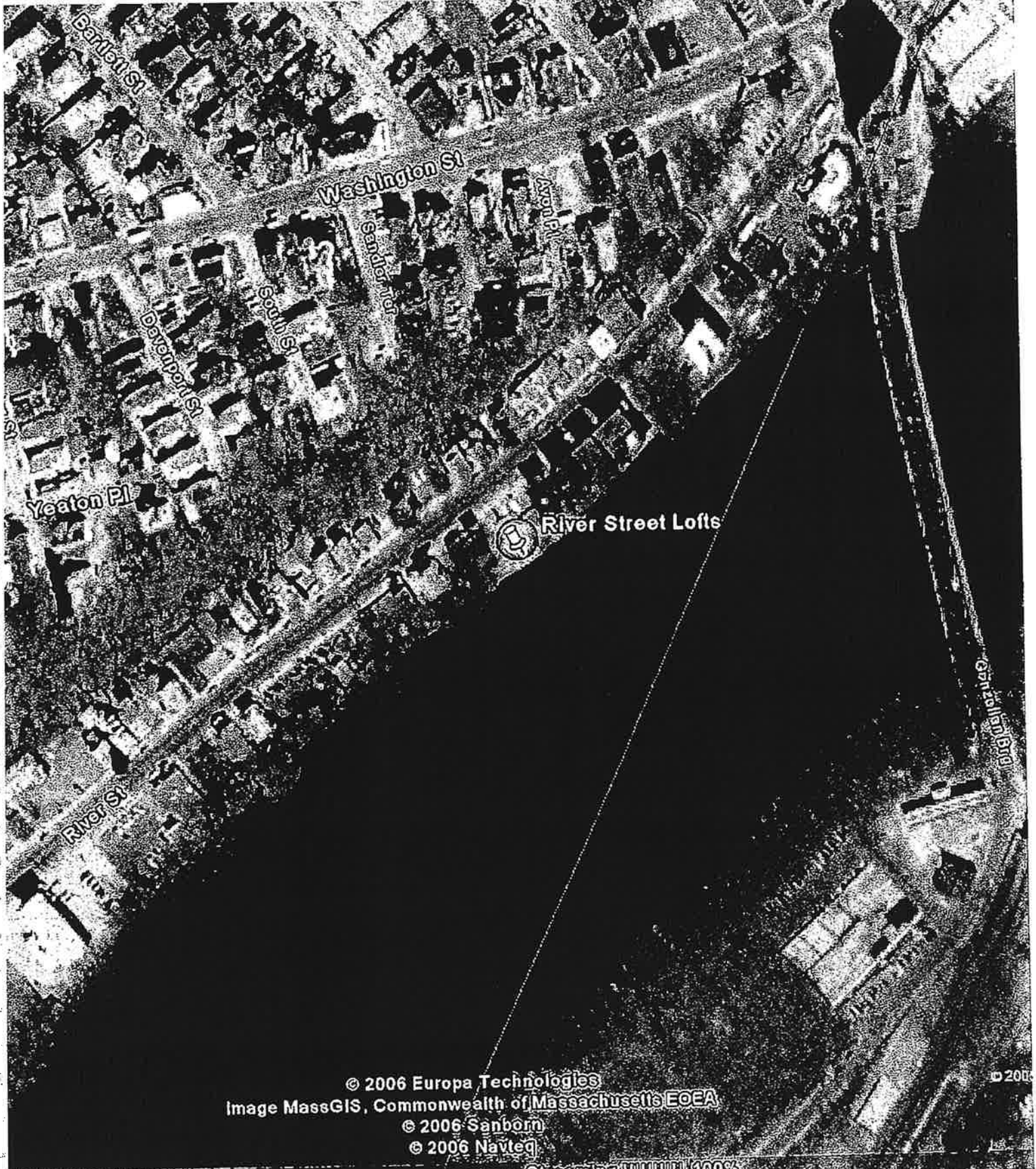
CORRECTOR	NAME	COHESIVE CONSISTENCY (Blows/Foot)		COHESIONLESS DENSITY (Blows/Foot)		PROPORTIONS USED	
		0-2	2-4	5-10	10-30	TRACE	LITTLE
	R. Marcoux	VERY SOFT	SOFT	VERY LOOSE	MEDIUM DENSE	0-10%	10-20%
	R. Michaud	MEDIUM STIFF	STIFF	LOOSE	DENSE	SOME	AND
		15-30	HARD	30-50	50+	20-35%	35-50%

ES:

WORKS: THE STRATIFICATION LINES REPRESENT THE APPARENT BOUNDARY BETWEEN SOIL TYPES. TRANSITION MAY BE GRADUAL. WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THE BORING LOGS. FLUCTUATIONS IN THE LEVEL OF THE GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS WERE MADE.

May 11, 2006

Appendix R: Site Photo's



© 2006 Europa Technologies
Image MassGIS, Commonwealth of Massachusetts EOGA
© 2006 Sanborn
© 2006 Navteq

09° W elev 27 ft

Streaming 100%

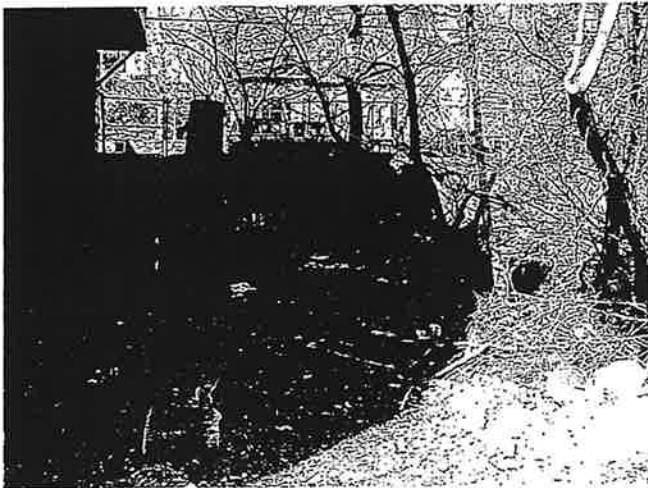
© 2006



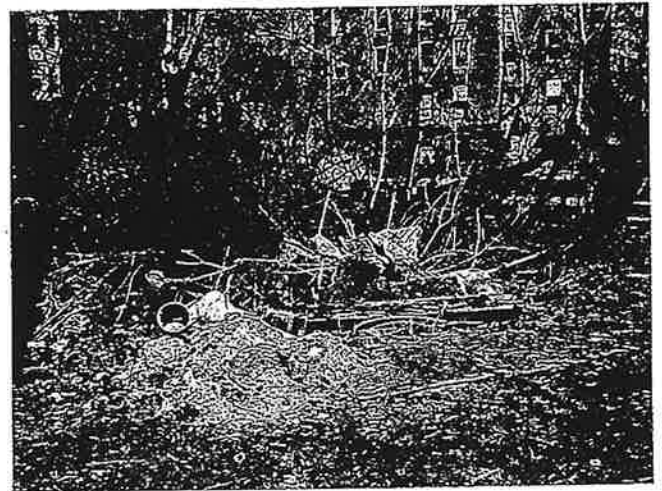
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03 Exist Site - River S
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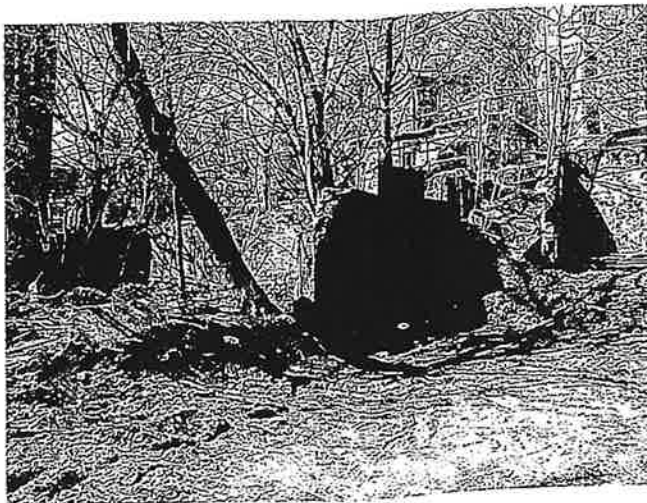
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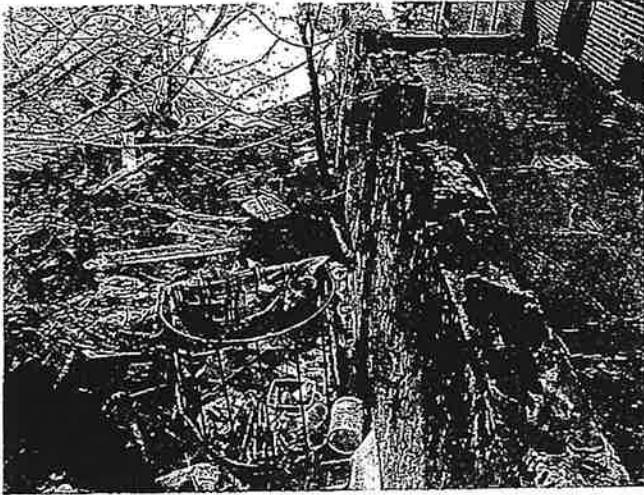
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3/16/2006 12:55



08 Exist Site - River S
3/16/2006 12:47



09 Exist Site - River S
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