ONLINE AUCTION

Aug 8 thru 5pm, Monday Aug 15th

New London CT

7.74± Acre Development Tract

Condominium Approvals in Place!

Impact Studies & Permitting Completed!
Ready for you to post bond & begin construction!

LOCATION: A) 22 Georgetown Rd, New London CT (6.36± Acres)
B) 115R Niles Hill Road, Waterford CT (1.38± Acres)

DESCRIPTION: 7.74± acre development tract
2 parcels to be sold as one tract!

COUNTY: New London

PROPERTY ID# A) E23 0047 0003 & B) 00487800

TAXES: A) $ 17,182.96
B) $ 493.88

**BUYER SHOULD NOT RELY ON THE SELLER'S CURRENT PROPERTY TAXES AS THE AMOUNT OF PROPERTY TAXES THAT THE BUYER MAY BE OBLIGATED TO PAY ON THE YEAR SUBSEQUENT TO PURCHASE. A CHANGE OF OWNERSHIP OR PROPERTY IMPROVEMENTS TRIGGERS REASSESSMENTS OF THE PROPERTY THAT COULD RESULT IN HIGHER PROPERTY TAXES. IF YOU HAVE ANY QUESTIONS CONCERNING VALUATION, CONTACT THE COUNTY PROPERTY APPRAISER'S OFFICE FOR INFORMATION.

UTILITIES: Water, Electric & Sewer available at the road.

ZONING: R-3; Multi-family Medium Density

FRONTAGE: 462±' frontage on Georgetown Road
16.84±' frontage on Gardner Ave.

TERMS: $2,500 Credit Card Authorization in order to bid. A 10% Earnest Money Deposit is due to closing agent office within 24 hours of termination of auction. Remaining Balance due at closing on or before 45 days.
11% Buyer's Premium.

Information Disclaimer

The data provided in this due diligence packet was compiled from a number of sources, including the public records, as a courtesy to the potential bidder. It is NOT intended to include all of the documentation affecting the subject property, but merely a partial collection of some of the frequently requested documentation. A potential bidder should not rely upon the information provided as his sole source of due diligence material. It is each bidder's sole responsibility to accomplish his due diligence in whatever manner he deems advisable. Although all information is derived from sources believed to be correct, neither the broker nor the seller make any warranty or representation as to the validity or accuracy of any information provided.

PROPERTY DETAILS – Elizabeth Haven's Estate

- Premier approved condominium project consisting of 31 – 1,400±sf units on an undeveloped 7.74± acre tract of land in a quiet community setting in New London, CT.
- Impact Studies Completed! Ready for you to post bond & begin construction!
- Designed for 31 total units with 3 bedrooms & 2-1/2 baths, kitchen, living room & basement, 1 car garage with 2 additional parking spaces at the back of each unit and an optional 10' x 20' deck at the back overlooking trees and natural vegetation.
- Located in a cozy New England style neighborhood away from the hustle & bustle but within the limits of the city of New London.
- A short walk to restaurants, doctors, the only major hospital along the immediate coastline, the beautiful homes along Ocean Beach the Thames River, marinas, restaurants overlooking the river, Mitchell College and the Electric Boat's office complex. A short drive to the West is the Eugene O'Neil Theatre Center and Harkness Memorial Park.
- Unique demographics with an increase in demand for medium income housing
- Approved project meets all required codes
- Construction is limited to 3 of the 7 acres allowing for 4 acres of undisturbed natural resources to residents
- Project has been approved to be constructed in three phases
- Perfect for middle income families looking for their first home or the older empty nest couples looking for a place with no lawn or maintenance responsibilities.
- Approvals from the Planning & Zoning Commission of the City of New London as well as a permit to conduct regulated activities from the New London Conservation Commission and an Inland Wetlands Permit are good until May 12, 2019.
- Phase 1 was to include the building of 2 buildings with 9 units
- Phase II was to allow for 3 buildings with a total of 17 units
- Phase III was to be the construction of the final building with 5 units and the completion of the site work.
- The project was ready to begin identifying a General Contractor and obtaining a building permit but due to funding & health issues, the project was put on hold.
- The seller has invested a lot of time, energy & effort, now it's your turn to continue on with the approved "Elizabeth Haven's Estate" or plan your own development!

Conceptual Drawing

TABLE OF CONTENTS

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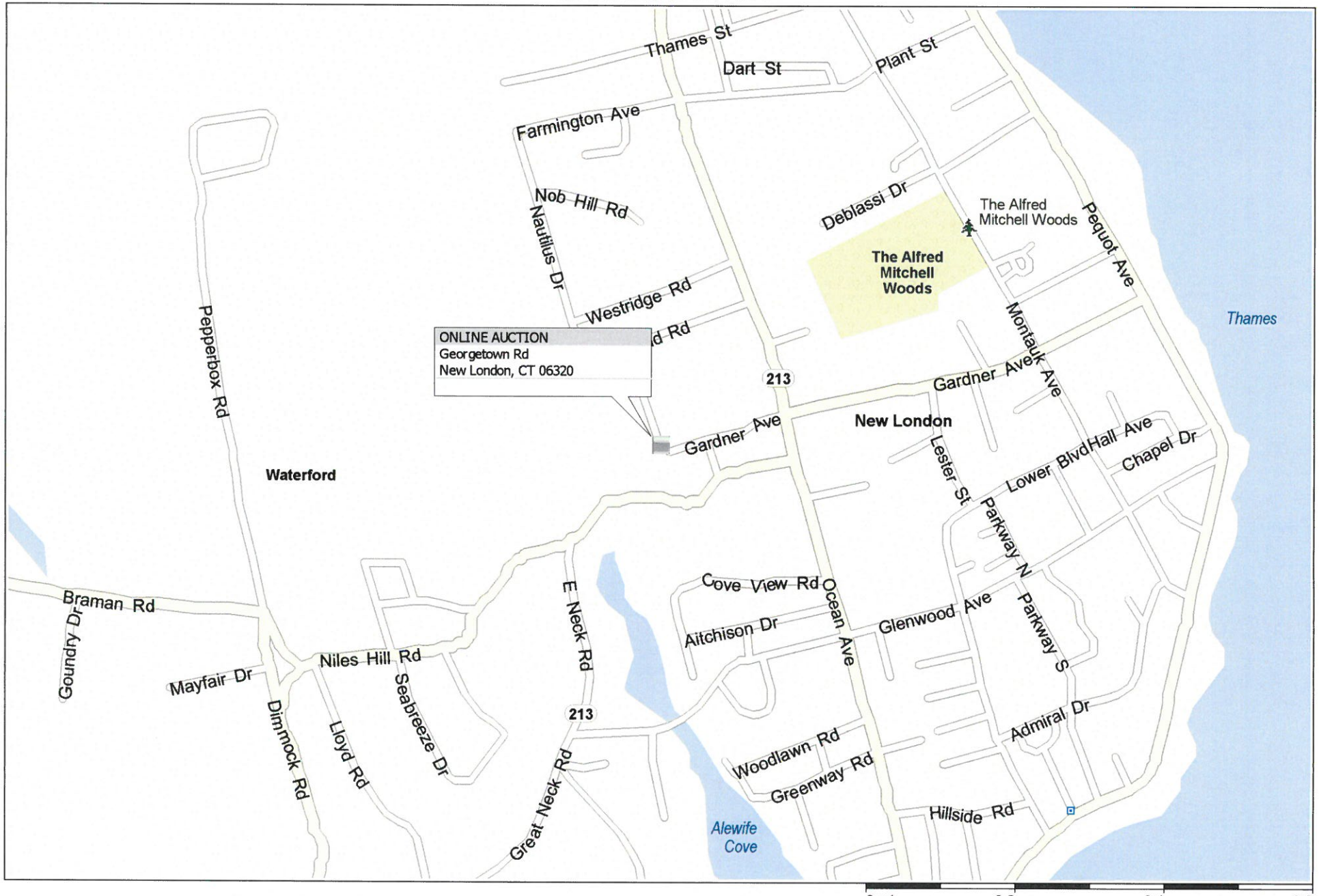
ONLINE AUCTION



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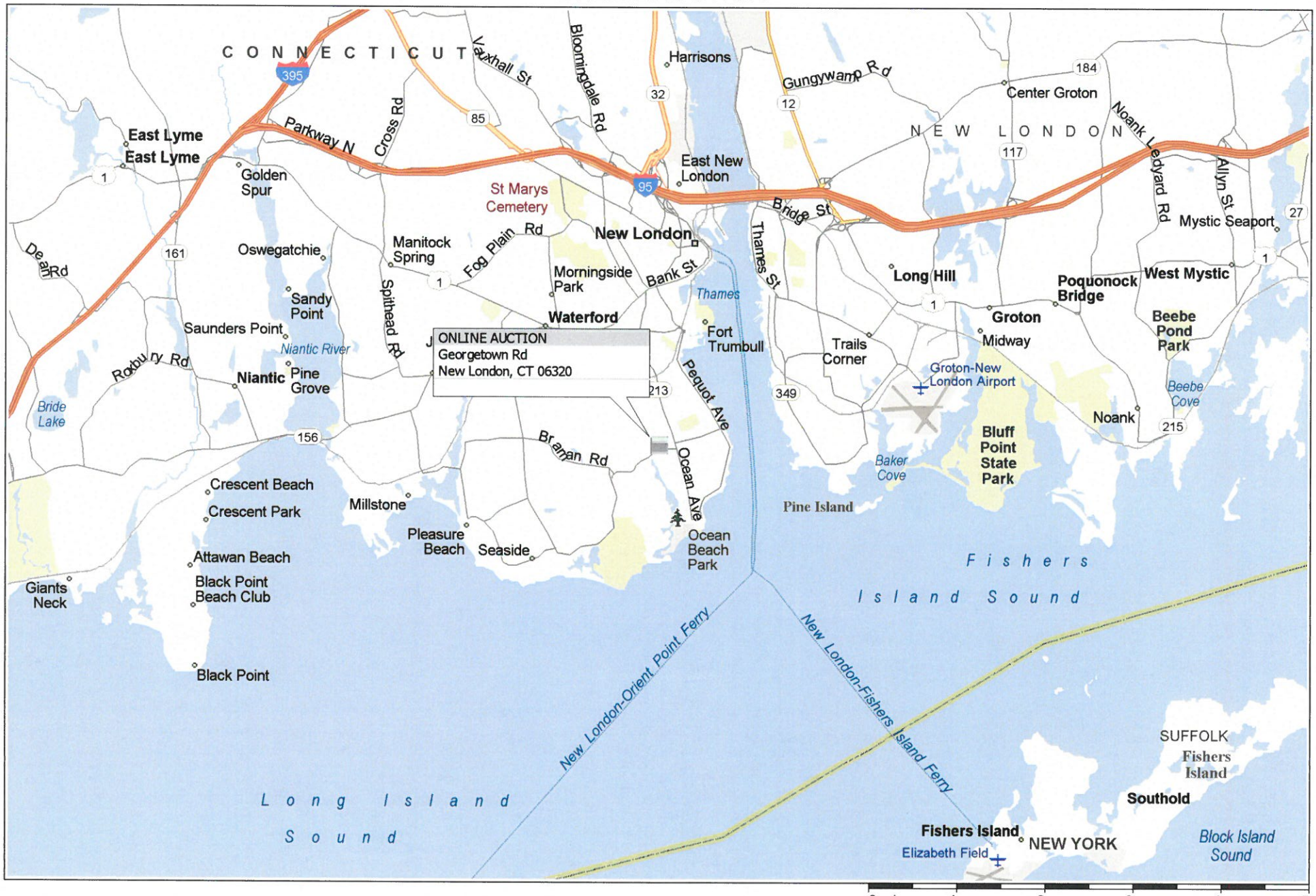
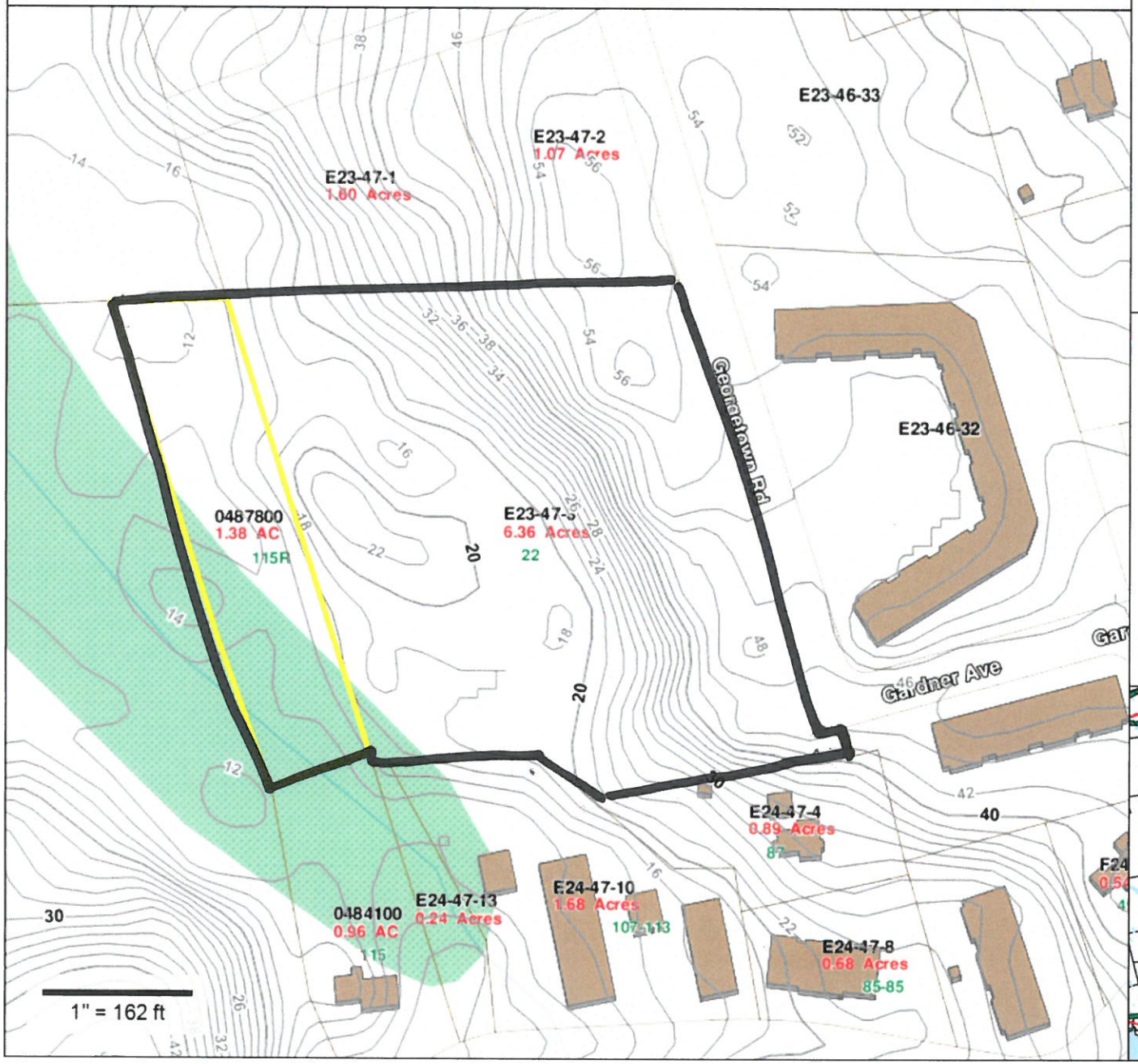


SCCOG

Topography

June 28, 2016



Property Information

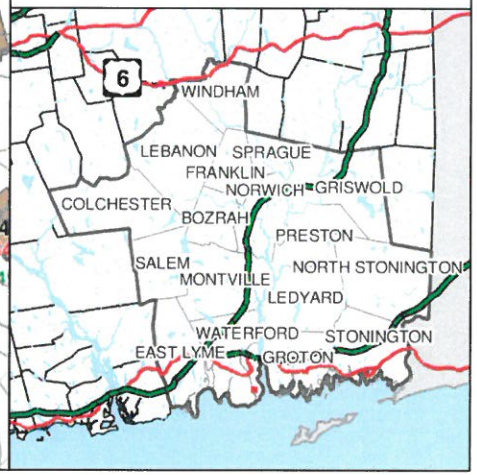
Property ID	152-0487800
Location	115R NILES HILL ROAD
Owner	NEW ENGLAND DEVELOPMENT A

SCCOG

MAP FOR REFERENCE ONLY
NOT A LEGAL DOCUMENT

The Town makes no claims and no warranties, expressed or implied, concerning the validity or accuracy of the GIS data presented on this map.

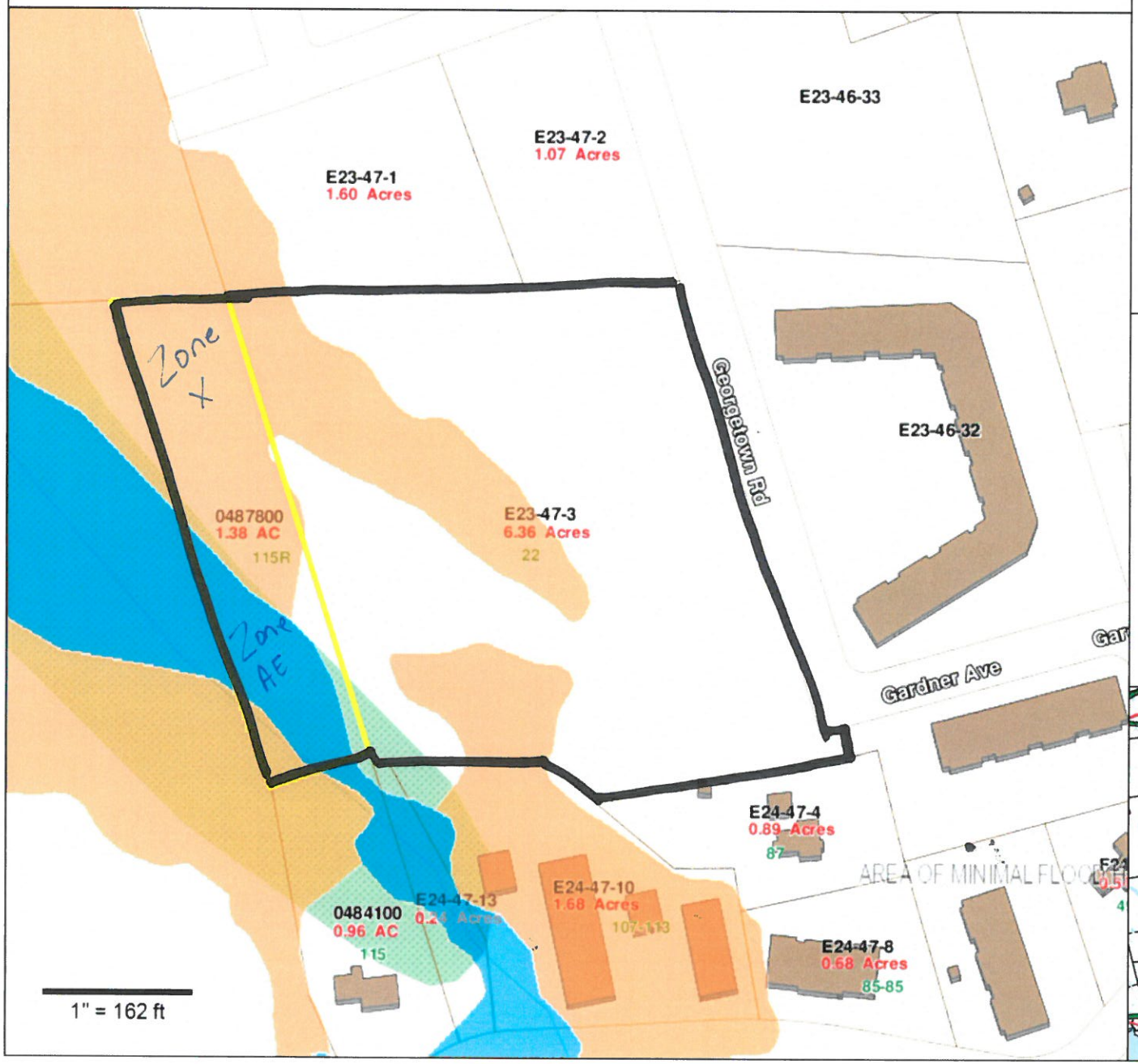
Parcels updated October 1, 2013



SCCOG

Flood Zone

June 28, 2016



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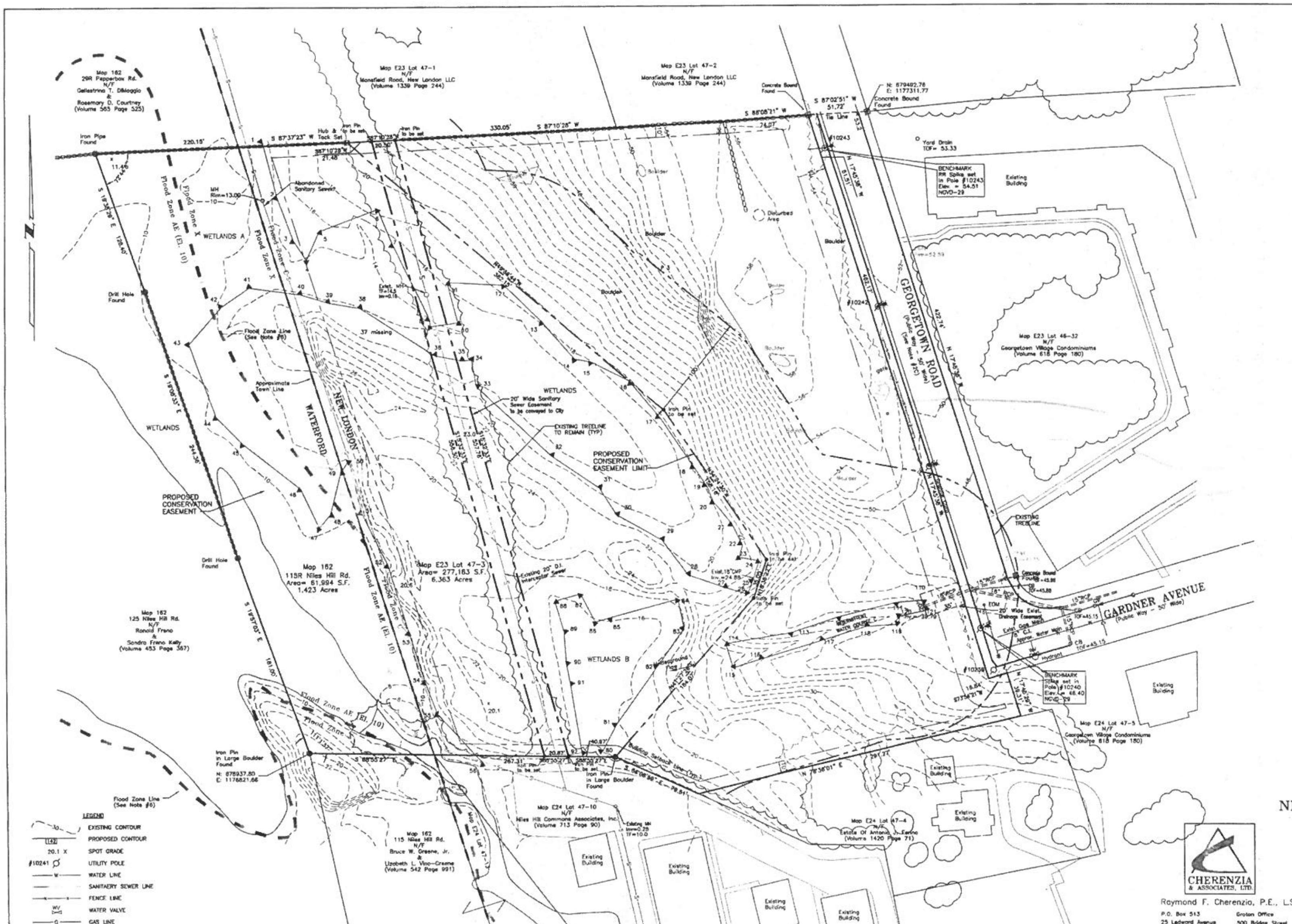

BULK REQUIREMENTS

ZONING DISTRICT – R-3	
Min. Lot Area *	5,000 S.F.
Min. Lot Width	50 Ft.
Min. Lot Frontage	50 Ft.
Min. Front Yard	25 Ft.
Min. Side Yard	10 Ft.
Min. Rear Yard	25 Ft.
Max. Building Height	3 Story/40'
Max. Lot Coverage	40 %

* 2,000 S.F. per Dwelling Unit
1,000 S.F. per Rooming Unit

NOTES:

1.) This survey has been prepared pursuant to the Regulations of Connecticut State Agencies Sections 20-300b-1 through 20-300b-20 and the "Standards for Surveys and Maps in the State of Connecticut" as adopted by the Connecticut Association of Land Surveyors, Inc. on September 26, 1996. This plan represents a Property Survey and is a First Survey of the parcel depicted hereon. This survey conforms to a Class A-2 Horizontal Accuracy Standard and a T-2 Topographic Accuracy Standard.

2.) Reference is made to the following deeds:

A.) A Special Warranty Deed from Leland H. Phillips as Nominee for and on behalf of the Georgetown Towers General Partnership granted to The Conservation Fund recorded October 29, 1999 in the Town of New London Land Evidence Records Volume 1130 Page 224.

B.) A Special Warranty Deed from Leland H. Phillips as Nominee for and on behalf of the Georgetown Towers General Partnership granted to The Conservation Fund recorded October 29, 1999 in the Town of Waterford Land Evidence Records Volume 505 Page 1258.

C.) A Warranty Deed from Paul C. Nassetta granted to the City Of New London dated June 15, 1965 and recorded in the Town of New London Land Evidence Records Volume 317 Page 347.

D.) An Easement from Paul C. Nassetta granted to The Hartford Electric Light Company recorded May 20, 1965 in the Town of New London Land Evidence Records Volume 314 Page 19.

3.) Reference is made to the following plans:

A.) Subdivision – Lots Number 1, 2 and 3 Plan & Profile Of Proposed Streets Gardner Avenue Georgetown Road Georgetown Village New London, Connecticut Aug. 4, 1964 Scale 1" = 50' Sheet 1 Of 1 Morton S. Fine & Associates, Hartford-Norwich, Conn. Revised through 12/14/64.

B.) Plan Of Land Of Sophie J. Freno Showing Also Existing Subdivision Of The Frontage Land Niles Hill Road Waterford, CT Scale 1" = 60 January, 1988 Edmond D. Sitty Land Surveyor.

4.) The bearings and North arrow orientation depicted hereon are based upon NAD-83 State Grid System.

5.) The topographic features depicted hereon are based upon NGVD-29 Vertical Datum.

6.) The flood zone information depicted hereon is from FIRM Flood Insurance Rate Map City Of New London, Connecticut New London County Panel 2 Of 2 Community-Panel Number 090100 0002 D Map Revised: August 2, 1995 and FIRM Flood Insurance Rate Map Town Of Waterford, Connecticut New London County Panel 15 Of 20 Community-Panel Number 090107 0015 F Map Revised: September 6, 1995.

APPROVED BY VOTE OF THE NEW LONDON PLANNING & ZONING COMMISSION

ON ______________
(Date)

______________ (Commission Chairman or Secretary) ______________ (Date of Signature)

CONDITIONAL APPROVAL BY THE NEW LONDON PLANNING & ZONING COMMISSION ON : ______________
(Date)

______________ (Commission Chairman or Secretary) ______________ (Date of Signature)

CONDITIONAL APPROVAL EXPIRES ON: ______________
(Date)

FINAL APPROVAL VOTED BY THE NEW LONDON PLANNING & ZONING

COMMISSION ON : ______________
(Date)

______________ (Commission Chairman or Secretary) ______________ (Date of Signature)

LEGEND

10	EXISTING CONTOUR
142	PROPOSED CONTOUR
20.1 X	SPOT GRADE
#10241	UTILITY POLE
W	WATER LINE
	SANITARY SEWER LINE
	FENCE LINE
WV	WATER VALVE
G	GAS LINE
GV	GAS VALVE
CB	CATCH BASIN
RCP	REINFORCED CONCRETE PIPE
TOF	TOP OF FRAME ELEVATION
RIM	RIM ELEVATION
29 ▲	WETLAND FLAG
	HYDRANT
N/F	NOW OR FORMERLY

We have reviewed the site map and the wetland/watercourse flag locations are correct as shown.

Donald J. Fortunato, Certified Soil Scientist No. 2278

"To my knowledge and belief, this map is substantially correct as noted hereon."

Nathan D. Louder, P.L.S. #15762 Date

PLAN REVISIONS

DATE	DESCRIPTION	DWN BY	CHK BY

CHERENZIA & ASSOCIATES, LTD.

Raymond F. Cherenzio, P.E., L.S.

P.O. Box 513
25 Ledward Avenue
Westerly, RI 02891
(401) 596-7747
FAX (401) 596-3810

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500 Bridge Street
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(860) 405-1900
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http://www.cherenzio.com/
email: cherenzio@cherenzio.com

STREET INDEX

GEORGETOWN ROAD

PROPERTY SURVEY
ELIZABETH HAVENS' ESTATES
PREPARED FOR
NEW ENGLAND DEVELOPMENT, L.L.C.

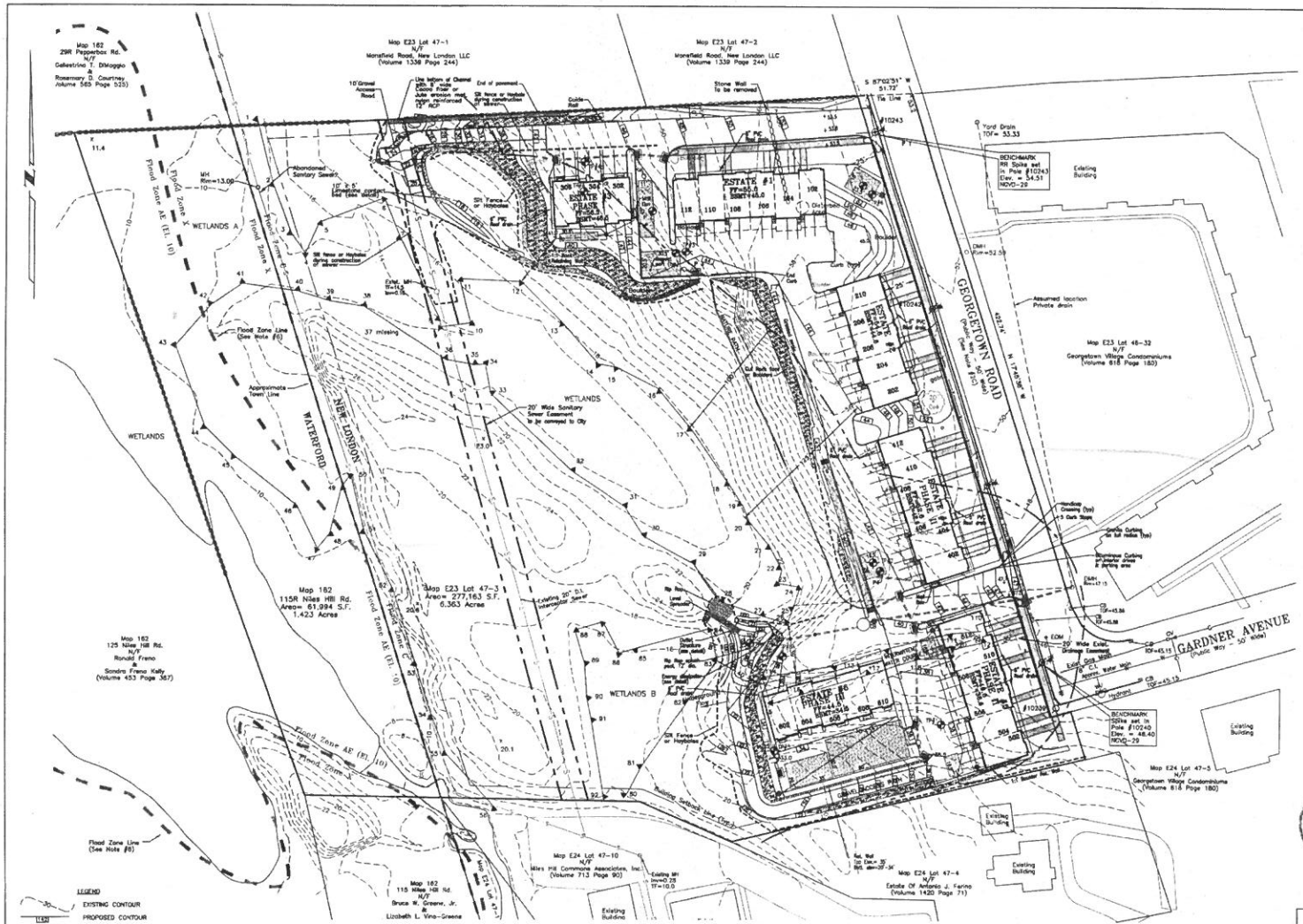
GARDNER AVENUE
&
GEORGETOWN ROAD
MAP E23 LOT 47-3
NEW LONDON, CONNECTICUT
&
MAP 162
WATERFORD, CONNECTICUT

SCALE: 1" = 40' DRAWN BY: MEG
APRIL 26, 2005 CHECK BY: NDL

40 0 40 80 120 Feet

CHERENZIA & ASSOCIATES, LTD.
WESTERLY, RHODE ISLAND

SHEET: 2 OF 14 JOB NO.: 204108
FILE NO.:



November 15, 2004
8 AM, Weather 40 degrees, fair.

Test Pit results

TH #6
0' – 10' Dark Brown Loam, many boulders
11' – 30' Tan medium sand with some silt, boulders, moderately compacted
31' – 64' Gray coarse to medium sand with orange lenses, with silt, boulders, moderately compacted.
65' –120' Brown gravelly silty sand.

Free water at 98 in, no mottling, no Boulder

Percolation test 11/15/04 : begun (9:29 AM)

Test hole 14 in. deep 72 in. below surface to match proposed bottom of infiltrators.
Calculated percolation rate is 8 minutes per inch.

December 22, 2004

Test pits to determine depth to groundwater, depth to Boulder, soil type, and approximate percolation rate. 9 AM, Weather 30 to 45 degrees, fair.

TH # 1
0' – 48' bouldery fill
22' – 96' orange yellow–brown sandy loam
96' –120' brown gravelly silty sand.
No water, no mottling, no Boulder
Remnants of fill, old boulders, debris chips, and big boulder

TH # 2
0' – 48' old glass bottles, dark brown sandy loam
48' – 96' Yellow/brown/orange sandy loam
96' –121' Gray fine sand
No water, no mottling, no Boulder

TH # 3
0' – 8' Dark Brown Topsoil
9' – 32' Yellow/orange sandy loam
33' – 48' Gray fine sand
49' –108' gray coarse sand.
108'–120' gravel and gray coarse sand
No water, no mottling, no Boulder

TH #4
0' – 8' Dark Brown Topsoil
9' – 48' Yellow/orange sandy loam
49' –120' Gray fine sand
Water at 9 ft, no Boulder

TH 4a
0' – 8' Dark Brown Topsoil
9' – 48' Yellow/orange sandy loam
At 48 in. Large Boulder or Boulder, no sign of mottling or water above refusal

TH # 5
0' –108' Boulder fill
No water, no mottling, no Boulder

TH #6A
0' – 0.5' Fine sandy loam; brown 10YR 5/3; fine granular; friable.

0.5' – 3' Boulder–strewn fill; Fine sandy loam soil material intermixed with boulders; yellowish brown 10YR 5/4 and light yellowish brown 10YR 6/4; fine granular; friable; coarse fragments (boulders) to 5'.

3' – 10' Boulder–strewn fill, Fine sandy loam soil material intermixed with boulders; brown 10YR 5/3 and dark brown 10YR 4/3; fine granular; friable; coarse fragments (boulders) to 5', some intermixed bricks and metal debris.

No Bedrock, No Standing water, No Mottling

TP #7 shall be done at the beginning of construction to determine soil types, and DWT. This work will be supervised by the Soil Scientist and will set the types and bottom elevation of sediment pond.

SEE SHEETS 7, 8, 9 – FOR PHASING AND SOIL AND EROSION CONTROL AND SHEETS 10, 12 – FOR DETAILS

Soil Permeability Results

P1– Original in–place soil (sandy loam @ 28")	3.5 inches/hour
P1– Original in–place soil (gravelly loamy sand @ 62")	9.0 inches/hour
P2– Original in–place soil (fine sandy loam @ 25")	2.9 inches/hour
P2– Original in–place soil (gravelly sand @ 53")	14.5 inches/hour
P3– Original in–place soil (gravelly loamy sand @ 65")	12.0 inches/hour
P4– Original in–place soil (fine sandy loam @ 29")	3.2 inches/hour
P4– Original in–place soil (gravelly loamy sand @ 64")	10.0 inches/hour

PLAN REVISIONS			
DATE	DESCRIPTION	DWN BY	CHK BY

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Raymond F. Cherenzia, P.E., L.S.
P.O. Box 513, 25 Ledward Avenue, Westerly, RI 02891, (401) 596-7747, FAX (401) 596-3610
Groton Office, 500 Bridge Street, Groton, CT. 06340, (860) 405-1900, FAX (860) 405-1990
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email: cherenzia@cherenzia.com

STREET INDEX
GEORGETOWN ROAD

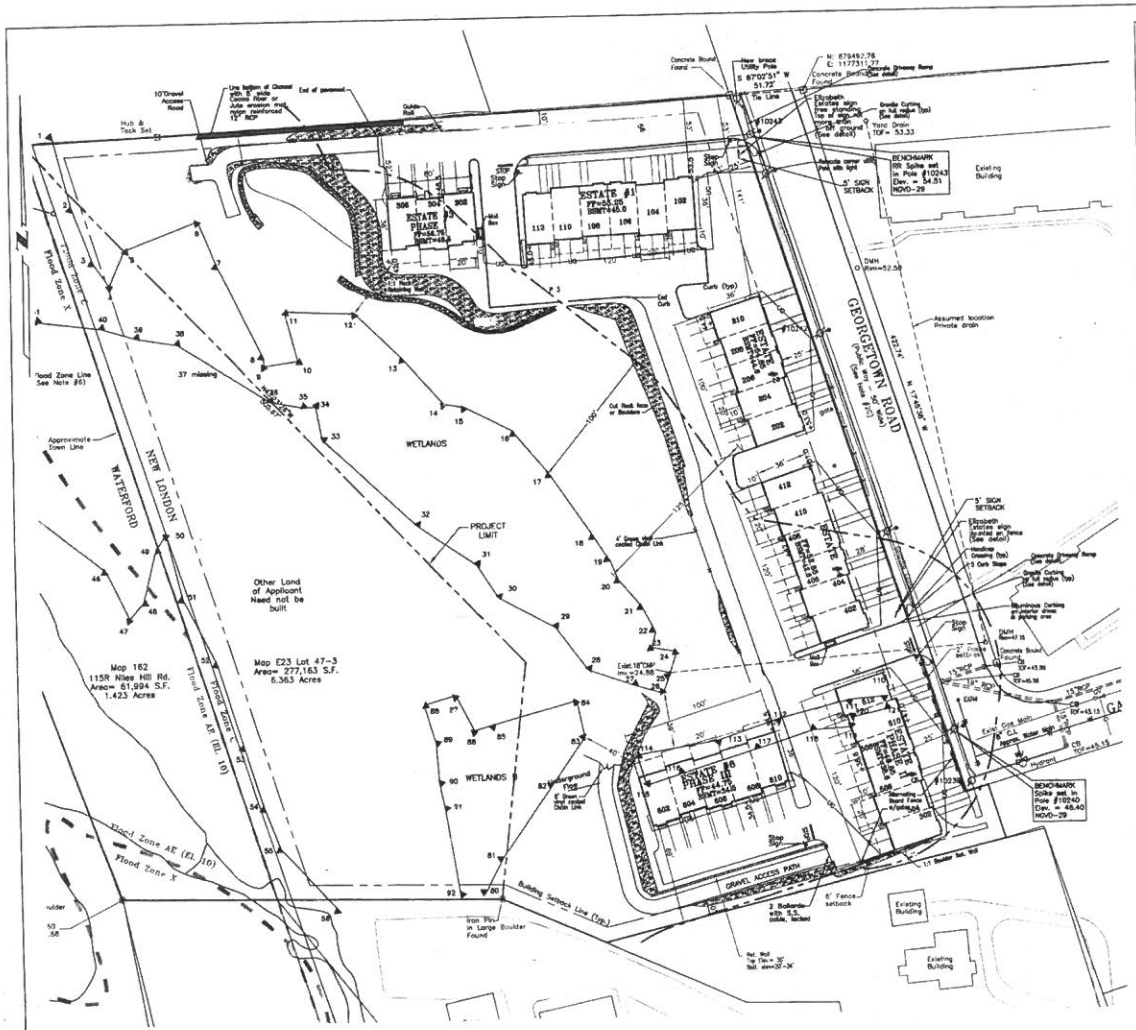
GRADING PLAN
ELIZABETH HAVENS' ESTATES
PREPARED FOR
NEW ENGLAND DEVELOPMENT ASSOCIATES, LLC
GARDNER AVENUE
&
GEORGETOWN ROAD
MAP E23 LOT 47–3
NEW LONDON, CONNECTICUT
&
MAP 162
WATERFORD, CONNECTICUT

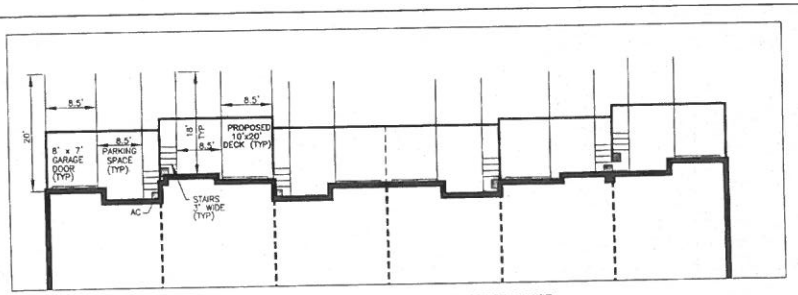
SCALE: 1" = 40' DRAWN BY: LA
APRIL 26, 2005 CHECK BY: DSM

40 0 40 80 120 Feet

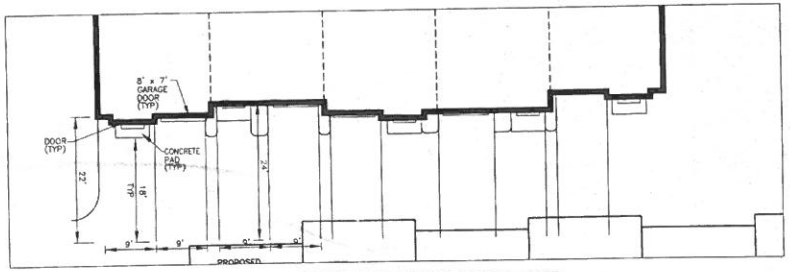
CHERENZIA & ASSOCIATES, LTD.
WESTERLY, RHODE ISLAND

SHEET: 3 OF 14 JOB NO.: 204108
FILE NO.:





TYPICAL BACK FACADE PARKING SPACE
(ESTATE #2 THE SAME LESS ONE UNIT)
SCALE: 1"=10'



TYPICAL FRONT FACADE PARKING SPACE
(ESTATE #3 THE SAME AS THE FIRST 3 UNITS)
SCALE: 1"=10'

BUILDING AREA AND HEIGHT TABLES REVISED MAY CREATED ON MAY 18, 2005

BUILDING AREA AND HEIGHT TABLES FOR ZONING COMPLIANCE

Dimensional height of all buildings: basement finish floor to roof ridge: 27 feet from first floor to roof peak. 10.25 feet from basement floor to first floor totaling 37.25 feet and three stories.

Building height is calculated by subtracting average grade elevation from roof peak elevation.

Estate +27 ft

Building	length	depth	low grade	high grade	Avg grade	FF	for roof Elev.	Peak elev.	Calc. Height
1	120	38	45.0	53.5	49.25	55.25	82.25	83.00	
2	100	36	44.8	53.0	48.90	54.85	81.85	83.00	
3	80	35	42.0	48.5	44.25	56.75	83.75	39.50	
4	120	38	42.8	51.0	46.8	52.85	79.85	33.05	
5	120	36	38.8	47.0	42.8	48.85	75.85	33.05	
6	100	36	35.0	39.0	37.0	44.75	71.75	34.75	

Depth dimensions do not include decks. Deck dimensions are 10 feet by 20 feet.

PARKING AND AREA CALCULATIONS

Estate Building Total	# Units	Req. for Parking	Full min. Parking	Non Provided Transient Parking
1	6	12.960	12	6
2	9	10.800	10	5
3	3	6,480	9	-
4	8	12,960	12	8
5	8	12,960	12	8
6	6	12,960	10	-
31		86,580	82	47

46 Total parking provided: 93 spaces.

All units have 3 bedrooms. Minimum required parking per unit is 2. Non-transient car parking areas provided under decks are 8.5 feet wide, but full length. One extra parking place per unit is available for guest or RV parking. There will be space available on the west side of Georgetown Road for 17 parallel parking spaces 21 feet long for the general public. Average foot print dimensions of all units: basement (including garage) plus two floors at 36 feet by 20 feet is 2,160 square feet per unit.

LEGEND

30	EXISTING CONTOUR
30	PROPOSED CONTOUR
20.1 x	SPOT GRADE
#10241	UTILITY POLE
W	WATER LINE
S	SANITAERY SEWER LINE
	FENCE LINE
WV Dwg	WATER VALVE
G	GAS LINE
GV Dwg	GAS VALVE
CB #9	CATCH BASIN
RCP	
TOF	TOP OF FRAME ELEVATION
RIM	RIM ELEVATION
29	WETLAND FLAG
	HYDRANT
N/F	NOW OR FORMERLY

BULK REQUIREMENTS

ZONING DISTRICT – R-3		LOT 1
Min. Lot Area *	5,000 S.F.	5,000 S.F.
Min. Lot Width	50 Ft.	50 Ft.
Min. Lot Frontage	50 Ft.	50 Ft.
Min. Front Yard	25 Ft.	25 Ft.
Min. Side Yard	10 Ft.	10 Ft.
Min. Rear Yard	25 Ft.	25 Ft.
Max. Building Height	3 Story/40'	3 Story/39.75'
Max Lot Coverage	40 %	40 %

* 2,000 S.F. per Dwelling Unit
1,000 S.F. per Rooming Unit

ELIZABETH HAVENS ESTATES

TYPICAL SIGNAGE, ONE MOUNTED ON BOARD FENCE, AND ONE FREE STANDING BETWEEN ESTATES 1 & 2. SIGN SHALL NOT BE TALLER THAN 8'

SIGN DETAIL
N.T.S.

PLAN REVISIONS			
DATE	DESCRIPTION	DWN BY	CHK BY
05/18/05	Modification per City comments	ARB	DSM

STREET INDEX

GEORGETOWN ROAD

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PARKING PLAN, TRAFFIC, SIGNAGE & STRIPING
ELIZABETH HAVENS' ESTATES
PREPARED FOR
NEW ENGLAND DEVELOPMENT ASSOCIATES, LLC
GARDNER AVENUE
&
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MAP E23 LOT 47-3
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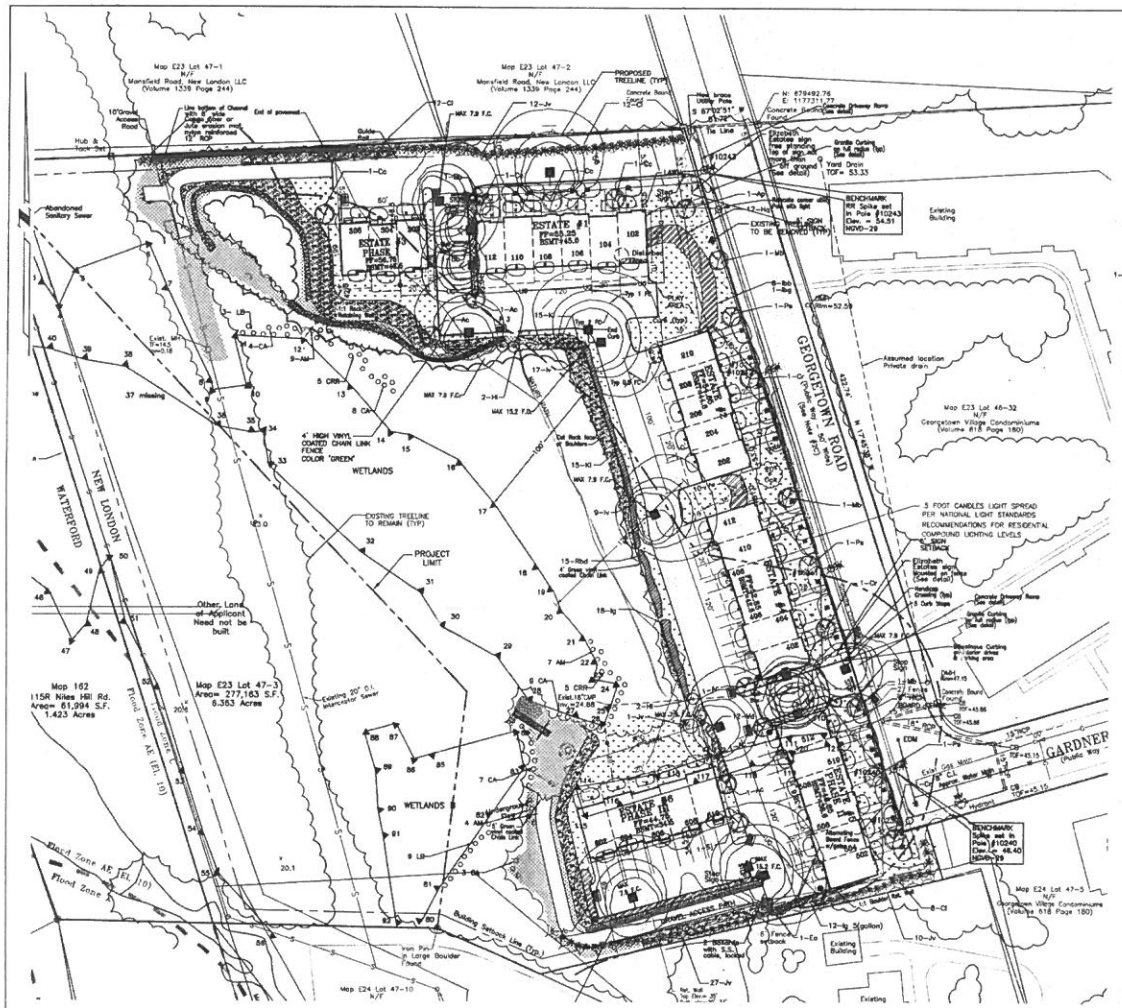
SCALE: AS NOTED
APRIL 26, 2005
DRAWN BY: LA
CHECK BY: DSM

40 0 40 80 120 Feet

CHERENZIA & ASSOCIATES, LTD.
WESTERLY, RHODE ISLAND

SHEET: 4 OF 14
JOB NO.: 204108
FILE NO.:



SCALE: 1" = 40'

LEGEND

- EXISTING CONTOUR
- PROPOSED CONTOUR
- SPOT GRADE
- UTILITY POLE
- EXISTING TREELINE TO BE REMOVED
- EXISTING TREELINE TO REMAIN
- PROPOSED TREELINE
- WETLAND FLAG
- EXISTING UTILITY POLE WITH STREET LIGHT
- PROPOSED 14' HIGH POLE MOUNTED FULL CUT-OFF DOWN LIGHT
- PROPOSED 10' HIGH BUILDING MOUNTED SCONCE FULL CUT-OFF DOWN LIGHT
- PROPOSED DECORATIVE WALL MOUNTED MAIN ENTRY DOWN LIGHT

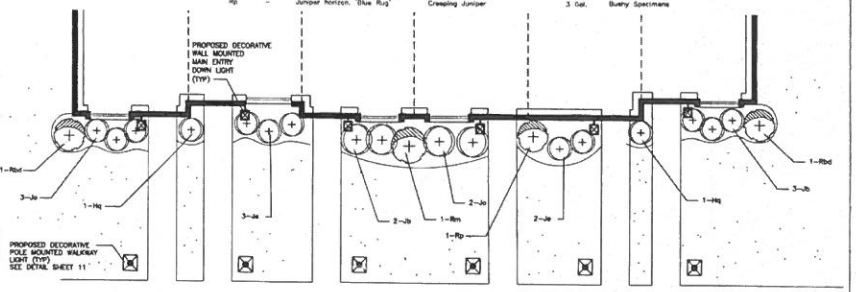
- PROPOSED DECIDUOUS TREE
- PROPOSED NEEDLED EVERGREEN TREE
- PROPOSED BROADLEAF EVERGREEN SHRUB
- PROPOSED BROADLEAF EVERGREEN SHRUB
- PROPOSED ECOLOGY MIX SEE DETAILS FOR MIX
- PROPOSED WETLAND BUFFER SHRUB
- PROPOSED NATIVE GRASS SEED MIX SEE DETAILS FOR MIX

UPLAND PLANTING LIST

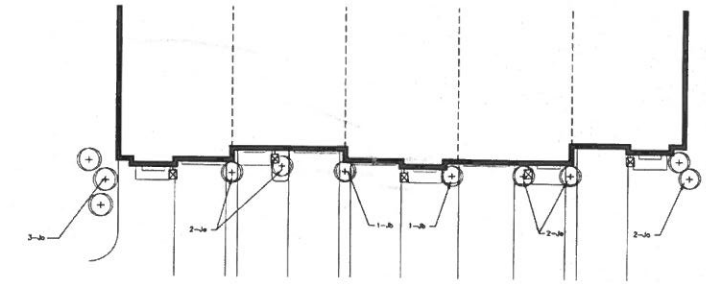
ABV.	QTY.	BOTANICAL NAME	COMMON NAME	SIZE (EXCEPT AS NOTED)	REMARKS
Ac	5	Amelanchier canadensis "Lamarckii"	Clumo Shadbow	3" Cal.	B&B
Ar	9	Acer rebrum	Red Maple	3" Cal.	B&B
Ap	1	Acer palmatum dissectum "Red Dragon"	Red Japanese Cutleaf Maple	3" Cal.	B&B
Bb	2	Buddleia davidii 'Ecolor'	Butterfly Bush	5' Ht.	
Cc	4	Cercis canadensis	American Redbud	3" Cal.	B&B
Cl	32	Cupressa cyparus leyandi	Leylond Cypress	6'-8' Ht.	B&B
Cr	3	Cornus rutbon 'Aurrea'	Aurora white Dogwood	3" Cal.	B&B
Eq	1	Eucnymus alata compacta	Burning Bush	5 Gal.	Bushy Specimens
Hi	4	Hamamelis intermedia	Red Witch Hazel	6'-8'	B&B Vase Shaped
Hq	17	Hydrangea quercifolia 'Snow Queen'	Oakleaf Hydrangea	3 Gal.	Bushy Specimens
Ibb	1	Ilex meserveae 'Blue Boy'	Blue Boy Holly	3 Gal.	Bushy Specimens
Ibg	1	Ilex meserveae 'Blue Girl'	Blue Boy Holly	3 Gal.	Bushy Specimens
Ig	65	Ilex glabra "Shamrock"	Shamrock Inkberry	3 Gal.	Bushy Specimens
Iv	26	Ilex verticillata	Winterberry Holly	3 Gal.	Bushy Specimens
Jv	77	Juniperus virginiana	Eastern Red Cedar	6'-8' Ht.	B&B
Kl	30	Kalmia latifolia	Mountain Laurel	3 Gal.	Bushy Specimens
Mb	3	Malus 'Brandywine'	Brandywine Flowering Crab	3" Cal.	B&B
Pa	3	Prunus serrulata	Flowering Cherry	3" Cal.	B&B
Rbd	15	Rhododendron Boule de Neige	White Rhododendron	3 Gal.	Bushy Specimens
Sj	1	Styrax japonica	Japanese Snowbell	3 Gal.	Bushy Specimens
Tc	7	Thuja occidentalis	Norway Spruce	6' Ht.	B&B
Vc	8	Vaccinium corymbosum	Highbush Blueberry	3 Gal.	Bushy Specimens
Vd	12	Viburnum dentatum	Arrowwood Viburnum	3 Gal.	Bushy Specimens
Vw	10	Viburnum wrightii	Wright Viburnum	3 Gal.	Bushy Specimens
Pc	40	Parthenocissus tricuspidata	80% Reliant II Hard Fescue Boston Ivy	1 gal.	3' O.C.
		Lofts "Ecology mix" Lawn seed	20% Jamestown II Chewings Fescue	10 lbs/1000 sf.	

BUILDING FACADE PLANTING LIST

ABV.	QTY.	BOTANICAL NAME	COMMON NAME	SIZE	REMARKS
Ap	–	Azalea 'Girard Peter Alan'	Girard Azalea Varitey	3 Gal.	Bushy Specimens
Hc	–	Hypericum calycinum	Aarons Beard St. Johnswort	3 Gal.	Bushy Specimens
Hq	–	Hydrangea quercifolia	Oakleaf Hydrangea	3 Gal.	Bushy Specimens
Rbd	–	Rhododendron Boule de Neige	White Rhododendron	3 Gal.	Bushy Specimens
Rm	–	Rhododendron 'Mary Flemming'	Mary Flemming Rhododendron	3 Gal.	Bushy Specimens
Rp	–	Rhododendron 'Purple Gem'	Purple Gem Rhododendron	3 Gal.	Bushy Specimens
Jo	–	Juniper horizon. 'Gray Owl'	Creeping Juniper	3 Gal.	Bushy Specimens
Je	–	Juniper horizon. 'Emerald Isle'	Creeping Juniper	3 Gal.	Bushy Specimens
Rp	–	Juniper horizon. 'Blue Rug'	Creeping Juniper	3 Gal.	Bushy Specimens



TYPICAL FRONT FACADE PLANTING
(ESTATE #2 THE SAME LESS ONE UNIT)
SCALE: 1"=10'



ESTATE #6 FRONT FACADE PLANTING
(ESTATE #3 THE SAME AS THE FIRST 3 UNITS)
SCALE: 1"=10'

WETLAND BUFFER PLANTINGS

ABV.	QTY.	BOTANICAL NAME	COMMON NAME	SIZE	REMARKS
AM	20	Aronia melanocarpa	Black Chokeberry	2 Gal.	Buffer Zone
CA	32	Cornus amomum	Silky Dogwood	2 Gal.	Wetter Areas
CRR	10	Cornus racemosa	Gray Dogwood	2 Gal.	Tolerates Shade
LB	12	Lindera Benzoin	Spice Bush	2 Gal.	Wetter & more shady areas

* All wetland buffer plantings 8' o.c.

LIGHTING NOTES:
LIGHTING IS SHOWN IN ISO BARS OF 0.1, 0.5, 1, AND 2 FOOT-CANDLES FOR COMMERCIAL FIXTURES AND 1.0 FOOT FOR DECORATIVE RESIDENTIAL FIXTURES.
ISO BARS FOR EXISTING STREET LIGHTS ON GEORGETOWN ROAD ARE NOT SHOWN. ISO BAR MERGING IS NOT SHOWN BETWEEN COMMERCIAL AND DECORATIVE RESIDENTIAL FIXTURES BECAUSE RESIDENTIAL FIXTURES MAY BE TURNED OFF BY OWNERS.

LANDSCAPE NOTES:
LANDSCAPING SHOWN COMPLIES WITH THE FOLLOWING SECTIONS OF THE NEW LONDON ZONING REGULATIONS: 603.6.14C(13), 800.8 (5)

PLAN REVISIONS

DATE	DESCRIPTION	DWN. BY	CHK. BY
05/19/06	Modification per City comments	ARB	DSM

STREET INDEX

GEORGETOWN ROAD

LIGHTING & LANDSCAPING PLAN
ELIZABETH HAVENS' ESTATES

PREPARED FOR

NEW ENGLAND DEVELOPMENT ASSOCIATES, LLC
GARDNER AVENUE
&
GEORGETOWN ROAD
MAP E23 LOT 47-3
NEW LONDON, CONNECTICUT
&
MAP 162
WATERFORD, CONNECTICUT

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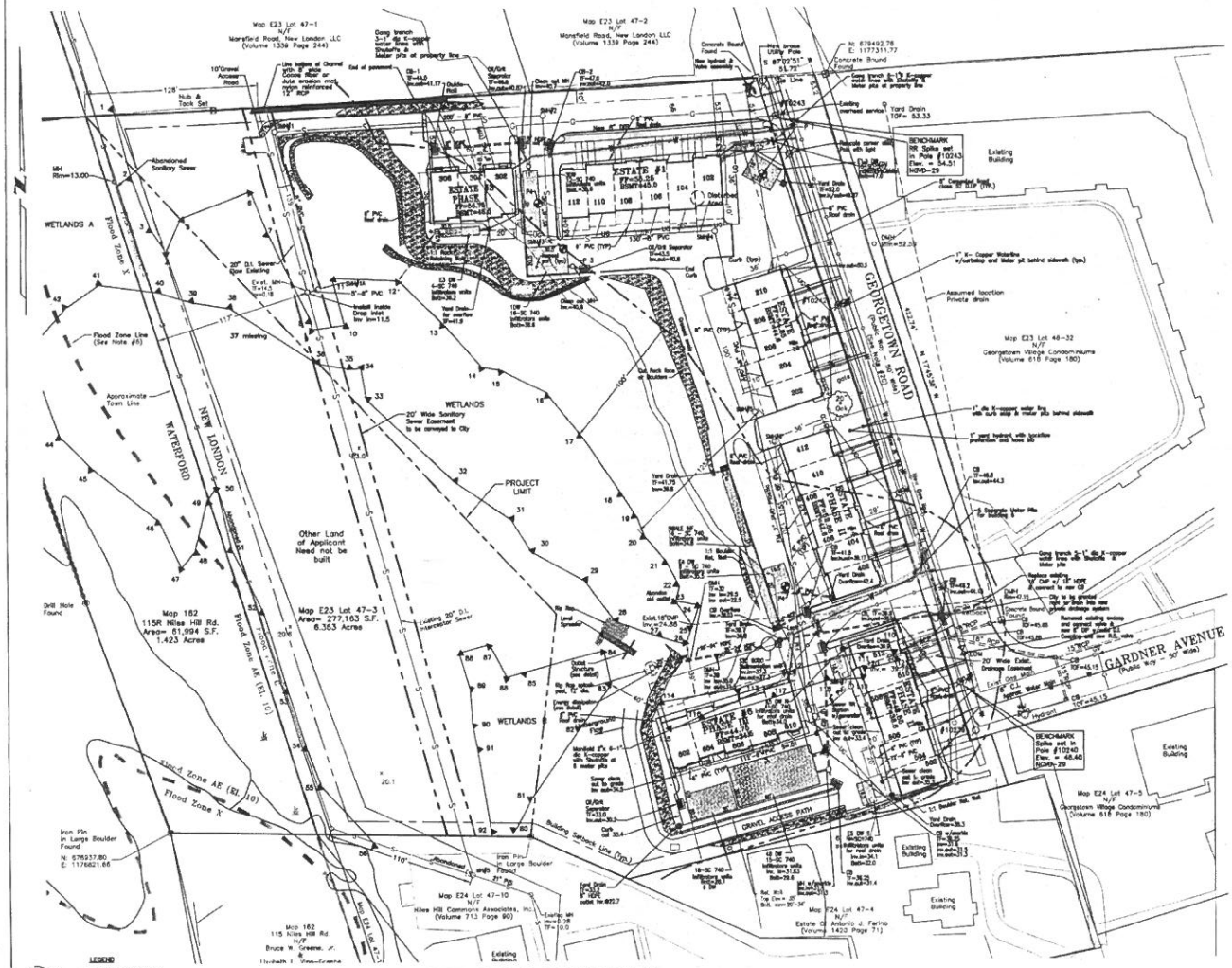
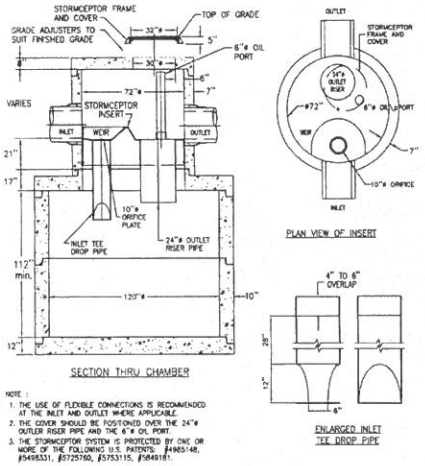
http://www.cherenzia.com/
email: cherenzia@cherenzia.com

SCALE: AS NOTED DRAWN BY: LA
APRIL 26, 2005 CHECK BY: DSM

40 0 40 80 120 Feet

CHERENZIA & ASSOCIATES, LTD.
WESTERLY, RHODE ISLAND
SHEET: 5 OF 14 JOB NO.: 204108
FILE NO.:





NOTE :
1. THE USE OF FLEXIBLE CONNECTIONS IS RECOMMENDED AT THE INLET AND OUTLET WHERE APPLICABLE.
2. THE COVER SHOULD BE POSITIONED OVER THE 24"ø OUTLET RISER PIPE AND THE 6"ø OIL PORT.
3. THE STORMCEPTOR SYSTEM IS PROTECTED BY ONE OR MORE OF THE FOLLOWING U.S. PATENTS: #4985148, #5498331, #5725760, #5753115, #5849181.

STC 6000 Precast Concrete Stormceptor (6000 US Gallon Capacity)
N.T.S.

NOTES:
1. UTILITY INSTALLATION SHALL CONFORM TO DETAILS AND SPECIFICATION OF RESPECTIVE UTILITY PROVIDERS.
2. EACH UNIT WILL BE INDIVIDUALLY METERED FOR GAS AND WATER SERVICES.
3. THE COST OF PROVIDING AND INSTALLING RADIO TRANSMITTER UNITS FOR NEPTUNE METERS INSTALLED IN MANHOLES SHALL BE BORNE BY THE CONTRACTOR
4. METER MANHOLES SHALL BE TO THE STANDARDS ISSUED BY THE CITY OF NEW LONDON AT THE TIME OF INSTALLATION.

LEGEND

100	EXISTING CONTOUR
1430	PROPOSED CONTOUR
20.1 X	SPOT GRADE
#10241	UTILITY POLE
W	WATER LINE
S	SANITAERY SEWER LINE
x x	FENCE LINE
WV D=Q	WATER VALVE
G	GAS LINE
GV D=Q	GAS VALVE
CB	CATCH BASIN
RCP	
TOF	TOP OF FRAME ELEVATION
RIM	RIM ELEVATION
29	WETLAND FLAG
	HYDRANT
N/F	NOW OR FORMERLY

SANITARY SEWER INVERT TABLE

	TF elev.	Pipe	Length	Slope (ft/ft)	Inv. in	Inv. Out
SMH-5	44.0				41.2	41.0
P-4		8" PVC	140	.010		
SMH-4	43.0				39.8	39.52
P-4		8" PVC	126	.010		
SMH-3	44.75				38.28	38.16
P-3		8" PVC	88'	.01		
SMH-2	47.3				37.38	37.24
P-1		8" PVC	196'	.078		
SMH-1	24.85				21.85	21.77
P-1		8" PVC	120'	.081		
SMH-1A	15.1				12.0	11.92
P-1A		8" PVC	5'	.084		
Exist.MH	14.5				11.5	Exist.=0.18
SMH-6	42.0				37.8	37.66
P-6		8" PVC	205'	.028		
Pump Station	38.0				33.3	34.0
FM		2" PVC	340'	-.02		
SMH-4	43.0				42.00	41.92
SMH-7	45.0				42.00	41.92
P-7		8" PVC	33'	-.037		

PLAN REVISIONS

DATE	DESCRIPTION	DRN. BY	CHK. BY

STREET INDEX

GEORGETOWN ROAD

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UTILITY PLAN
ELIZABETH HAVENS' ESTATES
PREPARED FOR
NEW ENGLAND DEVELOPMENT ASSOCIATES, LLC

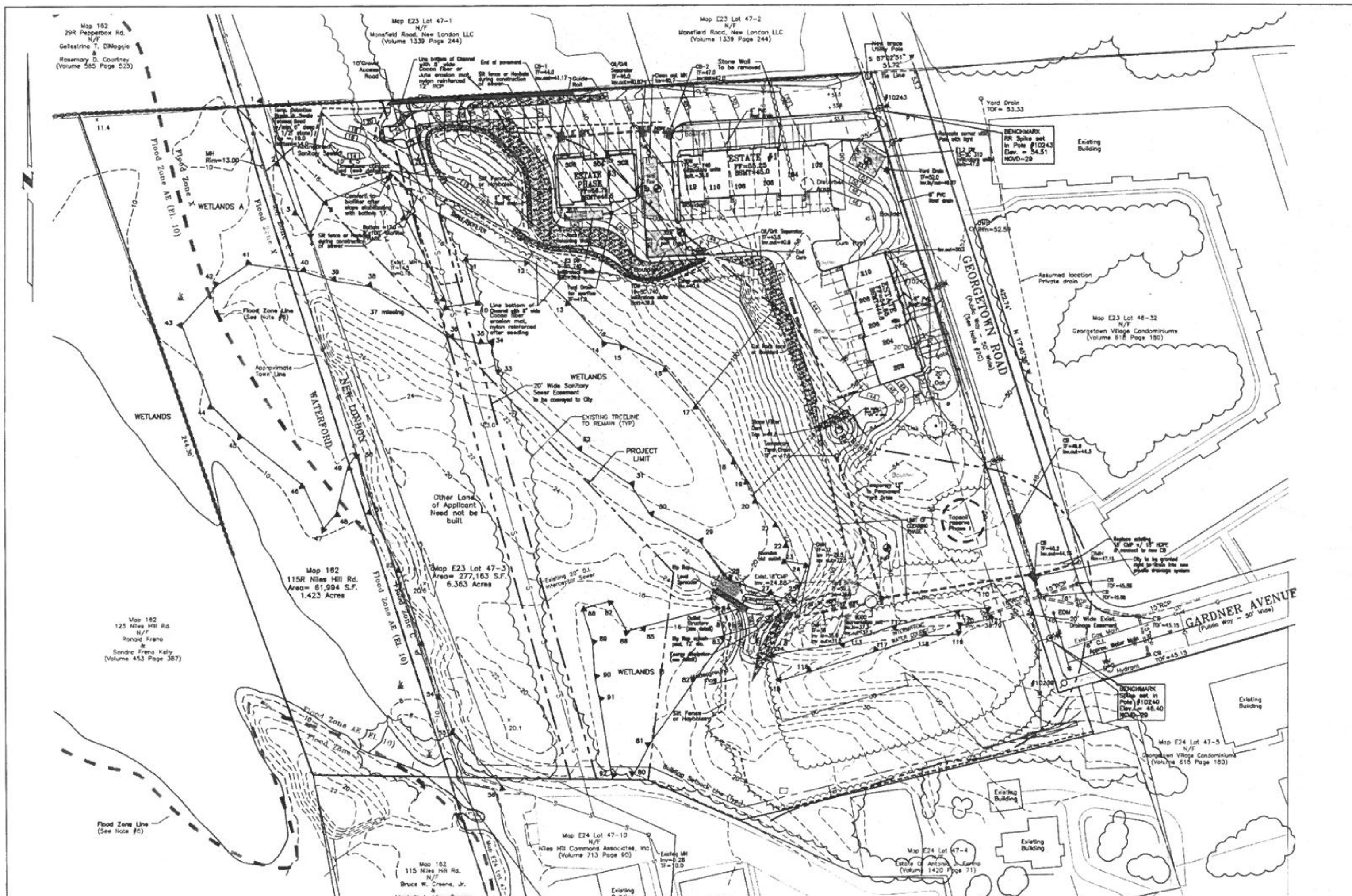
GARDNER AVENUE
&
GEORGETOWN ROAD
MAP E23 LOT 47-3
NEW LONDON, CONNECTICUT
&
MAP 162
WATERFORD, CONNECTICUT

SCALE: 1" = 40' DRAWN BY: LA
APRIL 26, 2005 CHECK BY: DSM

40 0 40 80 120 Feet

CHERENZIA & ASSOCIATES, LTD.
WESTERLY, RHODE ISLAND

SHEET: 6 OF 14 JOB NO.: 204108
FILE NO.:



LEGEND

30	EXISTING CONTOUR
142	PROPOSED CONTOUR
20.1 X	SPOT GRADE
#10241	UTILITY POLE
—W—	WATER LINE
—S—	SANITAERY SEWER LINE
—x—x—	FENCE LINE
WV	WATER VALVE
—G—	GAS LINE
GV	GAS VALVE
CB	CATCH BASIN
RCP	
TOF	TOP OF FRAME ELEVATION
RIM	RIM ELEVATION
29 ▲	WETLAND FLAG
	HYDRANT
N/F	NOW OR FORMERLY

SOIL EROSION & SEDIMENT CONTROL NOTES
GENERAL REQUIREMENTS:

1) Unnecessary clearing of any vegetation or ground cover will be avoided. Any disturbed area left un-vegetated for more than five days will be covered with a hay or straw mulch at a rate of 2-3 tons per acre (2 to 3 bales per 1000 square feet) to minimize erosion.
2) Following grading, all disturbed areas will be covered with 6 inches of loam and seeded as described in the landscape plans and details. If any seeded areas are disturbed or damaged, reseeding will occur as soon as possible.
3) If final grading occurs past October 15, disturbed areas will be seeded with winter ryegrass at a rate of 3 lbs per 1000 square feet, raked 1 inch into the soil and mulched with hay or straw at a rate of 1.5 to 2 tons per acre.
4) Any proposed vegetation that has not survived one growing season will be replaced.
5) All suitable material to be excavated for town homes or driveway construction is to be used elsewhere on site. Unsuitable material (stumps) will be removed from the site and deposited in a suitable location.
6) All soil erosion control measures to be used on the project are indicated on the grading, landscape, and the site detail sheets. Erosion control measures shall be in conformance with the provision of the Connecticut Guidelines for Soil Erosion and Sediment Control, 2002 edition.
7) This phase will require cuts and fills as shown on the plans. Cuts or fills shall not exceed a grade of 3 horizontal to 1 vertical, unless a boulder retaining wall is used, in which case grade may reach a maximum of 1 horizontal to one vertical.
8) Preliminary test pits have indicated that the exposed rock is mostly very large boulders. Where blasting is required, it may only proceed after application to and permission from the City.

Sediment and Erosion Control Construction Sequencing:
Phase One:

Will include the construction of estate buildings 1, 2 and 3, north driveway, sidewalks in front of buildings 1& 2, extend water and sewer, and gas mains to service site in street, relocate utility pole and install underground utilities to buildings 1, 2 and 3. Install new sewer to northwest, and construct new storm drain work in vicinity of drive to future Phase II as well as related Stormceptor work. Install permanent and temporary sediment basins and swales.

1) One week prior to commencement of construction of Phase 1, the City of New London Inlands Wetlands agent and Call-Before-You-Dig (1-800-922-4455) shall be notified.
2) Site Contractor shall provide an erosion and sedimentation schedule for anticipated dates of completion for this phase. The schedule shall note measures that are seasonally affected (frozen ground, planting, etc.) and shall propose additional measures that may be required to provide erosion protection in that schedule.
3) Silt fence required for phase one and silt sacks in Georgetown Road catch basins shall be installed per plan. When silt fence has been inspected by owners licensed engineer, and approved by the inland wetlands agent, clearing and grubbing may proceed only in areas where erosion control structures are to be built, and where reserve topsoil storage is to occur.
4) The construction entrance shall be installed at the location of the proposed North driveway.
5) Existing granite curbing in driveway area shall be removed carefully and reserved for re-use, or to be returned to the City if not necessary for this project.
6) Stumps are not to be buried on site. Stumps and boulders designated for removal shall be temporarily stored in the areas designated for topsoil reserve until they are removed from the site and shall be removed by a licensed carrier in accordance with state and local regulations.
7) Temporary and permanent sediment basins and swales shall be constructed as per plan and lined with a minimum of 6 in. of 1 in. to 1 ½ in. stone. Temporary overflows for the sediment basins shall be as shown in the plan detail sheet. Temporary stone filter dams shall be used as needed to control runoff velocity.
8) Once sedimentation structures have been completed and approved by the owners engineer, the remainder of the phase I site may be cleared and grubbed. Soil stockpiles and deposition areas for construction material shall be located outside wetland areas as shown on the plan, and shall be surrounded on downhill edges by properly installed silt fencing. Temporary vegetation and /or hay mulching shall be used to protect bare areas and stockpiles for erosion during construction. Bare earth slopes and soil stockpiles shall be kept to a strict minimum at all times, and must be mulched if to remain bare for more than 5 days.
9) One test pit will be required to determine soil type and ground water table elevation in the location of the central sediment pond shall be completed and witnessed as soon as access can be obtained. The results are to be used to set the bottom elevation of the sediment pond so it can be defined as a dry pond.
10) The new sanitary sewer line in the northwest of the site will be installed before the fill for the new access path is completed in order to minimize cuts required for the trench. Should groundwater or surface water collect in the trenches, water from the dewatering process shall be pumped to the north sediment pond/swale for settling.
11) After rough grading has been done, Estate buildings 1, 2, and 3 will be built and utilities installed for phase I. Water and gas mains will be extended to the site. Storm drains in the street at the future entrance to Phase II will be relocated, new catch basins constructed on the street, (and sumps on the interior) and the Stormceptor unit and associated piping will be installed. The last utility pole on Georgetown Road will be relocated as shown. Temporary patch will be applied to the street trenches within a week of construction.
12) A temporary yard drain and curbing to direct the flow will be installed at where the swale and pavement end at the south west corner of the drive behind building # 2 and will connect to a temporary 12 inch pipe laid to the junction catch basin sump prior to the Stormceptor unit. This drainpipe will be replaced by a grassed swale in phase II.
13) Paving shall be done after temporary and permanent structures are in place. At this time, pavement in the street will be saw cut and removed for one foot around all new trench work, and new paving will be installed over properly compacted base material and sealed at the edges after roller compaction of final surface. Bituminous curbing shall be installed as soon as possible after, to permit final fine grading and completion of plantings and lawns around curbing.
14) As soon as weather permits after completion of fine grading, all disturbed areas shall be permanently stabilized with placement of loam and a suitable grass seed mixture (Lofts Ecology mix for lawns and Lofts native grasses mix for [illegible]) [illegible] hay prior to the completion of the project. as shown on the plans to minimize soil disturbance while the plants and grasses are established. Grades completed outside the growing season shall be stabilized as indicted in erosion notes.
15) After stabilization of site is under way the sediment pond serving the Stormceptor outlet, and the sediment swale serving the north side of the project, and the temporary sediment basin shall be cleaned of sediment, loamed, and planted and seeded as directed.
16) After the stabilization of soils in phase one, the catch basin sumps and Stormceptor shall all be cleaned, including the sumps for the catch basins in Georgetown Road.
17) Following successful stabilization of disturbed areas all silt fencing shall be removed. Prior to that removal, all accumulated trapped sediments must be removed to a suitable upland site, and seeded.

PHASE I
GRADING, SOIL & EROSION CONTROL PLAN
ELIZABETH HAVENS' ESTATES

PREPARED FOR

NEW ENGLAND DEVELOPMENT ASSOCIATES, LLC

GARDNER AVENUE
&
GEORGETOWN ROAD
MAP E23 LOT 47-3
NEW LONDON, CONNECTICUT
&
MAP 162
WATERFORD, CONNECTICUT

SCALE: 1" = 40'   DRAWN BY: LA
APRIL 26, 2005   CHECK BY: DSM

40 0 40 80 120 Feet

PLAN REVISIONS			
DATE	DESCRIPTION	DWN BY	CHK BY
05/18/05	Revise soil erosion notes	ARB	DSM

STATE OF CONNECTICUT No. 13033 LICENSED PROFESSIONAL ENGINEER

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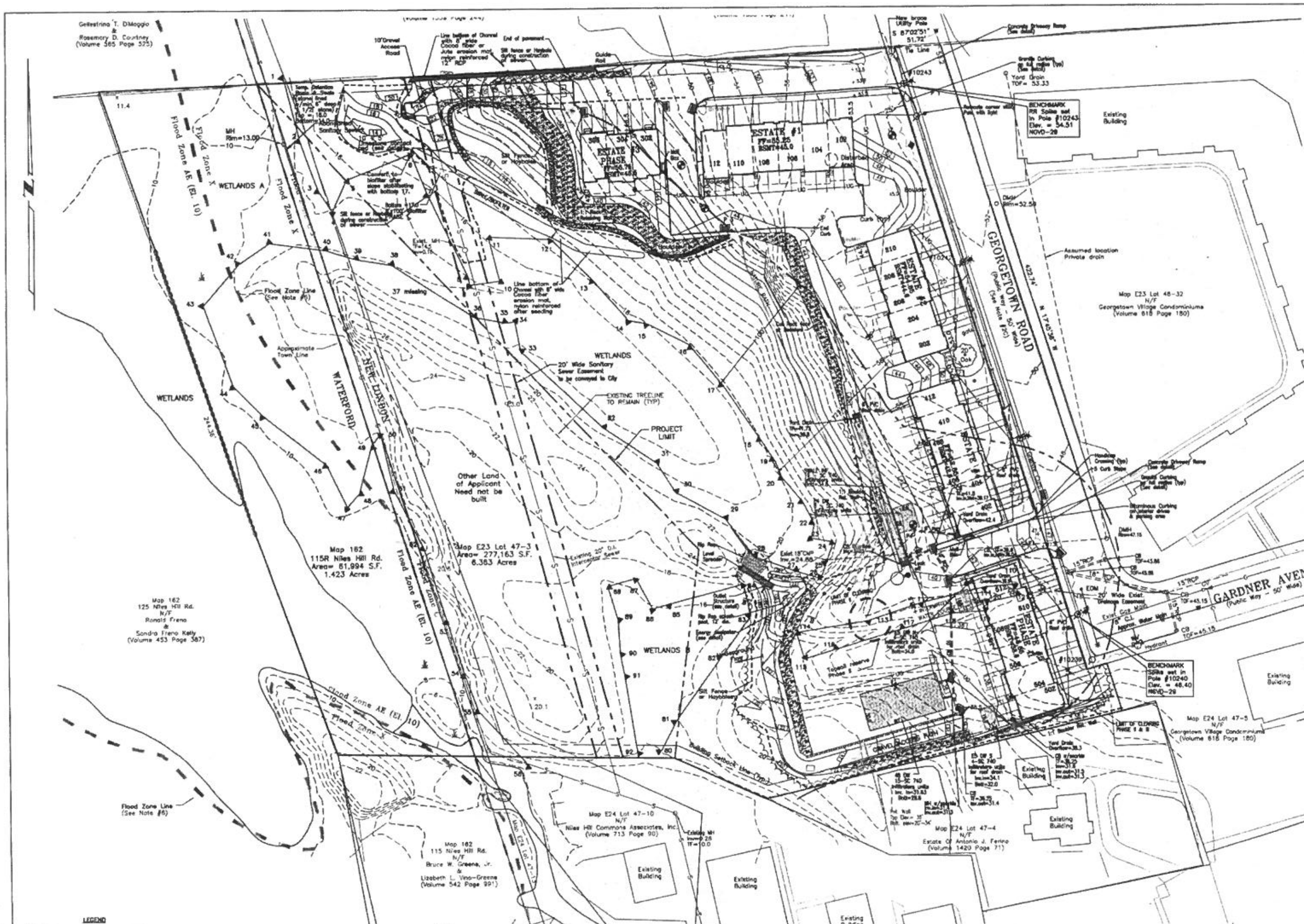
STREET INDEX

GEORGETOWN ROAD

CHERENZIA & ASSOCIATES, LTD.
WESTERLY, RHODE ISLAND

SHEET: 7 OF 14   JOB NO.: 204108
FILE NO.:



LEGEND

(symbol)	EXISTING CONTOUR
(symbol)	PROPOSED CONTOUR
20.1 X	SPOT GRADE
#10241 (symbol)	UTILITY POLE
——W——	WATER LINE
——S——	SANITARY SEWER LINE
—x——x—	FENCE LINE
WV	WATER VALVE
——G——	GAS LINE
GV	GAS VALVE
CB	CATCH BASIN
RCP	
TOF	TOP OF FRAME ELEVATION
RIM	RIM ELEVATION
29 ▲	WETLAND FLAG
(symbol)	HYDRANT
N/F	NOW OR FORMERLY

SOIL EROSION & SEDIMENT CONTROL NOTES GENERAL REQUIREMENTS;

1) Unnecessary clearing of any vegetation or ground cover will be avoided. Any disturbed area left un-vegetated for more than five days will be covered with a hay or straw mulch at a rate of 2-3 tons per acre (2 to 3 bales per 1000 square feet) to minimize erosion.
2) Following grading, all disturbed areas will be covered with 8 inches of loam and seeded as described in the landscape plans and details. If any seeded areas are disturbed or damaged, reseeding will occur as soon as possible.
3) If final grading occurs past October 15, disturbed areas will be seeded with winter ryegrass at a rate of 3 lbs per 1000 square feet, raked 1 inch into the soil and mulched with hay or straw at a rate of 1.5 to 2 tons per acre.
4) Any proposed vegetation that has not survived one growing season will be replaced.
5) All suitable material to be excavated for town homes or driveway construction is to be used elsewhere on site. Unsuitable material (stumps) will be removed from the site and deposited in a suitable location.
6) All soil erosion control measures to be used on the project are indicated on the grading, landscape, and the site detail sheets. Erosion control measures shall be in conformance with the provision of the Connecticut Guidelines for Soil Erosion and Sediment Control, 2002 edition.
7) This phase will require cuts and fills as shown on the plans. Cuts or fills shall not exceed a grade of 3 horizontal to 1 vertical, unless a boulder retaining wall is used, in which case grade may reach a maximum of 1 horizontal to one vertical.
8) Preliminary test pits have indicated that the exposed rock is mostly very large boulders. Where blasting is required, it may only proceed after application to and permission from the City.

Sediment and Erosion Control Construction Sequencing:

Phase Two:

Will include the construction of estate buildings 4 and 5, a new driveway to this section, the remainder of sidewalks on Georgetown Road, install interior utilities and new sewer lift station to sanitary sewer already constructed, fill area of phase II, complete swales to yard drain and remove temporary storm pipe from phase I.

1) One week prior to commencement of construction of Phase 1, the City of New London Inlands Wetlands agent and Call-Before-You-Dig (1-800-922-4455) shall be notified.
2) Site Contractor shall provide an erosion and sedimentation schedule for anticipated dates of completion for this phase. The schedule shall note measures that are seasonally affected (frozen ground, planting, etc.) and shall propose additional measures that may be required to provide erosion protection in that schedule.
3) Silt fence required for phase two and silt sacks in Georgetown Road catch basins shall be installed per plan. When silt fence has been inspected by owners licensed engineer, and approved by the inland wetlands agent, clearing and grubbing may proceed.
4) The construction entrance shall be installed at the location of the proposed south drive.
5) Existing granite curbing in driveway area shall be removed carefully and reserved for re-use, or to be returned to the City if not necessary for this project.
6) Stumps are not to be buried on site. Stumps and boulders designated for removal shall be temporarily stored in the areas designated for topsoil reserve until they are removed from the site and shall be removed by a licensed carrier in accordance with state and local regulations.
7) Soil stockpiles and deposition areas for construction material shall be located outside wetland areas as shown on the plan, and shall be surrounded on downhill edges by properly installed silt fencing.
8) After rough grading has been done, Estate buildings 4 and 5 will be built and utilities installed for phase II. The remaining Phase II catch basins shall be installed and on-site utilities will be installed.
9) Paving shall be done after temporary and permanent structures are in place. Bituminous curbing shall be installed as soon as possible after, to permit final fine grading and completion of plantings and lawns around curbing.
10) As soon as weather permits after completion of fine grading, all disturbed areas shall be permanently stabilized with placement of loam and a suitable grass seed mixture (Lofts Ecology mix for lawns and Lofts native grasses mix for the remainder of the site) and covered with a mat of loose hay prior to the completion of the project. Grades completed outside the growing season shall be stabilized as indicted in erosion notes.
11) The temporary yard drain and curbing to direct the flow from Phase I will be removed where the swale and pavement ended at the south west corner of the drive behind building # 2 and flow will be continued overland in the new grassed swale to the yard drain at the junction catch basin sump prior to the Stormceptor unit.
12) After stabilization of site is under way the central sediment pond shall be cleaned of sediment. At this time, the catch basin sumps and Stormceptor shall all be cleaned again, including the sumps for the catch basin in Georgetown Road if necessary.
13) Following successful stabilization of disturbed areas all silt fencing shall be removed. Prior to that removal, all accumulated trapped sediments must be removed to a suitable upland site and seeded.

PLAN REVISIONS			
DATE	DESCRIPTION	DWN BY	CHK BY
05/15/05	Revise soil erosion notes	ARB	DSM

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STREET INDEX

GEORGETOWN ROAD

PHASE II
GRADING, SOIL & EROSION CONTROL PLAN
ELIZABETH HAVENS' ESTATES

PREPARED FOR

NEW ENGLAND DEVELOPMENT ASSOCIATES, LLC

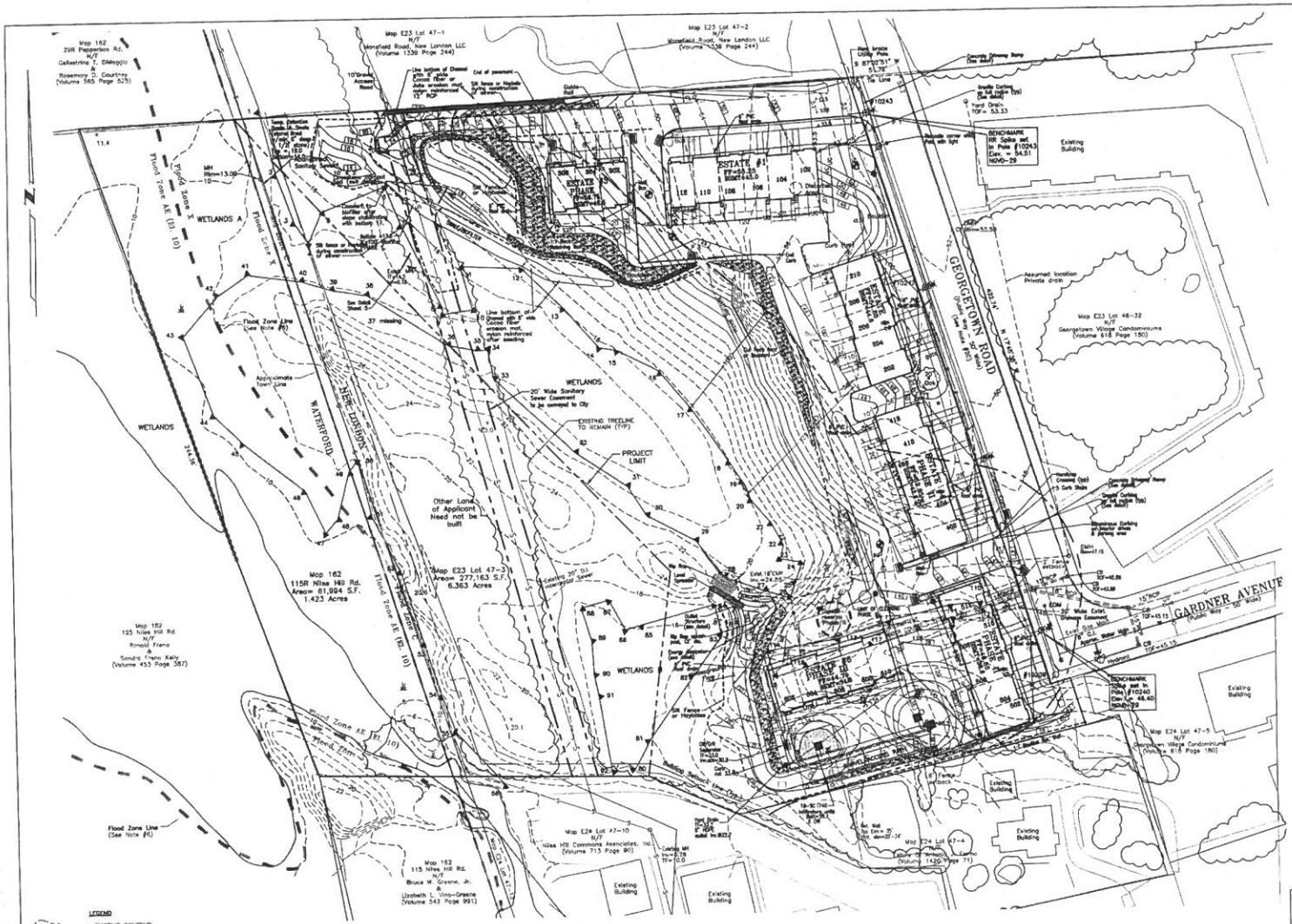
GARDNER AVENUE
&
GEORGETOWN ROAD
MAP E23 LOT 47-3
NEW LONDON, CONNECTICUT
&
MAP 162
WATERFORD, CONNECTICUT

SCALE: 1" = 40'   DRAWN BY: LA
APRIL 26, 2005   CHECK BY: DSM

40 0 40 80 120 Feet

CHERENZIA & ASSOCIATES, LTD.
WESTERLY, RHODE ISLAND

SHEET: 8 OF 14   JOB NO.: 204108
FILE NO.:



SOIL EROSION & SEDIMENT CONTROL NOTES GENERAL REQUIREMENTS:

1) Unnecessary clearing of any vegetation or ground cover will be avoided. Any disturbed area left un-vegetated for more than five days will be covered with a hay or straw mulch at a rate of 2–3 tons per acre (2 to 3 bales per 1000 square feet) to minimize erosion.
2) Following grading, all disturbed areas will be covered with 6 inches of loam and seeded as described in the landscape plans and details. If any seeded areas are disturbed or damaged, reseeding will occur as soon as possible.
3) If final grading occurs past October 15, disturbed areas will be seeded with winter ryegrass at a rate of 3 lbs per 1000 square feet, raked 1 inch into the soil and mulched with hay or straw at a rate of 1.5 to 2 tons per acre.
4) Any proposed vegetation that has not survived one growing season will be replaced.
5) All suitable material to be excavated for town homes is to be used elsewhere on site. Unsuitable material will be removed from the site and deposited in a suitable location.
6) All soil erosion control measures to be used on the project are indicated on the grading, landscape, and the site detail sheets. Erosion control measures shall be in conformance with the provision of the Connecticut Guidelines for Soil Erosion and Sediment Control, 2002 edition.

Sediment and Erosion Control Construction Sequencing:

Phase Three:

Will include the construction of estate building 8, new section of maintenance path on the south section, on-site utilities, and landscaping. This phase requires no clearing or grubbing and no major cutting and filling. One catch basin will be constructed to capture parking lot and roof runoff and direct it to the infiltrators. Sequencing will follow the same general outline as for phase 2, except no protection will be necessary for the storm system for the already completed sections or off-site areas since those are all uphill.

1) One week prior to commencement of construction of Phase 1, the City of New London Inlands Wetlands agent and Call-Before-You-Dig (1-800-922-4455) shall be notified.
2) Site Contractor shall provide an erosion and sedimentation schedule for anticipated dates of completion for this phase. The schedule shall note measures that are seasonally affected (frozen ground, painting, etc.) and shall propose additional measures that may be required to provide erosion protection in that schedule.
3) Silt fence required for this phase shall be installed per plan. When silt fence has been inspected by owners licensed engineer, and approved by the inland wetlands agent, construction entrance shall be installed at the location of the proposed drive.
4) There may be a small soil stockpile remaining from Phase two at the location shown, but since there is no clearing or grubbing, no additional soil will be stored here.
5) Some rough grading and excavation will be required. After rough grading has been done, Estate building 8 will be built and utilities installed for phase III. The Phase II catch basin and infiltrator shall be protected from runoff until the paving is completed.
6) Paving shall be done after temporary and permanent structures are in place. Bituminous curbing shall be installed as soon as possible after, to permit final fine grading and completion of plantings and lawns around curbing.
7) As soon as weather permits after completion of fine grading, all disturbed areas shall be permanently stabilized with placement of loam and a suitable grass seed mixture (Lofts Ecology mix for lawns and Lofts native grasses mix for the remainder of the site) and covered with a mat of loose hay prior to the completion of the project, except for steep areas where coco fiber matting or jute matting is specified. Grades completed outside the growing season shall be stabilized as indicted in erosion notes.
8) After lawns are established, all catch basins on site, the sediment basins, the Stormceptor, and catch basins in Georgetown road shall be inspected for sediment, and accumulated sediment shall be removed, if present.
9) Following successful stabilization of disturbed areas all silt fencing shall be removed. Prior to that removal, all accumulated trapped sediments must be removed to a suitable upland site.

LEGEND

- EXISTING CONTOUR
- PROPOSED CONTOUR
- SPOT GRADE
- UTILITY POLE
- WATER LINE
- SANITARY SEWER LINE
- FENCE LINE
- WATER VALVE
- GAS LINE
- GAS VALVE
- CATCH BASIN
- TOF: TOP OF FRAME ELEVATION
- RIM: RIM ELEVATION
- WETLAND FLAG
- HYDRANT
- N/F: NOW OR FORMERLY

PLAN REVISIONS			
DATE	DESCRIPTION	DWN BY	CHK BY
01/18/05	Modification per City comments	ARB	DSM

CHERENZIA & ASSOCIATES, LTD.

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Groton Office: 500 Bridge Street, Groton, CT. 06340, (860) 405-1900, FAX (860) 405-1990

http://www.cherenzia.com/
email: cherenzia@cherenzia.com

STREET INDEX

GEORGETOWN ROAD

PHASE III
GRADING, SOIL & EROSION CONTROL PLAN
ELIZABETH HAVENS' ESTATES
PREPARED FOR
NEW ENGLAND DEVELOPMENT ASSOCIATES, LLC

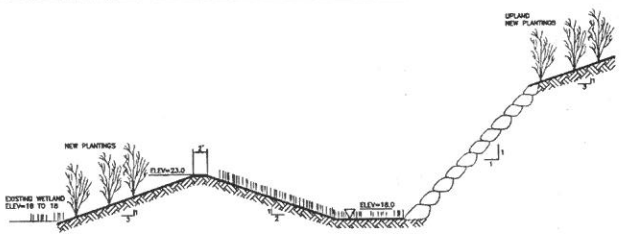
GARDNER AVENUE
&
GEORGETOWN ROAD
MAP E23 LOT 47-3
NEW LONDON, CONNECTICUT
&
MAP 162
WATERFORD, CONNECTICUT

SCALE: 1" = 40' DRAWN BY: LA
APRIL 26, 2005 CHECK BY: DSM

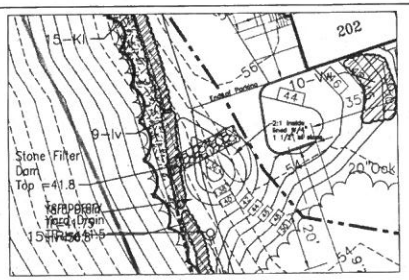
40 0 40 80 120 Feet

CHERENZIA & ASSOCIATES, LTD.
WESTERLY, RHODE ISLAND

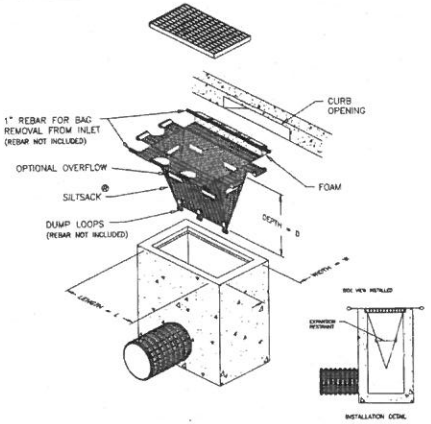
SHEET: 9 OF 14 JOB NO.: 204108
FILE NO.:



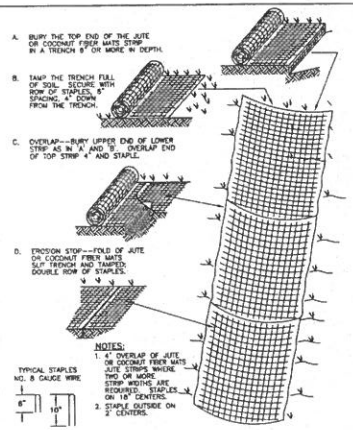
CROSS SECTION – SEDIMENT POND
NOT TO SCALE



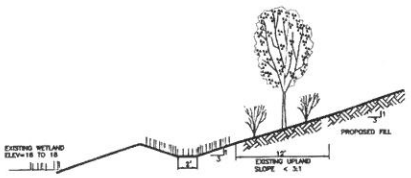
PHASE I
TEMPORARY SEDIMENT BASIN
SCALE: 1" = 20'



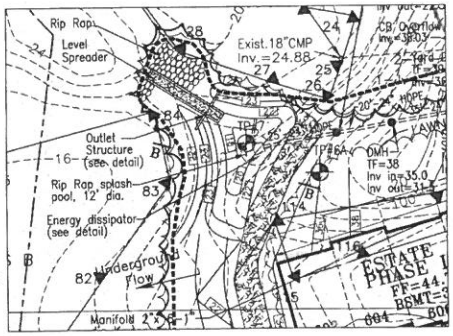
DETAIL OF INLET SEDIMENT CONTROL DEVICE
WITH CURB DEFLECTOR
NOT TO SCALE



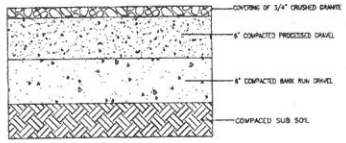
INSTALLATION OF JUTE OR COCONUT FIBER MATS
NTS



TYPICAL CROSS SECTION
NORTH SWALE
NOT TO SCALE



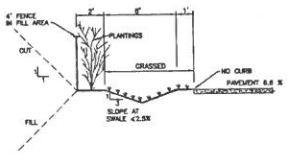
PHASE I/II
SEDIMENT BASIN AT SOUTH SECTION OF SITE
SCALE: 1" = 20'



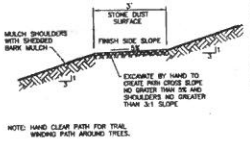
GRAVEL ROADWAY DETAIL

SOIL EROSION & SEDIMENT CONTROL NOTES

1. Unnecessary disturbing of any vegetation or ground cover will be avoided. Any disturbed area left unvegetated for more than five days will be covered with a hay or straw mulch to minimize erosion material.
2. Following final grading, all disturbed areas will be covered with 6" loam and seeded as described on landscape plan and details sheet.
3. Any proposed vegetation which has not survived one growing season will be replaced.



TYPICAL CROSS SECTION
PARKING LOT INTERCEPTING SWALE
NOT TO SCALE



NOTE: HAND CLEAR PATH FOR TRAIL
WINDING PATH AROUND TREES.

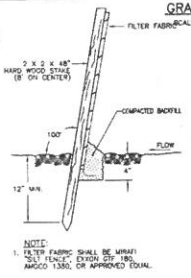
NATURE PATH DETAIL
NOT TO SCALE

FILTER FENCE INSTALLATION

1. DIG A 6" TRENCH ON THE UPHILL SIDE OF THE DESIRED FENCE LINE LOCATION
2. POSITION THE POST IN THE BACK OF THE TRENCH (DOWNHILL SIDE), AND HAMMER THE POST AT LEAST 1.5 FEET INTO THE GROUND.
3. LAY THE BOTTOM 6 INCHES OF THE FABRIC INTO THE TRENCH TO PREVENT UNDERMINING BY STORM WATER RUN-OFF.
4. BACKFILL THE TRENCH AND COMPACT.
5. IF BOULDER INTERRUPTS FENCE – RUN FENCE UPHILL AROUND BOULDER

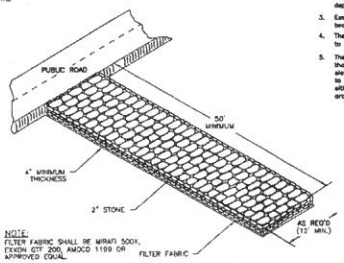
FILTER FENCE MAINTENANCE

1. FILTER FENCE SHALL BE INSPECTED AFTER HEAVY RAINFALL. IF THE FABRIC OR POSTS ARE OUT OF THE GROUND THEY WILL BE REPLACED INTO THE GROUND.
2. SEDIMENT DEPOSITS ARE TO BE REMOVED IF THEY REACH ONE FOOT IN HEIGHT BEHIND THE FENCE.



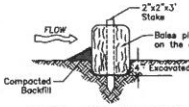
NOTE:
1. FILTER FABRIC SHALL BE MIRAFI 100X, AMOCO 1380, OR APPROVED EQUAL.

SEDIMENT CONTROL
FILTER FABRIC BARRIER
NTS



NOTE:
1. FILTER FABRIC SHALL BE MIRAFI 500X, EXXON GTF 200, AMOCO 1199 OR APPROVED EQUAL.

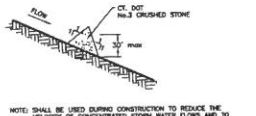
CONSTRUCTION ENTRANCE
NTS



STAKED HAY BALE DETAIL
SCALE: N.T.S.

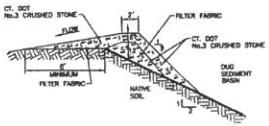
HAY BALE INSTALLATION

1. Bales shall be placed in a single row, lengthwise, oriented along to the contour, with ends of adjacent bales tightly abutting one another.
2. Bales shall be embedded and bankfilled. A trench shall be excavated the width of a bale and the length of the proposed barrier to a minimum depth of 4 inches.
3. Each bale shall be securely anchored by at least two (2) stakes.
4. The gaps between bales shall be sealed with straw to prevent water from escaping between the bales.
5. The barrier shall be extended to such a length that the bottoms of the end bales are higher in elevation than the top of the lowest middle bale to assure that sediment laden run-off will flow either through or over the barrier, but not around it.



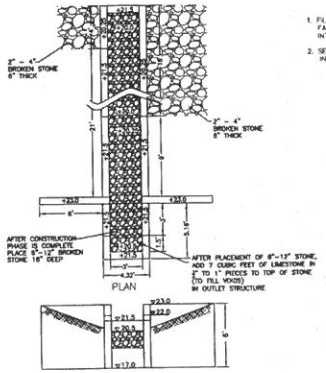
NOTE: SHALL BE USED DURING CONSTRUCTION TO REDUCE THE VELOCITY OF CONCENTRATED STORM WATER FLOWS AND TO TEMPORARILY POND WATER TO ALLOW SEDIMENTS TO DROP OUT. IT IS USED UPSTREAM OF A TEMPORARY SEDIMENT BASIN AND LOCATED IN ACCORDANCE WITH FIELD CONDITIONS.

TEMPORARY STONE CHECK DAM
NOT TO SCALE

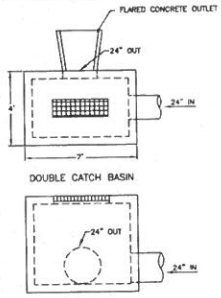


NOTE: 1. SPILLWAY SHALL BE AT LEAST 4' WIDE AND WILL BE KEYED INTO NATIVE SOIL.
2. THE TOP OF THE FILTER CLOTH SHALL BE 6" BELOW THE IMPOUNDMENT NATIVE SOIL RIM. THE TOP OF THE STONE SHALL BE EVEN WITH THE NATIVE SOIL RIM.

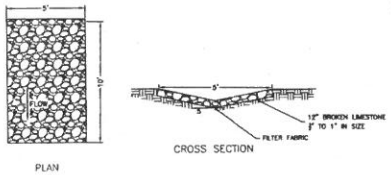
SPILLWAY FOR TEMPORARY
SEDIMENT BASIN
NOT TO SCALE



OUTLET WEIR STRUCTURE
N.T.S.



ENERGY DISSIPATER
FOR SEDIMENT POND
SCALE: NOT TO SCALE



LIMESTONE CONTACT BED
N.T.S.

PLAN REVISIONS			
DATE	DESCRIPTION	DWN BY	CHK BY

EROSION & SEDIMENT CONTROL DETAILS
ELIZABETH HAVENS' ESTATES
PREPARED FOR
NEW ENGLAND DEVELOPMENT ASSOCIATES, LLC
GARDNER AVENUE
&
GEORGETOWN ROAD
MAP E23 LOT 47-3
NEW LONDON, CONNECTICUT
&
MAP 162
WATERFORD, CONNECTICUT

SCALE: NTS DRAWN BY: LA
APRIL 28, 2005 CHECK BY: DSM

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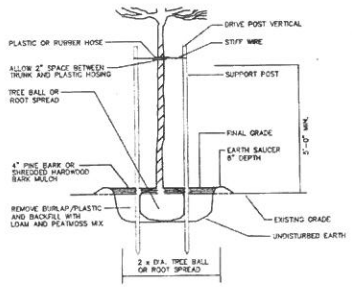
STREET INDEX
GEORGETOWN ROAD

SHEET: 10 OF 14 JOB NO.: 204108
FILE NO.:



DECIDUOUS OR EVERGREEN TREE STAKING DETAIL

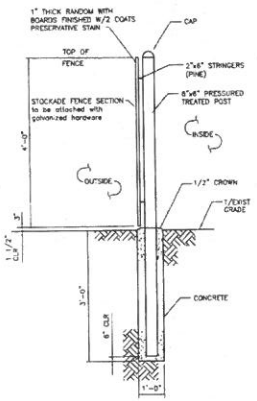
SCALE: N.T.S.

BUILDING MOUNTED SCONCE DOWN LIGHT

NOT TO SCALE

NOTES:

1. Building mounted sconce down light to be Gardco 191 Performance Sconce Mounted at 14' above Ground 100 watt metal halide Type 4 forward throw in Bronze finish.



BOARD FENCE DETAIL

SCALE: NTS

LANDSCAPE NOTES:

1. INSTALL 4" OF SHREDDED HARDWOOD BARK MULCH IN ALL PARKING AREA ISLAND PLANTING BEDS AND FOUNDATION PLANTING BEDS.
   ALL TREES OUTSIDE OF PLANTING BEDS TO HAVE 3" SHREDDED HARDWOOD BARK MULCH PLANTING WELLS.
2. NURSERY STOCK SHALL MEET THE STANDARDS OF THE AMERICAN ASSOCIATION OF NURSERYMEN AS TO THE GRADING AND QUALITY .
3. STAKE ALL TREES OVER 8' HIGH AS SHOWN IN DETAIL A. REMOVE ALL STAKES AT THE END OF ONE GROWING SEASON.
4. WATER ALL PLANTS WITHIN 24 HOURS OF PLANTING AND AS MANY TIMES THEREAFTER TO SUSTAIN HEALTHY CONDITIONS WITH SPECIAL ATTENTION TO WATERING DURING HOT DRY PERIODS.
5. ANY PLANTS NOT SURVIVING OR NOT IN SATISFACTORY GROWTH AT THE END OF ONE YEAR SHALL BE REPLACED AT THE CONTRACTOR'S EXPENSE.
6. THE CONTRACTOR IS RESPONSIBLE FOR VERIFYING THE PLANT QUANTITIES BY COUNT ON THE PLAN. IF THERE IS A DISCREPANCY BETWEEN THE PLAN AND THE PLANT LIST, THE PLAN WILL PREVAIL.
7. DISTURBED AREAS: LAWNS AND CURBS AS SHOWN IN LANDSCAPE PLANS: SHALL BE FILLED/BACKFILLED WITH 6 INCHES OF LOAM, FERTILIZED, LIMED, AND SEEDED WITH LOFTS ECOLOGY MIX AT A RATE OF 10 POUNDS PER 1000 SQUARE FEET. ADD ONE POUND PER 1000 SQUARE FEET OF LOFT RYEGRASS TO ACT AS A NURSE GRASS. MULCH ALL PLANTED AREAS WITH HAY.
8. DISTURBED AREAS: DRY AREAS OUTSIDE OF MAINTAINED LAWN AREAS AS SHOWN IN LANDSCAPE PLANS: SHALL BE FILLED/BACKFILLED WITH 6 INCHES OF LOAM, FERTILIZED, LIMED, AND SEEDED WITH LOFTS RECLAIM NATIVE GRASSES MIX AT A RATE OF 10 POUNDS PER 1000 SQUARE FEET. MULCH ALL PLANTED AREAS WITH HAY.
9. WATER ALL SEEDED AREAS WITHIN 24 HOURS OF PLANTING AND AS MANY TIMES NEEDED THEREAFTER TO SUSTAIN HEALTHY CONDITIONS WITH SPECIAL ATTENTION TO WATERING DURING HOT DRY PERIODS.

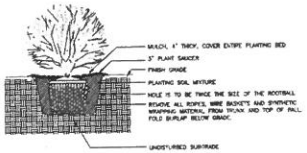
SEED MIXTURES: LOFTS SEED COMPANY 1-800-648-7333

LOFTS RECLAIM NATIVE GRASS MIX

Seed Mixture	Seeding Rate
40% Rebel II Tall Fescue	10 Lbs./1000 SF
20% Weeping Lovegrass	
10% Reliant II Hard Fescue	
10% Jamestown II Chewings Fescue	
10% Pennar II Perennial Ryegrass	
5% White Clover	
5% Blackwell Switchgrass	

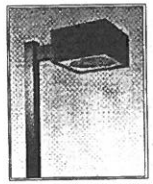
LOFTS ECOLOGY MIX(add 1#/1000 SF ryegrass for nurse grass)

Seed Mixture	Seeding Rate
80% Reliant II Hard Fescue	10 Lbs./1000 SF
20% Jamestown II Chewings Fescue	



SHRUB PLANTING DETAIL

NOT TO SCALE



POLE MOUNTED DOWN LIGHT

NOT TO SCALE

LIGHTING NOTES:

1. Pole Mounted Luminaire to be EMCO Ecotume 175 watt metal halide type IV forward throw lighting Fixture from: S & K Associates 95/22 Corner Circle Canton, MA 02021 Phone 781-821-1770
2. Pole for above shall be 14' from ground to fixture.

Wall mounted light fixtures shall be provided by each main entry door, by each garage and by each door onto the deck and shall be Model PL9460-7 Hawthorne one-light, compact fluorescent with as manufactured by Thomas Lighting. Units shall incorporate one 26w CFL G24 Quad lamp behind white art glass panels.

LIGHT DETAIL

NOT TO SCALE

Light Fixtures on walkway poles in front of Estate Buildings 1, 2, 4, and 5 shall be Model PL9050-7 Hawthorne one-light, compact fluorescent with as manufactured by Thomas Lighting. Units shall incorporate one 26w CFL G24 Quad lamp behind white art glass panels. Pole mounted light shall be 7 feet high.

LIGHT DETAIL

NOT TO SCALE

PLAN REVISIONS			
DATE	DESCRIPTION	DWN BY	CHK BY

STREET INDEX

GEORGETOWN ROAD

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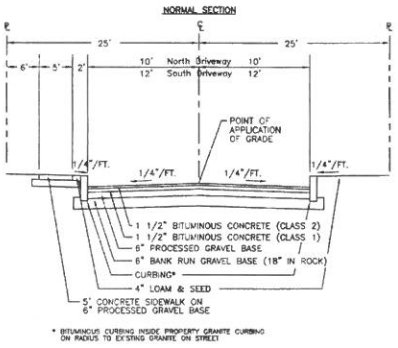
LIGHTING & LANDSCAPING DETAILS
ELIZABETH HAVENS' ESTATES
PREPARED FOR
NEW ENGLAND DEVELOPMENT ASSOCIATES, LLC
GARDNER AVENUE
&
GEORGETOWN ROAD
MAP E23 LOT 47-3
NEW LONDON, CONNECTICUT
&
MAP 162
WATERFORD, CONNECTICUT

SCALE: AS NOTED DRAWN BY: LA
APRIL 26, 2005 CHECK BY: DSM

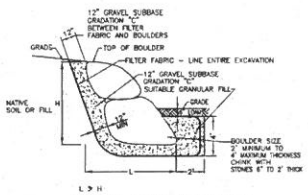
40 0 40 80 120 Feet

CHERENZIA & ASSOCIATES, LTD.
WESTERLY, RHODE ISLAND

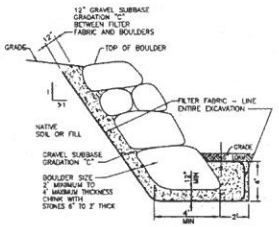
SHEET: 11 OF 14 JOB NO.: 204108
FILE NO.:



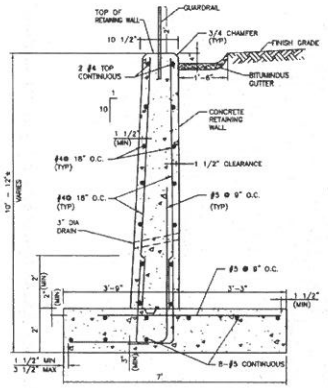
ROAD & DRAINAGE CROSS – SECTION TYPICAL
NOT TO SCALE



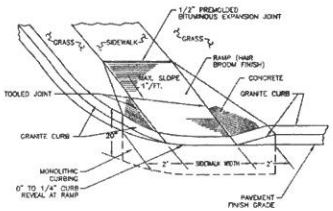
STONE RETAINING WALL
for walls 6' high or less
SCALE: N.T.S.



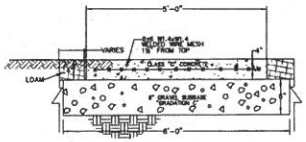
STONE RETAINING WALL
for walls over 6' high
SCALE: N.T.S.



REINFORCED CONCRETE
RETAINING WALL
NOT TO SCALE



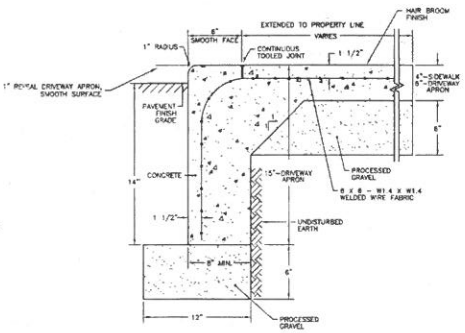
HANDICAP RAMP
NOT TO SCALE



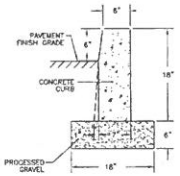
SIDEWALK NOTES:

1. CONCRETE SHALL CONFORM TO CONNDOT STANDARDS M.03 FOR CLASS "C" PORTLAND CEMENT CONCRETE.
2. CONTRACTOR TO SLOPE NEWLY INSTALLED CONC. SIDEWALK SECTIONS TOWARD ADJACENT LAWN AREAS TO AID IN REDUCING RUNOFF TO STREET AND AWAY FROM ALL STRUCTURES AT A SLOPE OF 1/4"/FT.
3. MINIMUM COVER ON REINFORCED SHALL BE 1½" FROM TOP, TYP.
4. GRAVEL BASE SHALL CONFORM TO CONNDOT MATERIAL STANDARDS M.02.06, GRADING "C"
5. DUMMY JOINTS AT 4' O.C., EXPANSION JOINTS AT 12' O.C.
6. ALL SIDEWALKS IN THIS PROJECT ARE 5' WIDE

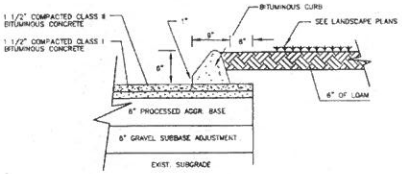
TYPICAL SIDEWALK SECTION DETAIL
SCALE: N.T.S.



CONCRETE DRIVEWAY RAMP
SCALE: N.T.S.



GRANITE CURBING
NOT TO SCALE



BITUMINOUS CONCRETE LIP CURBING SHALL CONFORM TO SECTION 8.15 AND SECTION M.04 OF THE STATE STANDARD SPECIFICATIONS

TYPICAL ROADWAY/PARKING
AREA AND CURB SECTION
SCALE: N.T.S.

PLAN REVISIONS			
DATE	DESCRIPTION	DWN BY	CHK BY
09/18/05	Modification per City comments	ARB	DSM

CHERENZIA & ASSOCIATES, LTD.

Raymond F. Cherenzia, P.E., L.S.

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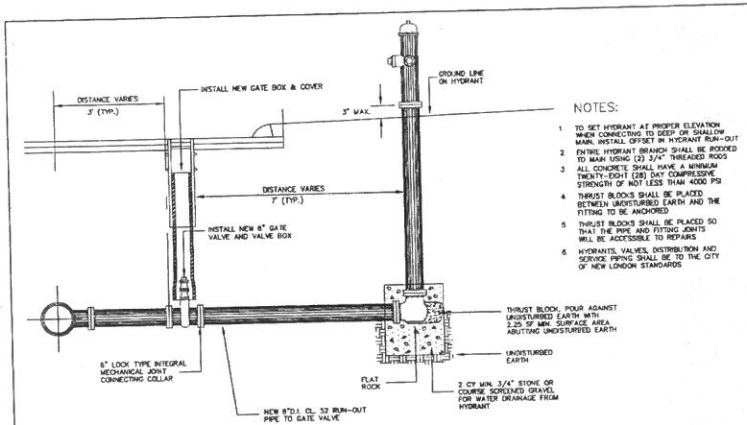
http://www.cherenzia.com/
email: cherenzia@cherenzia.com

STREET INDEX

GEORGETOWN ROAD

SITE DETAILS
ELIZABETH HAVENS' ESTATES
PREPARED FOR
NEW ENGLAND DEVELOPMENT ASSOCIATES, LLC
GARDNER AVENUE
&
GEORGETOWN ROAD
MAP E23 LOT 47-3
NEW LONDON, CONNECTICUT
&
MAP 162
WATERFORD, CONNECTICUT

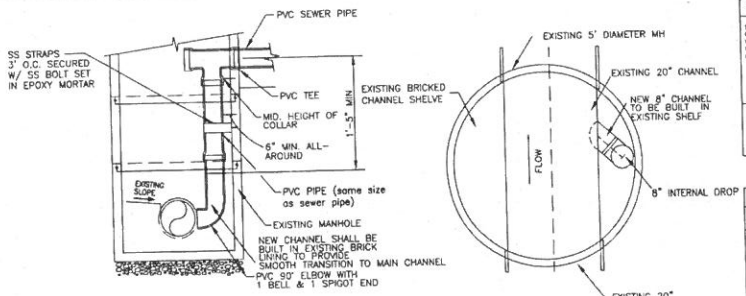
SCALE: N.T.S. DRAWN BY: LA
APRIL 26, 2005 CHECK BY: DSM
CHERENZIA & ASSOCIATES, LTD.
WESTERLY, RHODE ISLAND
SHEET: 12 OF 14 JOB NO.: 204108
FILE NO.:



NOTES:

1. TO SET HYDRANT AT PROPER ELEVATION WHEN CONNECTING TO DEEP OR SHALLOW MAIN, INSTALL OFFSET IN HYDRANT RUN-OUT
2. ENTIRE HYDRANT BRANCH SHALL BE RODDED TO MAIN USING (2) 3/4" THREADED RODS
3. ALL CONCRETE SHALL HAVE A MINIMUM TWENTY-EIGHT (28) DAY COMPRESSIVE STRENGTH OF NOT LESS THAN 4000 PSI
4. THRUST BLOCKS SHALL BE PLACED BETWEEN UNDISTURBED EARTH AND THE FITTING TO BE ANCHORED
5. THRUST BLOCKS SHALL BE PLACED SO THAT THE PIPE AND FITTING JOINTS WILL BE ACCESSIBLE TO REPAIRS
6. HYDRANTS, VALVES, DISTRIBUTION AND SERVICE PIPING SHALL BE TO THE CITY OF NEW LONDON STANDARDS

HYDRANT ASSEMBLY DETAIL
SCALE: NOT TO SCALE



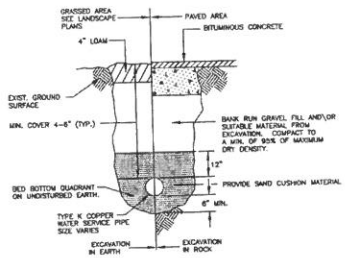
INTERIOR DROP SEWER MH
NOT TO SCALE
FOR EXISTING SEWER MH

MAINTENANCE CHECKLIST FOR STORM STRUCTURES

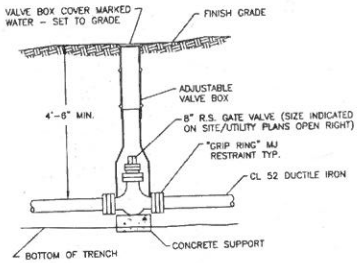
Control Measure	Problems to look for	Remedies, Schedule
STANDARD CATCH BASIN WITH ULTRA DRAIN GUARD PLUS INSERT MODEL #219	Trash, Litter	Inspect and remove quarterly
	Sediment in sump	Inspect and remove all sediment in sump each spring and fall if sediment is within 1" of inlet
	Flooding	Remove trash or replace insert if full of sediment
	Red pop up activated	Replace insert
	Old insert	Replace insert w/all Sorbent pillow each spring & fall
IN-LINE STORMCEPTOR	Oil	Inspect Quarterly, remove all if present
	Sediment	Inspect Spring and Fall, clean all Sediment & oil from unit spring & fall
	Trash	Check chutes and walls, remove debris Quarterly

MAINTENANCE CHECKLIST FOR SEDIMENT PONDS

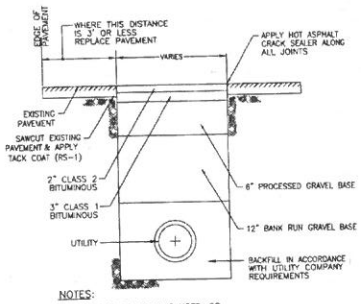
Control Measure	Problems to look for	Remedies
RIPRAP - LINED CHANNELS	Scour beneath stones	Install proper filter fabric or graded bedding
SEDIMENT PONDS	Obstructed Outlet	Remove debris
	Basin not dewatering Between Storms	Clean holes. Clear or replace sediment-choked surrounding dewatering hole or subsurface drain.
	Spillway erosion	Line spillway with rock, filter or fabric.
	Outlet erosion	Make certain outlet is flush with ground and on level grade, treated, extend or repair riprap apron as required.
	Pipe flotation	Anchor riser in concrete foundation.
DEBRIS AND LITTER REMOVAL	Litter accumulation on pond and embankment	Remove litter Spring and Fall
NUISANCE CONTROL	Insects, weeds, odors and algae	Programs of maintenance and biological control with small-brains, minnows and fish rather than chemical applications.



WATER SERVICE TRENCH DETAIL
SCALE: NOT TO SCALE

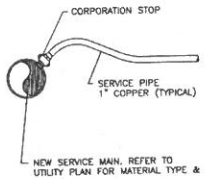


TYPICAL IN-LINE VALVE
SCALE: NOT TO SCALE



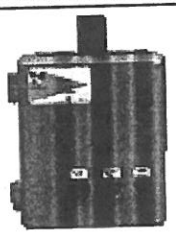
NOTES:
1. IF A TEMPORARY PATCH IS USED, OR REQUIRED, IT SHALL BE A MINIMUM OF 2 INCHES THICK BITUMINOUS CONCRETE (CLASS 1).

UTILITY TRENCH PATCH
N.T.S

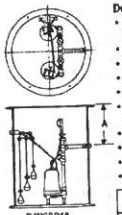


WATER SERVICE CONNECTION TO TOWN HOMES
SCALE: NOT TO SCALE

S10020 CONTROL PANEL



Duplex			
Max. Pump Running Amps	Pump Circuit Breakers	Panel Order No.	Where Used
20	25	D10020	Outdoor
		D10020N1	Indoor



Duplex
- 36" diameter fiberglass basin with integral anti-floatation ring.
- Stainless steel hardware.
- Grass green solid fiberglass cover.
- 1.5" electrical grommet. "
- 4" inlet grommet. "
- (2) brass quick disconnect couplings with stainless steel pull rods.
- Schedule 80 PVC discharge pipes.
- (2) PVC ball type check valves.
- (2) PVC gate valves.
- ¼" stainless steel pump lifting cable.

Kit No.	Discharge Piping (PVC)	Basin Diam.	Basin Depth	"W" Dim.
D4NGRD48	1.25"	36"	48" (tall)	20"
D4NGRD84	1.25"	36"	84" (tall)	42"
D2NGRD48	2.00"	36"	48" (tall)	20"
D2NGRD84	2.00"	36"	84" (tall)	42"

PUMP KITS

Duplex	DUPNGSK1714"	(2) RGS20I2	2 HP, 230 V, single phase, pump
		(1) D10828	Duplex outdoor control panel
		(3) A2D23W	Mechanical level switch
		4X639	Cast iron pump leg (set of 3)

Sewer Lift Station Notes:

1. Station shall be designed to serve 17 three-bedroom units. Design flow shall be 6,000 GPD. Max hourly flow shall be 530 GPH. Min hourly flow shall be 83 GPH.
2. Wet well shall be fiberglass basin 84 inches tall, 48 inches diameter, 300 gallon capacity.
3. Pumping system shall consist of duplex, alternating pumps with float switches with above ground control box and telephone alarm system.
4. Pumps shall be 40-45 gpm submersible grinder pumps, 2 BHP, 230 volt.
5. Propane powered electric generator set, with automatic transfer switch, suitable for outdoor all-weather installation with automatic test cycle, sufficient to provide start up voltage for selected pump, shall be included.

PLAN REVISIONS			
DATE	DESCRIPTION	DWN BY	CHK BY
12/30/05	ADD PUMP STATION DETAIL	LA	DSM
04/06/05	MODIFY UTILITIES PER CITY COMMENTS	ARB	DSM
04/29/05	Modification per City comments	LA	DSM

STREET INDEX
GEORGETOWN ROAD

CHERENZIA & ASSOCIATES, LTD
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UTILITY DETAILS
ELIZABETH HAVENS' ESTATES
PREPARED FOR
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GARDNER AVENUE
&
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MAP E23 LOT 47-3
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&
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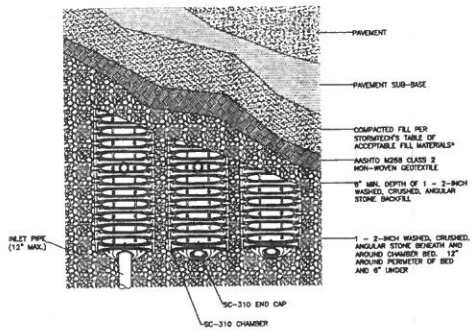
WATERFORD, CONNECTICUT

SCALE: NTS DRAWN BY: LA
FEBRUARY 22, 2005 CHECK BY: DSM

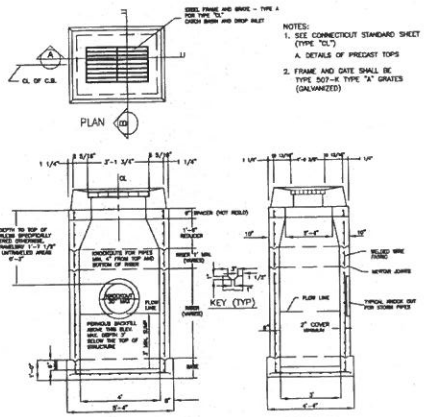
CHERENZIA & ASSOCIATES, LTD.
WESTERLY, RHODE ISLAND

SHEET: 13 OF 14 JOB NO.: 204105
FILE NO.:



STORMTECH SC-310 CHAMBER SYSTEM PLAN VIEW DETAIL

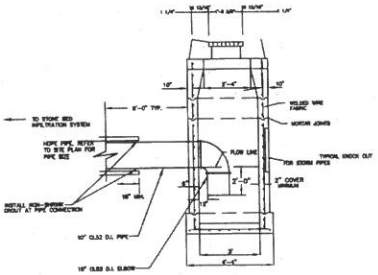
NOT TO SCALE



NOTE:
ALL CATCH BASINS AND FRAMES SHALL CONFORM TO THE STATE OF CONNECTICUT STANDARDS. FRAME AND GRATE TYPES ARE INDICATED ON SITE UTILITY AND GRADING PLANS.

STANDARD CATCH BASIN

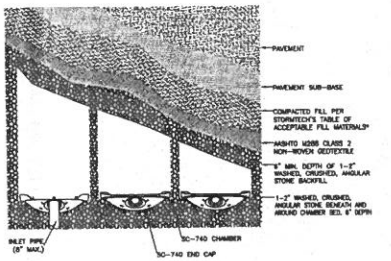
TYPE "CL" SCALE: N.T.S.



NOTE:
ALL CATCH BASINS AND FRAMES SHALL CONFORM TO THE STATE OF CONNECTICUT STANDARDS. FRAME AND GRATE TYPES ARE INDICATED ON SITE UTILITY AND GRADING PLANS.

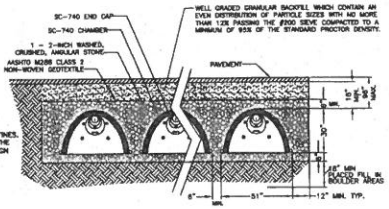
OIL/GRIT SEPARATOR CATCH BASIN

NOT TO SCALE TYPE "CI" SCALE: N.T.S.



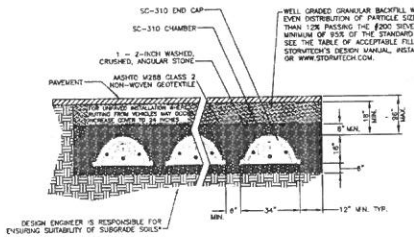
STORMTECH SC-740 CHAMBER SYSTEM PLAN VIEW DETAIL

NOT TO SCALE



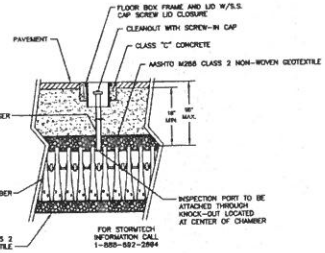
STORMTECH SC-740 CHAMBER SYSTEM TYPICAL CROSS SECTION DETAIL

NOT TO SCALE



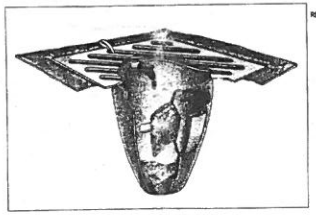
STORMTECH SC-310 CHAMBER SYSTEM TYPICAL CROSS SECTION DETAIL

NOT TO SCALE



STORMTECH SC-740 CHAMBER SYSTEM OPTIONAL INSPECTION PORT DEATAIL

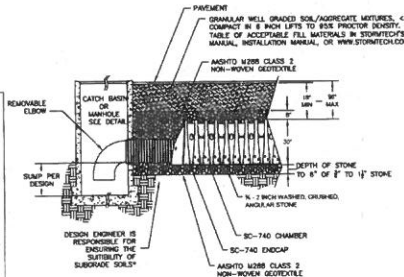
NOT TO SCALE



CATCH BASIN INSERT

NOT TO SCALE

Ultra Drainguard Model 9225
for oil and sediment with pop up capacity indicator, (part 9236)
to be installed in all catch basin capturing surface runoff on site.



STORMTECH SC-740 CHAMBER SYSTEM INLET DIRECT FROM CATCH BASIN/MANHOLE

NOT TO SCALE

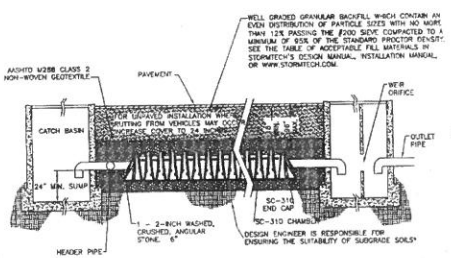
* Where infiltrators are to be placed in areas of boulder fill, material shall be removed below the proposed bottom elevation in the area of the infiltrators and for 2 feet additional width and length to native soil.

* The excavated area shall be backfilled with on-site material, screened through a bar screen separator with a bar spacing of 4 inches or less in lifts of no more than 4 inches. Each lift shall be compacted to a minimum of 95 percent of the standard proctor density. Material placed shall be approved by engineer.

Cleaning Instructions for Isolator Row

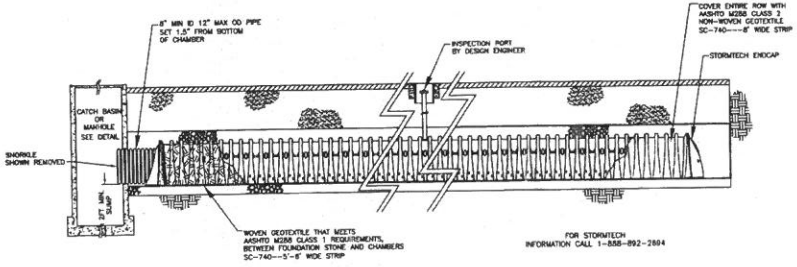
If catch basin inserts are not maintained and if catch basins are not cleaned as needed, sediments may deposit inside the isolator row of the infiltrator bed. Symptoms will include overflowing in storms of magnitude of less than 10-year return. If this is the case, sediment should be checked by sampling the depth though the inspection port. If sediment has collected within the infiltrator, it should be removed.
To clean the isolator row:

1. Remove the snorkel inlet from the junction manhole or catch basin.
2. Open the inspection manhole.
3. Using a sewer cleaning jet/vacuum cleaning machine, run jet cleaning hose (with reverse spray head) into the infiltrator for the full length of the row. Do not use high pressure to start.
4. Retrieve hose, while spraying, forcing dirty water back into the sump of the manhole or catch basin, where it can be removed by the vacuum truck, or pumped into a sediment bag or mobile basin and disposed of properly.
5. Repeat until clean, increasing pressure if necessary.
6. Replace snorkel tube, and observation port.



STORMTECH SC-310 CHAMBER DETENTION SYSTEM INLET OUTLET DETAIL

NOT TO SCALE



STORMTECH ISOLATOR™ ROW PROFILE VIEW DETAIL

NOT TO SCALE

ONE ISOLATOR ROW TO BE PROVIDED PER BED

PLAN REVISIONS			
DATE	DESCRIPTION	DWN BY	CHK BY

STORM DRAIN AND INFILTRATOR DETAILS
ELIZABETH HAVENS' ESTATES
PREPARED FOR
NEW ENGLAND DEVELOPMENT ASSOCIATES, LLC
GARDNER AVENUE
&
GEORGETOWN ROAD
MAP E23 LOT 47-3
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MAP 162
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SCALE: NTS DRAWN BY: LA
APRIL 26, 2005 CHECK BY: DSM

CHERENZIA & ASSOCIATES, LTD.
WESTERLY, RHODE ISLAND
SHEET: 14 OF 14 JOB NO.: 204105
FILE NO.:

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STREET INDEX
GEORGETOWN ROAD

City of New London

Office of Development & Planning
Planning, Zoning Wetlands Division
111 Union Street New London, CT 06320•Phone (860) 437-6379•Fax (860) 437-4467

CERTIFIED MAIL 7011 2000 0000 9069 4102

November 4, 2014

Attorney Mark T. Kelly
900 Chapel Street, Suite 620
New Haven, CT 06510

Re: Planning & Zoning Commission – October 16, 2014
Site Plan Review/Coastal Site Plan Review-Georgetown Road Map
E23/Block 47/Lot 3

Dear Attorney Kelly:

At the Thursday October 16, 2014 regular meeting of the City's Planning and Zoning Commission, the Commission voted unanimously to accept your letter dated September 29, 2014 to extend the Site Development Plan Approval Permit #783 (granted 05/19/05) as referenced above. This approval was granted pursuant to Section 8-3(i) of the Connecticut General Statutes, as amended. Please note that based on the specific request in your letter of September 29, 2014 the Commission acted to extend the Approval (Permit #783) until May 5, 2019. Please also note that all conditions of this approval shall remain in full force and effect.

If you have any questions or need clarification regarding this correspondence, please do not hesitate to contact me at (860) 437-6289.

Sincerely,

Shelly Briscoe

Shelly Briscoe,
Land Use Assistant

Cc: IWCC File

CITY OF NEW LONDON

INLAND WETLAND & CONSERVATION COMMISSION

181 State Street New London, CT 06320•Phone (860) 437-6379•Fax (860) 437-4467

June 10, 2016

Judith A. Bell
Red Feather LLC
52 Coachman Pike
Ledyard, CT 06339

RE: Inland Wetlands Permit Dated May 12, 2005
New England Development Associates LLC – Gardner Avenue @Georgetown Road
Construction of 31 Residential Condominium Units with Associated Site Improvements

Dear Ms. Bell:

Please accept this letter as it relates to the above referenced project.

The City of New London's Inland Wetlands Commission granted the original permit (#2005-02) for this project on May 12, 2005. At that time the permit had a "life span" of five (5) years with the expiration being May 12, 2010 with the ability to request one (1) five year time extension with which the project could be completed. On July 9, 2009 Commission approved a request from Attorney Mark Kelly to extend this permit five years beyond the original expiration bringing the expiration date to May 12, 2015 (ten (10) years from the date of its granting).

The Connecticut General Statutes (CGS 22a-42a (g)) were amended to extend the "life span" for those Inland Wetland Permits approved prior to July 1, 2011, that have not expired prior to May 9, 2011 for up to fourteen (14) years from the approval date. Specific to this approval, the expiration date of this approval has been extended out to May 12, 2019.

Please note that all conditions of this approval shall remain in full force & effect.

Sincerely,

Michelle Johnson Scovish, CZEO/DAA
Assistant Planner/Zoning & Wetlands Official

Article III, Section 330.1 – Summary of Lot and Bulk Requirements

R-3

	Minimum Lot Requirements					Minimum Yard Requirements				
Zoning District	Lot Area (Sq.ft.)	Lot Area per D.U. (sq.ft.)	Frontage (feet)	Width (feet)	Coverage (max.)	Front (feet)	Side (feet)	Rear (feet)	Max. Height (stories)/ (feet)	Floor Area Ratio (FAR)
R-1	7,500	---	75	75	25%	25(1)	10	25	2.5/35	---
R-1A	5,000	---	50	50	25%	25(1)	6	25	2.5/35	---
R-2	5,000	2,000	50	50	30%	25(1)	6	25	2.5/35	---
R-3	5,000	2,000(2)	50	50	40%	25(1)	10	25	3/40	---
R-4	5,000	1,000(2)	50	50	40%	25(1)	10(3)	25	7/70	---
NB	5,000	2,000	50	50	50%	10(3)	10(3)	10	3/35	---
C-1	5,000	2,000(3)	50	50	80%	10(3)	6(3)	10(3)	40(3)	---
C-2	20,000	N/A	50	50	40%	25	25	25	40(3)	---
CBD-1	5,000	750(3)	50	50	80%	0	---(3)	---(3)	---(3)	2.0(3)
CBD-2	5,000	750(3)	50	50	80%	0	---(3)	---(3)	---(3)	2.0(3)
WD	20,000	N/A	50(3)	50	50%	20(3)	10(3)	20(3)	25(3)	---
WCI-1	10,000	N/A	75	100	50%	20(3)	10(3)	20(3)	45(3)	---
WCI-2	10,000	N/A	75	100	50%	20(3)	10(3)	20(3)	45(3)	---
MD	10,000	500	75(3)	100	50%(3)	10(3)	10(3)	10(3)	50(3)	---
LI-O	20,000	1,000(3)	100	150	40%	25	25	25	50(3)	---
INST	40,000	---	150	150	30%	40(3)	25	40	6/75	---
OS	---	---	---	---	10%	---	---	---	---	---

(1) See Article VI, Section 605.G.4
(2) 1,000 square feet for each rooming unit
(3) Refer to text for variations permitted in this district

(Amended 5/2/02)

(1) See Article VI, Section 605.G.4
(2) 1,000 square feet for each rooming unit
(3) Refer to text for variations permitted in this district

Section 420 R-3 Multi-Family Medium Density Residential District

420.1 Purpose of District. To provide areas for several types of housing at a medium density in a residential environment with good access and access to a range of commercial and community services.

420.2 Permitted Uses: The following uses are permitted by right.

1) Single family dwellings.

2) Two family dwellings.

3) Multi-family dwellings.

4) Townhouses.

5) Home Based Businesses in accordance with Article IV, Section 400.2.2. *(Amended 10/18/01)*

6) Libraries, museums, and art galleries.

420.3 Uses permitted subject to issuance of a Special Permit by the Planning and Zoning Commission in accordance with the requirements of Article VIII, Section 810 of this regulation.

1) Public and private utility substations.

2) Places of worship in accordance with Article IV., Section 410.3.2.

3) RESERVED *(Amended 07/26/06)*

4) Convalescent homes.

5) Community residences for more than 6 but not more than 12 residents provided that there are at least two staff persons on duty at all times and the facility is licensed under the provisions of Section 19-574 of State Statutes.

6) Child day care centers or group day care home, subject to the following requirements *(Amended 8/15/02)*:

(a) The applicant shall have obtained all licenses, certifications, or approvals that may be required by Federal, State, or local law.

(b) For each child registered, there shall be a minimum of 35 square feet of floor space exclusive of halls, bathrooms, and kitchens.

(c) For each child enrolled there shall be provided not less than 75 square feet of usable exterior open space. The Planning and Zoning Commission may authorize the substitution of interior space available for recreation purposes if it determines that the aggregate space to be provided is adequate. Useable exterior open space known as Outdoor Play Space shall be provided on the same lot as the use it supports, except where specifically permitted elsewhere in these regulations.

(d) No permanently installed play equipment shall be located in any required front or side yard.

(e) Any outdoor play area shall be screened in a manner to ensure visual and auditory privacy to adjacent properties.

(f) Required Outdoor Play Space may be provided on sites other than the site they serve under certain circumstances after meeting all of the following requirements: (Amended 8/15/02)

(1) The site must be located within 2640 feet (1/2 mile) along public pedestrian thoroughfares measured from property line to property line.

(2) The outdoor play space shall be located within a zone that allows child day care centers.

(3) In all cases, such outdoor play space shall conform to all of the provisions of the regulations of the district in which they are located. Parks, school yards, and parking areas will be exempt from screening but shall be fenced or otherwise protected for safety.

(4) Such outdoor play space shall be in the same ownership as the use to which they serve or if in separate ownership there shall be a written agreement between the parties that the outdoor play space shall be available to the use to which it is assigned. If the outdoor play space is a park, written permission shall be obtained from the City allowing usage.

(5) A Special Use Permit must be issued by the Planning & Zoning Commission.

7) Professional or business offices as part of a two or multi-family dwelling subject to the following requirements:

(a) Office uses shall be limited to the first floor;

(b) Office uses shall be primarily to serve residents of the immediate neighborhood;

(c) Such office space shall be limited to 800 square feet for each ten dwelling units in the building or major fraction thereof;

(d) Entrances and exits to offices shall be separate from the residential portion of the building.

8) Professional office in residence.

(a) Said office shall be limited to one professional who shall reside on the premises and not more than two non-resident assistants.

(b) Said office shall be incidental and subordinate to the residential use of the building, and shall not occupy more than 25 percent of the gross floor area of the principal building. No office shall be located in an accessory building.

(c) In no manner shall the appearance of the building be altered or shall the office within the residence be conducted in a manner that would cause the premises to lose its residential character, either by use of colors, materials, construction, or lighting.

(d) No professional office shall create noise, dust, vibration, odor, smoke, electrical interference, fire hazard, or any other nuisance that is perceptible beyond the lot lines.

9) Free standing signs. *(Amended 04/10/87)*

10) Duplex Dwellings

(a) The Commission may allow the conversion of a structure to a duplex dwelling provided that the overall density shall be significantly reduced. In the cases of the conversion of one and two family structures, no reduction of density will be required;

(b) In the case of an individual lot associated with a duplex lot dwelling divided by a common party wall, the provisions set forth for required lot area, lot width, front yard, side yards, rear yard and lot coverage shall be as follows:

(1) Minimum lot area 1800 square feet;
(2) Minimum lot width 22'0";
(3) Minimum lot frontage 22'0";
4) Minimum Yards:
aa. front 6 feet;
bb. side 0 feet;
cc. rear 25 feet;

*The Commission may permit a reduction in the rear yard to 6 feet if, in its judgment such a reduction will help to achieve the purposes of the district.

(5) Maximum lot coverage 50%

(c) No owner of all or half a duplex shall make any changes in the architectural style, general design and general arrangement of the exterior of the building including the color, the kind and texture of the building material and the type and style of the doors and other appurtenant features, unless approval is granted by the City Planner.

11) Public or private parks and playgrounds including all appropriate and/or necessary supplementary uses or facilities customarily associated with the permitted use. *(Amended 03/ 23/00)*

12) Bed & Breakfast Inns in accordance with the requirements of Article IV, Section 400.3 10). *(Amended 01/07/03)*

13) Tourist Homes provided the following conditions are met *(Amended 02/20/03):*

(a) The applicant must submit an application for a Special Use Permit, together with a Site Plan. The Site Plan shall include, but not be limited to, the following information in addition to the requirements for a Special Use Permit and the Site Development Plan Regulations *(Amended 02/20/03):*

(1) A proposed floor plan of the dwelling with the dimensions and square footage of all rooms in the structure.
(2) Proposed area to be dedicated to guest accommodations.
(3) Proposed area to be dedicated to private residential use.
(4) Entrances, exits, driveways and parking areas.

The Commission may require, in its discretion, such plan to be prepared and sealed by an Architect, Land Surveyor or Professional Engineer licensed in the State of Connecticut.

(b) The applicant shall establish that it will meet all requirements of the Public Health Code of the City of New London and State of Connecticut as the same apply to Tourist Homes.

(c) The applicant shall be required to obtain written certification or waivers from the Fire Marshal and Building Inspector regarding compliance with the State building code and applicable fire code regulations and the same shall be a condition of approval.

(d) The recorded owner or the manager of a property used as a Tourist Home, shall establish and maintain his/her residence in the property, which shall have its own bath for their exclusive use.

(e) The property shall have no less than three (3) guest rooms.

(f) There shall be at least one bathroom for use per two (2) guest rooms.

(g) Maximum length of stay per guest may not exceed twelve (12) consecutive days.

(h) The owner or manager of the property shall make the Guest Book recording the lengths of stay of patrons available to the City, at the request of any Zoning Official within ten (10) days of written request of the same.

(i) Breakfast is the only full meal which may be served, and is to be served for the pleasure of guests only, not the general public. Additionally, guests may prepare their own meals in a kitchen that is separate from the guest rooms.

(j) A Tourist Home facility, including the parking area, shall be such as to not eliminate the residential appearance of the property in question.

(k) The Commission shall have the authority to revoke the permit of a Tourist Home at any time the property is found to be in non-compliance with the original permit, after a warning and 60 days written notice to the owner, and also to the manager or lessee of the property as the case may be.

(l) Parking shall be in accordance with the provisions of Article VI, Section 614 of these regulations and shall be provided on the site plan which is to be submitted. The site plan shall provide for the shielding of the parking area from neighboring properties through the use of trees, shrubbery, fencing or such other means to enhance and maintain the residential character of the neighborhood, as may be required by the Commission.

(m) Tourist Home facilities shall be permitted a sign or signs to identify the property, provided said sign(s) are in conformance with the applicable regulations, are lit only by indirect lighting and are approved by the Commission as part of the site plan.

The purpose of this provision is to allow Tourist Homes such as youth hostels, for overnight use of transients.

420.4 Accessory Uses

1) Off-street parking for uses permitted in the district.

2) Buildings for housing pets; children's playhouses.

3) Garden houses; greenhouses.

4) Signs subject to the requirements of Article VI, Section 615.

5) Dumpster in rear yard only.

6) Swimming pools and/or tennis courts and related recreational facilities.

7) Keeping of animals according to Section 622 A. *(Amended 08/10/12)*

8) Accessory use customary and incidental to a permitted use.

420.5 Lot and Bulk Requirements

1) Minimum lot area 5,000 square feet; 2,000 square feet for each dwelling unit, 1,000 square feet for each rooming unit.

2) Minimum lot width 50 feet.

3) Minimum frontage 50 feet.

4) Minimum yards:

front - 25 feet (see Article VI, Section 605.G.4)
side - 10 feet.
rear - 25 feet.

5) Maximum height 3 stories or 40 feet, whichever is less.
6) Maximum lot coverage for principal and accessory buildings - 40 percent.

420.6 Off-Street Parking

Off-street parking spaces shall be provided for each lot within this district in accordance with the provisions of Article VI, Section 614 of these regulations.

Executive Summary

Development Tract
Georgetown Rd, New London, Connecticut, 06320
Ring Bands: 0-1, 1-3, 3-5 mile radii

Prepared by Esri
Latitude: 41.32351
Longitude: -72.10427

	0 - 1 mile	1 - 3 mile	3 - 5 mile
Population			
2000 Population	7,046	32,574	29,425
2010 Population	7,302	33,716	29,669
2016 Population	7,377	33,481	30,688
2021 Population	7,456	34,024	30,813
2000-2010 Annual Rate	0.36%	0.35%	0.08%
2010-2016 Annual Rate	0.16%	-0.11%	0.54%
2016-2021 Annual Rate	0.21%	0.32%	0.08%
2016 Male Population	48.9%	48.7%	51.6%
2016 Female Population	51.1%	51.3%	48.4%
2016 Median Age	43.4	37.0	31.2

In the identified area, the current year population is 30,688. In 2010, the Census count in the area was 29,669. The rate of change since 2010 was 0.54% annually. The five-year projection for the population in the area is 30,813 representing a change of 0.08% annually from 2016 to 2021. Currently, the population is 51.6% male and 48.4% female.

Median Age

The median age in this area is 43.4, compared to U.S. median age of 38.0.

Race and Ethnicity			
2016 White Alone	77.6%	59.7%	76.7%
2016 Black Alone	9.7%	16.4%	7.5%
2016 American Indian/Alaska Native Alone	1.2%	0.9%	0.7%
2016 Asian Alone	2.4%	4.3%	6.5%
2016 Pacific Islander Alone	0.1%	0.1%	0.1%
2016 Other Race	4.6%	11.7%	3.3%
2016 Two or More Races	4.5%	7.0%	5.2%
2016 Hispanic Origin (Any Race)	12.8%	29.5%	12.0%

Persons of Hispanic origin represent 12.0% of the population in the identified area compared to 17.9% of the U.S. population. Persons of Hispanic Origin may be of any race. The Diversity Index, which measures the probability that two people from the same area will be from different race/ethnic groups, is 52.8 in the identified area, compared to 63.5 for the U.S. as a whole.

Households			
2000 Households	3,167	13,600	10,736
2010 Households	3,263	13,707	11,090
2016 Total Households	3,305	13,983	11,115
2021 Total Households	3,343	14,201	11,169
2000-2010 Annual Rate	0.30%	0.08%	0.32%
2010-2016 Annual Rate	0.20%	0.32%	0.04%
2016-2021 Annual Rate	0.23%	0.31%	0.10%
2016 Average Household Size	2.02	2.36	2.34

The household count in this area has changed from 11,090 in 2010 to 11,115 in the current year, a change of 0.04% annually. The five-year projection of households is 11,169, a change of 0.10% annually from the current year total. Average household size is currently 2.34, compared to 2.34 in the year 2010. The number of families in the current year is 6,686 in the specified area.

Data Note: Income is expressed in current dollars
Source: U.S. Census Bureau, Census 2010 Summary File 1. Esri forecasts for 2016 and 2021. Esri converted Census 2000 data into 2010 geography.

July 21, 2016

Development Tract
Georgetown Rd, New London, Connecticut, 06320
Ring Bands: 0-1, 1-3, 3-5 mile radii

Prepared by Esri
Latitude: 41.32351
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	0 - 1 mile	1 - 3 mile	3 - 5 mile
Median Household Income			
2016 Median Household Income	$66,270	$45,256	$60,295
2021 Median Household Income	$67,700	$43,350	$62,583
2016-2021 Annual Rate	0.43%	-0.86%	0.75%
Average Household Income			
2016 Average Household Income	$91,675	$64,762	$81,378
2021 Average Household Income	$96,847	$68,383	$86,753
2016-2021 Annual Rate	1.10%	1.09%	1.29%
Per Capita Income			
2016 Per Capita Income	$43,195	$27,592	$31,873
2021 Per Capita Income	$45,492	$29,086	$33,806
2016-2021 Annual Rate	1.04%	1.06%	1.18%

Households by Income

Current median household income is $60,295 in the area, compared to $54,149 for all U.S. households. Median household income is projected to be $62,583 in five years, compared to $59,476 for all U.S. households

Current average household income is $81,378 in this area, compared to $77,008 for all U.S. households. Average household income is projected to be $86,753 in five years, compared to $84,021 for all U.S. households

Current per capita income is $31,873 in the area, compared to the U.S. per capita income of $29,472. The per capita income is projected to be $33,806 in five years, compared to $32,025 for all U.S. households

Housing			
2000 Total Housing Units	3,490	15,118	11,690
2000 Owner Occupied Housing Units	1,977	6,185	5,578
2000 Renter Occupied Housing Units	1,190	7,415	5,157
2000 Vacant Housing Units	323	1,518	955
2010 Total Housing Units	3,625	15,550	12,500
2010 Owner Occupied Housing Units	2,084	6,222	5,717
2010 Renter Occupied Housing Units	1,179	7,485	5,373
2010 Vacant Housing Units	362	1,843	1,410
2016 Total Housing Units	3,703	15,978	12,724
2016 Owner Occupied Housing Units	1,993	5,915	5,448
2016 Renter Occupied Housing Units	1,312	8,068	5,667
2016 Vacant Housing Units	398	1,995	1,609
2021 Total Housing Units	3,759	16,216	12,889
2021 Owner Occupied Housing Units	1,989	5,967	5,480
2021 Renter Occupied Housing Units	1,353	8,234	5,689
2021 Vacant Housing Units	416	2,015	1,720

Currently, 42.8% of the 12,724 housing units in the area are owner occupied; 44.5%, renter occupied; and 12.6% are vacant. Currently, in the U.S., 55.4% of the housing units in the area are owner occupied; 32.9% are renter occupied; and 11.7% are vacant. In 2010, there were 12,500 housing units in the area - 45.7% owner occupied, 43.0% renter occupied, and 11.3% vacant. The annual rate of change in housing units since 2010 is 0.79%. Median home value in the area is $238,391, compared to a median home value of $198,891 for the U.S. In five years, median value is projected to change by 2.93% annually to $275,487.

Data Note: Income is expressed in current dollars
Source: U.S. Census Bureau, Census 2010 Summary File 1. Esri forecasts for 2016 and 2021. Esri converted Census 2000 data into 2010 geography.

July 21, 2016

Demographic and Income Comparison Profile

Development Tract
Georgetown Rd, New London, Connecticut, 06320
Ring Bands: 0-1, 1-3, 3-5 mile radii

Prepared by Esri
Latitude: 41.32351
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	0 - 1 mile	1 - 3 mile	3 - 5 mile
Census 2010 Summary			
Population	7,302	33,716	29,669
Households	3,263	13,707	11,090
Families	1,628	7,799	6,713
Average Household Size	2.03	2.35	2.34
Owner Occupied Housing Units	2,084	6,222	5,717
Renter Occupied Housing Units	1,179	7,485	5,373
Median Age	42.4	35.1	31.4
2016 Summary			
Population	7,377	33,481	30,688
Households	3,305	13,983	11,115
Families	1,631	7,886	6,686
Average Household Size	2.02	2.36	2.34
Owner Occupied Housing Units	1,993	5,915	5,448
Renter Occupied Housing Units	1,312	8,068	5,667
Median Age	43.4	37.0	31.2
Median Household Income	$66,270	$45,256	$60,295
Average Household Income	$91,675	$64,762	$81,378
2021 Summary			
Population	7,456	34,024	30,813
Households	3,343	14,201	11,169
Families	1,639	7,969	6,699
Average Household Size	2.02	2.36	2.34
Owner Occupied Housing Units	1,989	5,967	5,480
Renter Occupied Housing Units	1,353	8,234	5,689
Median Age	43.6	37.7	31.9
Median Household Income	$67,700	$43,350	$62,583
Average Household Income	$96,847	$68,383	$86,753
Trends: 2016-2021 Annual Rate			
Population	0.21%	0.32%	0.08%
Households	0.23%	0.31%	0.10%
Families	0.10%	0.21%	0.04%
Owner Households	-0.04%	0.18%	0.12%
Median Household Income	0.43%	-0.86%	0.75%

Source: U.S. Census Bureau, Census 2010 Summary File 1. Esri forecasts for 2016 and 2021.

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Demographic and Income Comparison Profile

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	0 - 1 mile		1 - 3 mile		3 - 5 mile	
2016 Households by Income	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**
<$15,000	216	6.5%	2,099	15.0%	890	8.0%
$15,000 - $24,999	200	6.1%	1,429	10.2%	782	7.0%
$25,000 - $34,999	273	8.3%	1,641	11.7%	1,111	10.0%
$35,000 - $49,999	594	18.0%	2,424	17.3%	1,646	14.8%
$50,000 - $74,999	509	15.4%	2,781	19.9%	2,205	19.8%
$75,000 - $99,999	434	13.1%	1,260	9.0%	1,566	14.1%
$100,000 - $149,999	559	16.9%	1,269	9.1%	1,737	15.6%
$150,000 - $199,999	311	9.4%	593	4.2%	637	5.7%
$200,000+	208	6.3%	488	3.5%	540	4.9%
Median Household Income	$66,270		$45,256		$60,295	
Average Household Income	$91,675		$64,762		$81,378	
Per Capita Income	$43,195		$27,592		$31,873	
2021 Households by Income	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**
<$15,000	227	6.8%	2,265	15.9%	1,009	9.0%
$15,000 - $24,999	180	5.4%	1,337	9.4%	737	6.6%
$25,000 - $34,999	231	6.9%	1,480	10.4%	1,010	9.0%
$35,000 - $49,999	792	23.7%	3,110	21.9%	1,915	17.1%
$50,000 - $74,999	316	9.5%	1,974	13.9%	1,554	13.9%
$75,000 - $99,999	414	12.4%	1,363	9.6%	1,739	15.6%
$100,000 - $149,999	592	17.7%	1,420	10.0%	1,844	16.5%
$150,000 - $199,999	365	10.9%	701	4.9%	744	6.7%
$200,000+	226	6.8%	551	3.9%	615	5.5%
Median Household Income	$67,700		$43,350		$62,583	
Average Household Income	$96,847		$68,383		$86,753	
Per Capita Income	$45,492		$29,086		$33,806	

Data Note: Income is expressed in current dollars.

Source: U.S. Census Bureau, Census 2010 Summary File 1. Esri forecasts for 2016 and 2021.

July 21, 2016

Demographic and Income Comparison Profile

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	0 - 1 mile		1 - 3 mile		3 - 5 mile	
2010 Population by Age	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**
Age 0 - 4	326	4.5%	2,222	6.6%	2,068	7.0%
Age 5 - 9	305	4.2%	2,130	6.3%	1,608	5.4%
Age 10 - 14	290	4.0%	2,082	6.2%	1,490	5.0%
Age 15 - 19	569	7.8%	2,126	6.3%	2,570	8.7%
Age 20 - 24	734	10.1%	3,072	9.1%	4,080	13.8%
Age 25 - 34	841	11.5%	5,182	15.4%	4,421	14.9%
Age 35 - 44	798	10.9%	4,262	12.6%	3,259	11.0%
Age 45 - 54	1,108	15.2%	4,735	14.0%	3,510	11.8%
Age 55 - 64	1,067	14.6%	3,699	11.0%	2,796	9.4%
Age 65 - 74	599	8.2%	2,055	6.1%	1,758	5.9%
Age 75 - 84	426	5.8%	1,450	4.3%	1,317	4.4%
Age 85+	240	3.3%	701	2.1%	794	2.7%
2016 Population by Age	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**
Age 0 - 4	311	4.2%	2,149	6.4%	1,946	6.3%
Age 5 - 9	328	4.4%	2,100	6.3%	1,596	5.2%
Age 10 - 14	294	4.0%	2,023	6.0%	1,425	4.6%
Age 15 - 19	518	7.0%	2,008	6.0%	2,628	8.6%
Age 20 - 24	632	8.6%	2,432	7.3%	4,607	15.0%
Age 25 - 34	922	12.5%	5,153	15.4%	4,776	15.6%
Age 35 - 44	816	11.1%	4,144	12.4%	3,110	10.1%
Age 45 - 54	945	12.8%	4,380	13.1%	3,157	10.3%
Age 55 - 64	1,158	15.7%	4,174	12.5%	3,119	10.2%
Age 65 - 74	775	10.5%	2,723	8.1%	2,181	7.1%
Age 75 - 84	413	5.6%	1,417	4.2%	1,298	4.2%
Age 85+	265	3.6%	777	2.3%	846	2.8%
2021 Population by Age	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**
Age 0 - 4	316	4.2%	2,169	6.4%	1,943	6.3%
Age 5 - 9	323	4.3%	2,046	6.0%	1,548	5.0%
Age 10 - 14	317	4.3%	2,024	5.9%	1,452	4.7%
Age 15 - 19	518	6.9%	1,942	5.7%	2,564	8.3%
Age 20 - 24	600	8.0%	2,343	6.9%	4,426	14.4%
Age 25 - 34	922	12.4%	5,212	15.3%	4,812	15.6%
Age 35 - 44	850	11.4%	4,442	13.1%	3,282	10.7%
Age 45 - 54	858	11.5%	4,015	11.8%	2,827	9.2%
Age 55 - 64	1,105	14.8%	4,201	12.3%	3,153	10.2%
Age 65 - 74	944	12.7%	3,232	9.5%	2,469	8.0%
Age 75 - 84	443	5.9%	1,636	4.8%	1,493	4.8%
Age 85+	262	3.5%	763	2.2%	843	2.7%

Source: U.S. Census Bureau, Census 2010 Summary File 1. Esri forecasts for 2016 and 2021.

July 21, 2016

Demographic and Income Comparison Profile

Development Tract
Georgetown Rd, New London, Connecticut, 06320
Ring Bands: 0-1, 1-3, 3-5 mile radii

Prepared by Esri
Latitude: 41.32351
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	0 - 1 mile		1 - 3 mile		3 - 5 mile	
2010 Race and Ethnicity	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**
White Alone	5,902	80.8%	21,856	64.8%	23,519	79.3%
Black Alone	611	8.4%	4,948	14.7%	1,933	6.5%
American Indian Alone	79	1.1%	286	0.8%	212	0.7%
Asian Alone	163	2.2%	1,313	3.9%	1,850	6.2%
Pacific Islander Alone	6	0.1%	37	0.1%	26	0.1%
Some Other Race Alone	251	3.4%	3,185	9.4%	758	2.6%
Two or More Races	290	4.0%	2,090	6.2%	1,371	4.6%
Hispanic Origin (Any Race)	711	9.7%	8,041	23.8%	2,754	9.3%
2016 Race and Ethnicity	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**
White Alone	5,724	77.6%	19,972	59.7%	23,545	76.7%
Black Alone	712	9.7%	5,481	16.4%	2,289	7.5%
American Indian Alone	85	1.2%	298	0.9%	228	0.7%
Asian Alone	176	2.4%	1,423	4.3%	1,980	6.5%
Pacific Islander Alone	10	0.1%	44	0.1%	33	0.1%
Some Other Race Alone	336	4.6%	3,934	11.7%	1,003	3.3%
Two or More Races	333	4.5%	2,329	7.0%	1,610	5.2%
Hispanic Origin (Any Race)	946	12.8%	9,875	29.5%	3,692	12.0%
2021 Race and Ethnicity	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**
White Alone	5,560	74.6%	19,329	56.8%	22,907	74.3%
Black Alone	798	10.7%	5,716	16.8%	2,487	8.1%
American Indian Alone	91	1.2%	315	0.9%	232	0.8%
Asian Alone	198	2.7%	1,526	4.5%	2,173	7.1%
Pacific Islander Alone	10	0.1%	48	0.1%	38	0.1%
Some Other Race Alone	424	5.7%	4,589	13.5%	1,210	3.9%
Two or More Races	375	5.0%	2,501	7.4%	1,765	5.7%
Hispanic Origin (Any Race)	1,190	16.0%	11,441	33.6%	4,455	14.5%

Source: U.S. Census Bureau, Census 2010 Summary File 1. Esri forecasts for 2016 and 2021.

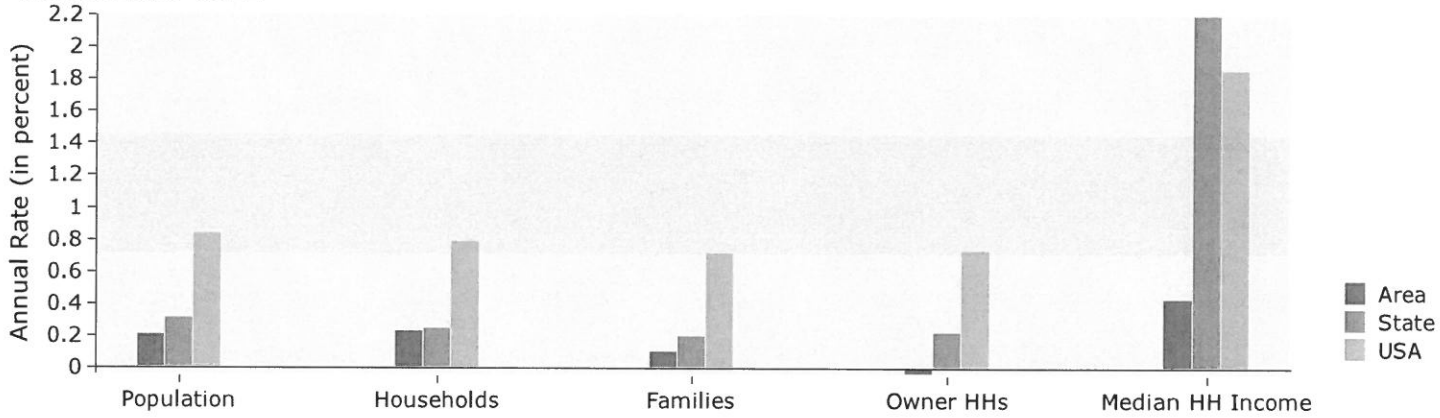
July 21, 2016

Development Tract
Georgetown Rd, New London, Connecticut, 06320
Ring Bands: 0-1, 1-3, 3-5 mile radii

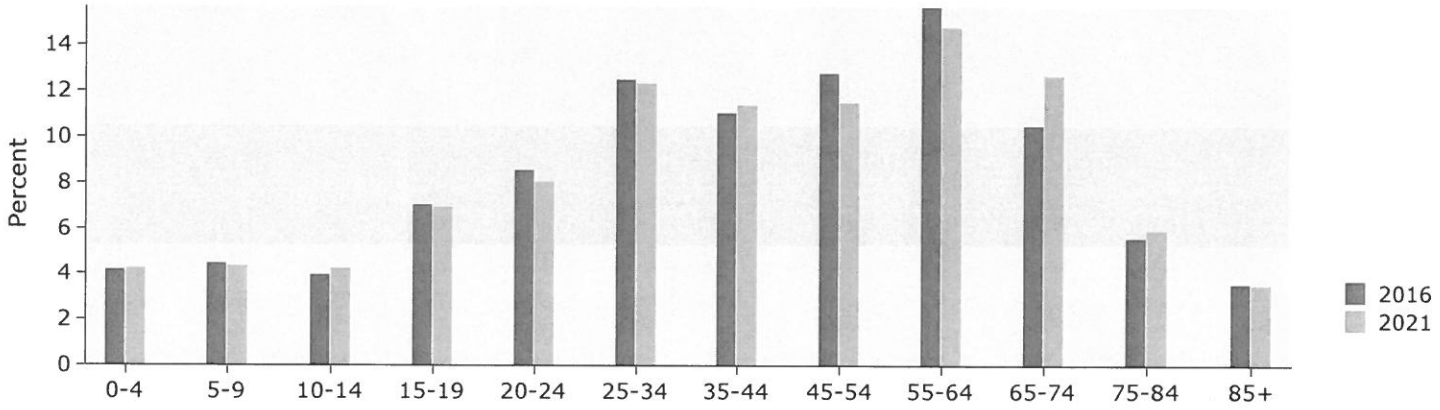
Prepared by Esri
Latitude: 41.32351
Longitude: -72.10427

0 - 1 mile

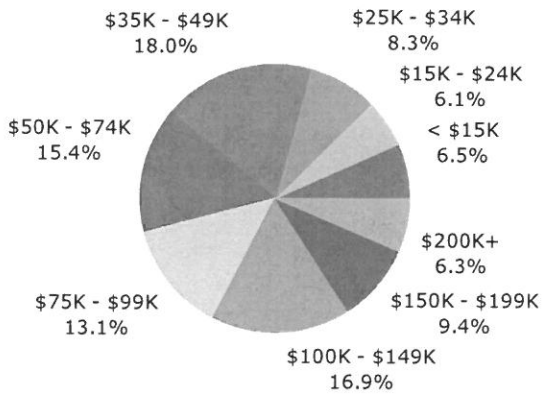
Trends 2016-2021



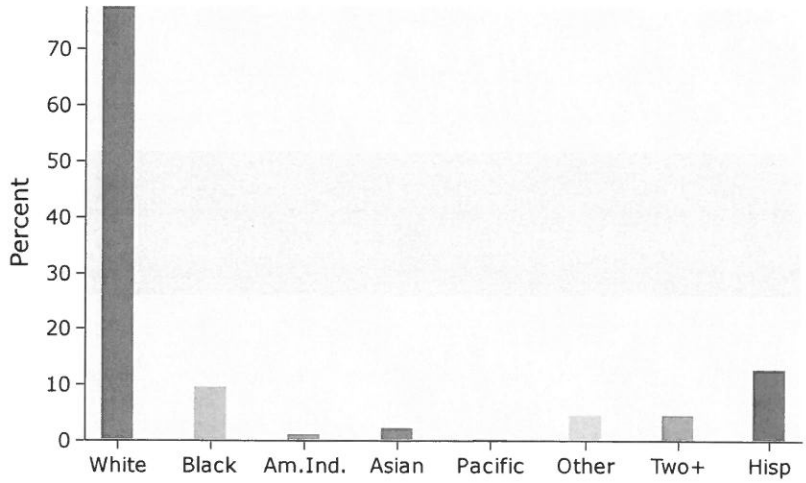
Population by Age



2016 Household Income



2016 Population by Race



Source: U.S. Census Bureau, Census 2010 Summary File 1. Esri forecasts for 2016 and 2021.

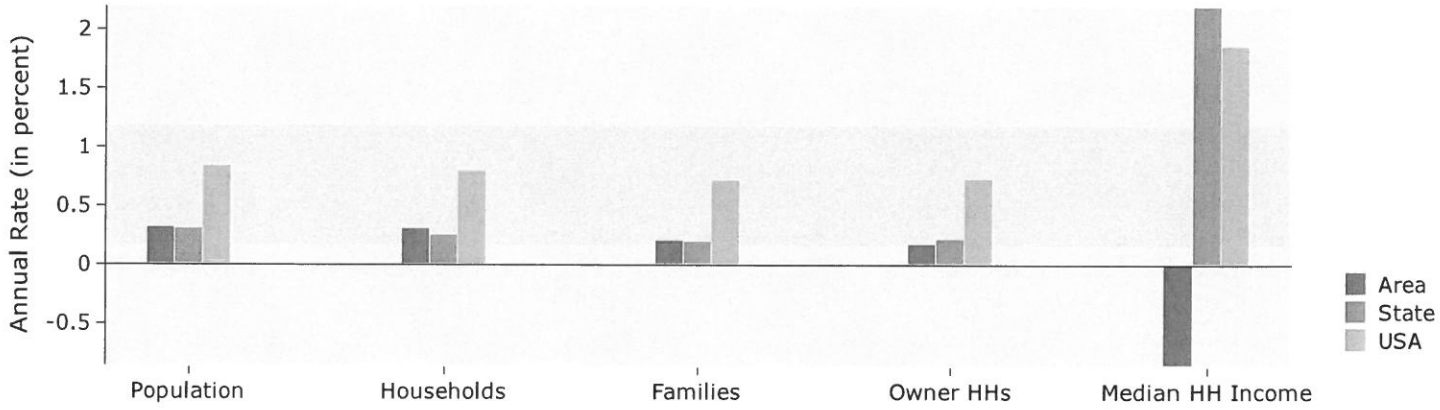
July 21, 2016

Development Tract
Georgetown Rd, New London, Connecticut, 06320
Ring Bands: 0-1, 1-3, 3-5 mile radii

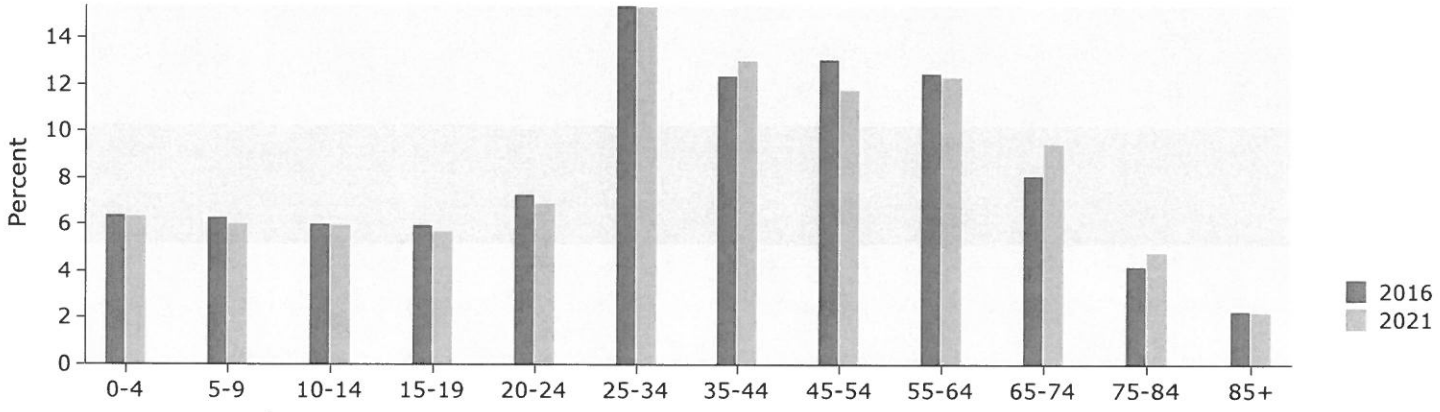
Prepared by Esri
Latitude: 41.32351
Longitude: -72.10427

1 - 3 mile

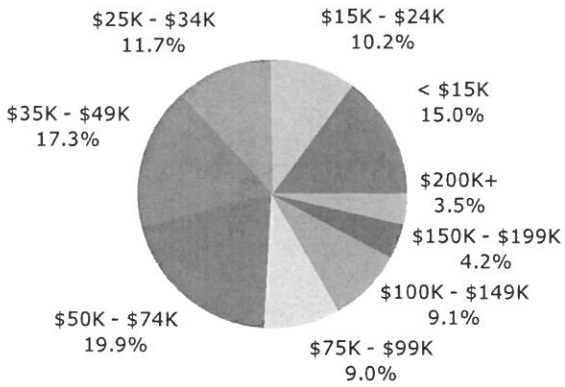
Trends 2016-2021



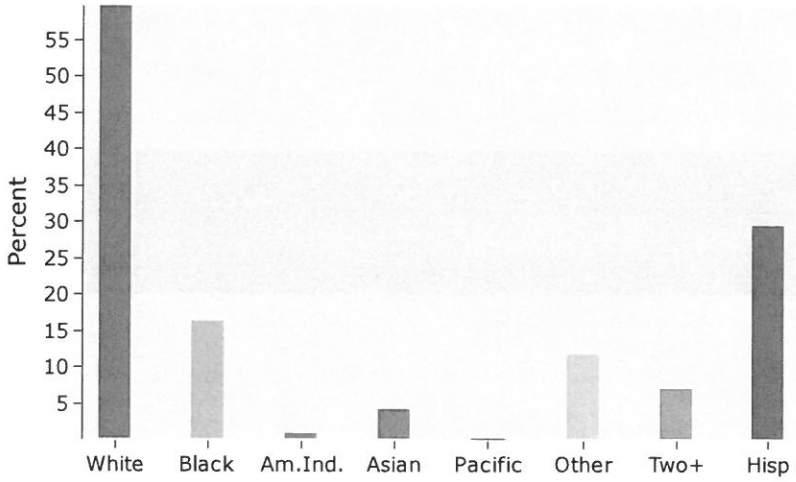
Population by Age



2016 Household Income



2016 Population by Race

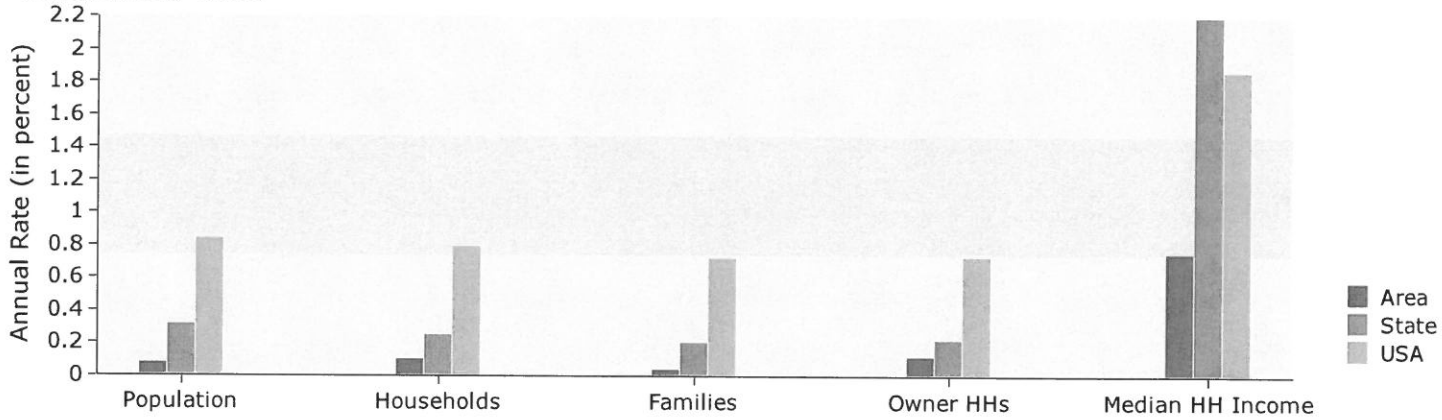


Source: U.S. Census Bureau, Census 2010 Summary File 1. Esri forecasts for 2016 and 2021.

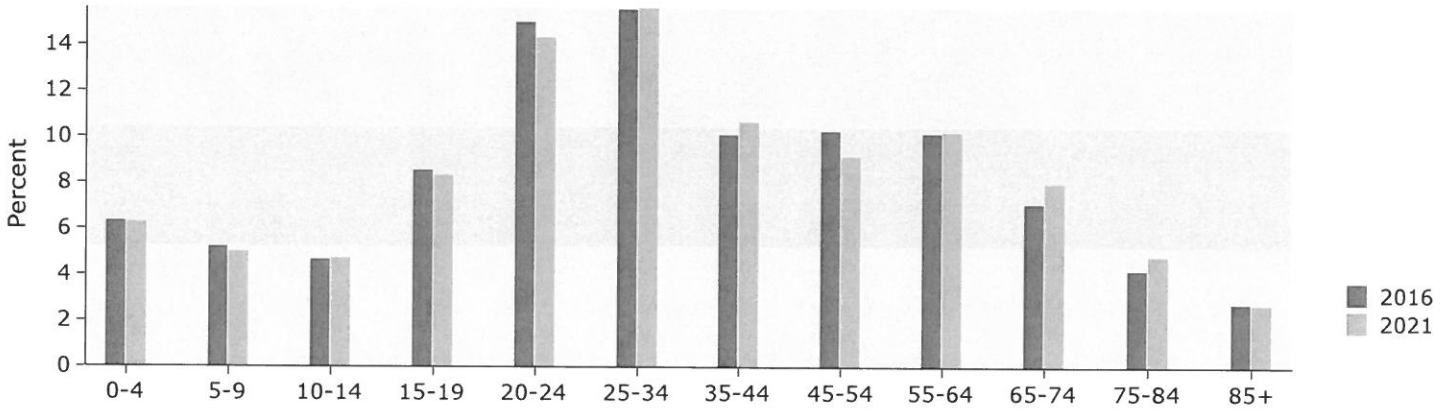
July 21, 2016

3 - 5 mile

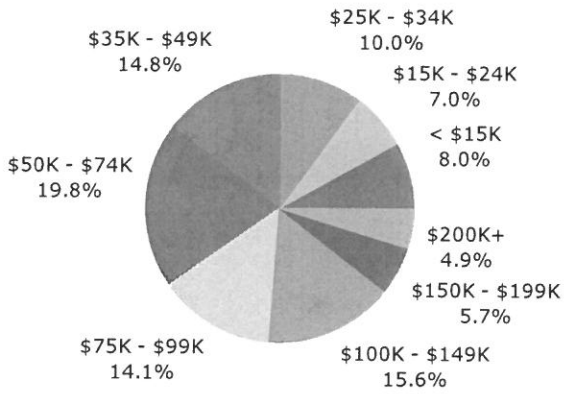
Trends 2016-2021



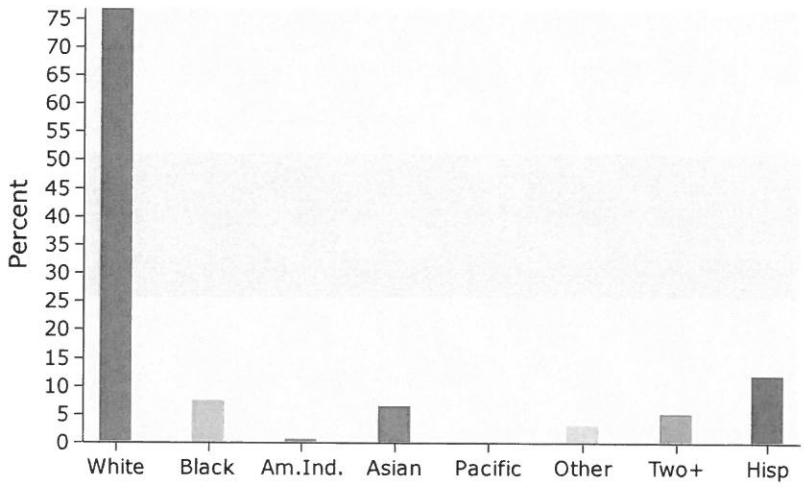
Population by Age



2016 Household Income



2016 Population by Race

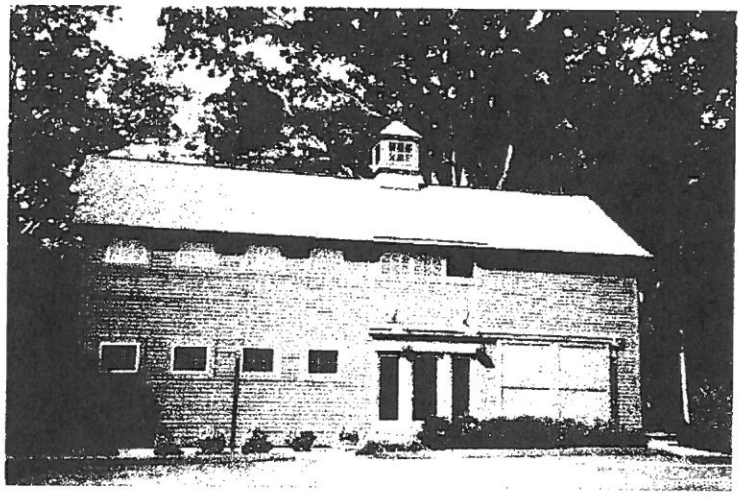


Source: U.S. Census Bureau, Census 2010 Summary File 1. Esri forecasts for 2016 and 2021.

July 21, 2016

ENVIRONMENTAL TRANSACTION SCREEN
FOR
47 GARDNER AVENUE
NEW LONDON, CONNECTICUT

PREPARED FOR:
SAVINGS INSTITUTE BANK AND TRUST COMPANY
803 MAIN STREET
WILLIMANTIC, CONNECTICUT



CHARTER OAK ENVIRONMENTAL SERVICES, INC.
33 Ledgebrook Drive
Mansfield, CT 06250
Telephone: (860) 423-2670 Facsimile: (860) 423-2675
Email: charteroak@charteroak.net

CHARTER OAK
ENVIRONMENTAL SERVICES, INC.

October 26, 2004

Mr. Steven Bishop
Savings Institute Bank & Trust Company
803 Main Street
Willimantic, CT 06226

Re: Environmental Transaction Screening Report
Lot 47 Gardner Avenue Parcel
New London, Connecticut

Dear Mr. Bishop:

This letter presents an Environmental Transaction Screening Report prepared by Charter Oak Environmental Services, Inc. (Charter Oak) for the above-referenced property. The Savings Institute Bank & Trust Company retained Charter Oak on behalf of Wayne A. Taylor of New England Development Associates, LLC (NEDA), the current property owner.

OBJECTIVE

The objective of the Environmental Transaction Screening was to evaluate the environmental conditions on the site based on existing information. The second objective was to provide information regarding the site's status relative to the Connecticut Property Transfer Act. The assessment was consistent with the practices described in ASTM E 1528-00 (Standard for Environmental Site Assessments –Transaction Screen Process).

ENVIRONMENTAL TRANSACTION SCREENING

The Environment Transaction Screening consists of three main parts:

Interviewing the site owner or other person with knowledge of the site;
Field reconnaissance; and,
Querying environmental databases

Field Reconnaissance and Interview

On October 20, 2004, Charter Oak visited the site. Mr. Wayne A. Taylor of NEDA, the current owner of the parcel, accompanied Charter Oak during its inspection of the site. Mr. Taylor has owned the property since June 2004. The approximately 7.4-acre parcel is located on the western side of Georgetown Road near the intersection of Georgetown

33 LEDGEBROOK DRIVE MANSFIELD, CT 06250
PHONE: 860-423-2670 FAX: 860-423-2675 charteroak@charteroak.net www.charteroak.net

Road and Gardner Avenue in New London. The New London/Waterford town line is sub-parallel to the site's western boundary such that the majority of the site is in New London with a portion of the site in Waterford. Reportedly, the address of the Waterford portion is 115 Niles Hill Road. The site contains no buildings or structures. The site is undeveloped land and has reportedly always been undeveloped land. Mr. Taylor is planning on building residential townhouses on the site.

During the inspection, Charter Oak reviewed the ASTM Environmental Transaction Screen Questionnaire with Mr. Taylor and recorded his answers. The completed Questionnaire is presented as Attachment A.

Georgetown Road borders the subject property along its eastern boundary. East of Georgetown Road, across the road from the subject property, are residential condominiums that are inferred to be upgradient of the subject property in terms of ground water flow. The subject property is bordered by residential condominiums and residential houses to the south that are inferred to be downgradient of the subject property in terms of ground water flow. The subject property is bordered by mowed open fields associate with a farm estate to the west. Reportedly, farming operations have not been conducted on these fields since approximately the 1960s. This land is inferred to be downgradient of the subject property in terms of ground water flow. The subject property is bordered by undeveloped land to the north that is inferred to be upgradient of the subject property in terms of ground water flow. Further north are more residential condominiums that are also inferred to be upgradient of the subject property. Based on the topographic map, ground water is inferred to flow in a westerly direction.

There is a stockpile of topsoil on the subject property that was reportedly used during the construction of the condominiums on the east side of Georgetown Road. When those condominiums were being built, the owner of the parcel where the condominiums are located was also the owner of the subject property. Mr. Taylor was unable to elucidate the history of the topsoil material or the property it came from, because he purchased the subject property in 2004, after the condominiums had been built. The origin of the topsoil is unknown. Reportedly, it was either removed from the condominiums parcel during construction and stockpiled on the subject property or it was transported to the subject property from an unknown location for use on the condominiums parcel. Reportedly, when the condominiums were finished, the excess topsoil remained on the subject property. Within the scope of this transaction screen, Charter Oak is not able to independently assess the origin of the topsoil stockpile.

Charter Oak spoke with Calvin Darrow, the Fire Marshal of the City of New London, on October 26, 2004 concerning the subject property. According to Mr. Darrow, no oil storage tanks or environmental issues were identified in the fire marshal files for the parcels on Gardner Avenue and Georgetown Road. He did explain that approximately 10 to 12 years ago, heavy equipment had to be mobilized to the site for an extended period of time while the bedrock was blasted for a sewer line. He stated that the heavy

equipment was pretty clean but probably leaked some hydrocarbons due to the nature of the equipment and the length of stay. Most likely this would amount to only minimal surface spills from the filling of equipment with fuel, hydraulic system leaks, and grease drippings.

Federal and State Database Search

Charter Oak employed a computer software tool called Environmental FirstSearch, a registered trademark of DataMap Technology Corporation, to search Connecticut DEP and United States EPA electronic databases. FirstSearch uses ASTM standard minimum search radiuses around the subject property when querying the electronic databases. The FirstSearch report is presented as Attachment B.

FirstSearch did not identify the subject property, or adjacent sites, in any of the government environmental databases.

FirstSearch identified four leaking underground storage tank (LUST) reports within the 0.5 mile search radius of the subject property. The first two reports both concern No. 2 fuel oil overfill releases from a 275-gallon oil storage tank at Herbert & Hartman of 539 Alewife Parkway in New London. This site is 0.44 miles southeast of the subject property and, based on the direction of ground water flow inferred from the topographic map, downgradient of the subject property. Therefore, this LUST is not a concern for the subject property.

On October 18, 1991, a 275-gallon No. 2 fuel oil storage tank had an overfill release at the residential house at 102 Plant Street in New London. This spill was reportedly remediated by being pumped. This site is 0.49 miles northeast of the subject property and, based on the direction of ground water flow inferred from the topographic map, upgradient of the subject property.

On September 10, 2003, a 550-gallon No. 2 fuel oil LUST and the associated contaminated soil were reportedly removed from Mitchell College at 715 Montuk Avenue in New London. This site is 0.50 miles northeast of the subject property and, based on the direction of ground water flow inferred from the topographic map, upgradient of the subject property.

Of these four LUST spill reports, only the LUSTs on Plant Street and Montuk Avenue appear to be upgradient of the subject site, based on ground water flow directions inferred from the USGS topographic quadrangle map. Therefore, these two LUSTs may potentially impact the subject site's ground water. If Mr. Taylor intends to use the ground water, it should be tested for petroleum constituents.

FirstSearch did not identify any spills on the subject property or within the 0.25 mile search radius.

CHARTER OAK
ENVIRONMENTAL SERVICES, INC.

CONCLUSIONS AND RECOMMENDATIONS

Based on the Environmental Transaction Screening described above, Charter Oak identified one on-site environmental concern for the subject property and adjacent properties. This concern is the topsoil stockpile located on the subject property. The origin and history of this material is unknown. Charter Oak recommends interviewing the prior property owner and transportation contractor to ascertain the origin and history of the topsoil. Depending on what information is uncovered, soil sampling may be necessary.

Charter Oak did not identify any information for the subject property indicating that it is subject to the Connecticut Property Transfer Act.

Charter Oak recommends that, if drinking water wells are included in the subject property development plans, the ground water be tested for extractable total petroleum hydrocarbons and volatile organic compounds due to the two LUSTs inferred to be upgradient of the subject property.

Sincerely,

CHARTER OAK ENVIRONMENTAL SERVICES, INC.

JR Taormina
Engineer

Attachments

Description of Site: Address:
LOT 47 GARDNER AVENUE, NEW LONDON, CT
115 NILES HILL ROAD, WATERFORD, CT

Question	Owner[7]			Occupants (if applicable)			Observed During Site Visit	
1a. Is the *property* used for an industrial use?	Yes	(No)	Unk	Yes	No	Unk	Yes	(No)
1b. Is any *adjoining property* used for an industrial use?	Yes	(No)	Unk	Yes	No	Unk	Yes	(No)
2a. Did you observe evidence or do you have any prior knowledge that the *property* has been used for an industrial use in the past?	Yes	(No)	Unk	Yes	No	Unk	Yes	(No)
2b. Did you observe evidence or do you have any prior knowledge that any *adjoining property* has been used for an industrial use in the past?	Yes	(No)	Unk	Yes	No	Unk	Yes	(No)
3a. Is the *property* used as a gasoline station, motor repair facility, commercial printing facility, dry cleaners, photo developing laboratory, junkyard or landfill, or as a waste treatment, storage, disposal, processing, or recycling facility (if applicable, identify which)?	Yes	(No)	Unk	Yes	No	Unk	Yes	(No)
3b. Is any *adjoining property* used as a gasoline station, motor repair facility, commercial printing facility, dry cleaners, photo developing laboratory, junkyard or landfill, or as a waste treatment, storage, disposal, processing, or recycling facility (if applicable, identify which)?	Yes	(No)	Unk	Yes	No	Unk	Yes	(No)
4a. Did you observe evidence or do you have any prior knowledge that the *property* has been used as a gasoline station, motor repair facility, commercial printing facility, dry cleaners, photo developing laboratory, junkyard or landfill, or as a waste treatment, storage, disposal, processing, or recycling facility (if applicable, identify which)?	Yes	(No)	Unk	Yes	No	Unk	Yes	(No)
4b. Did you observe evidence or do you have any prior knowledge that any *adjoining property* has been used as a gasoline station, motor repair facility, commercial printing facility, dry cleaners, photo developing laboratory, junkyard or landfill, or as a waste treatment, storage, disposal, processing, or recycling facility (if applicable, identify which)?	Yes	(No)	Unk	Yes	No	Unk	Yes	(No)
5a. Are there currently any damaged or discarded automotive or industrial batteries, pesticides, paints, or other chemicals in individual containers of >5 gal (19 L) in volume or 50 gal (190 L) in the aggregate, stored on or used at the *property* or at the facility?	Yes	(No)	Unk	Yes	No	Unk	Yes	(No)

Question	Owner[7]			Occupants (if applicable)			Observed During Site Visit	
5b. Did you observe evidence or do you have any prior knowledge that there have been previously any damaged or discarded automotive or industrial batteries, or pesticides, paints, or other chemicals in individual containers of >5 gal (19 L) in volume or 50 gal (190 L) in the aggregate, stored on or used at the *property* or at the facility?	Yes	(No)	Unk	Yes	No	Unk	Yes	(No)
6a. Are there currently any industrial *drums* (typically 55 gal (208 L)) or sacks of chemicals located on the property or at the facility?	Yes	(No)	Unk	Yes	No	Unk	Yes	(No)
6b. Did you observe evidence or do you have any prior knowledge that there have been previously any industrial *drums* (typically 55 gal (208 L)) or sacks of chemicals located on the property or at the facility?	Yes	(No)	Unk	Yes	No	Unk	Yes	(No)
7a. Did you observe evidence or do you have any prior knowledge that *fill dirt* has been brought onto the property that originated from a contaminated site?	Yes	(No)	Unk	Yes	No	Unk	Yes	(No)
7b. Did you observe evidence or do you have any prior knowledge that *fill dirt* has been brought onto the property that is of an unknown origin?	(Yes)	No	Unk	Yes	No	Unk	(Yes)	No
8a. Are there currently any *pits, ponds,* or *lagoons* located on the *property* in connection with waste treatment or waste disposal?	Yes	(No)	Unk	Yes	No	Unk	Yes	(No)
8b. Did you observe evidence or do you have any prior knowledge that there have been previously, any *pits, ponds,* or *lagoons* located on the *property* in connection with waste treatment or waste disposal?	Yes	(No)	Unk	Yes	No	Unk	Yes	(No)
9a. Is there currently any stained soil on the *property*?	Yes	(No)	Unk	Yes	No	Unk	Yes	(No)
9b. Did you observe evidence or do you have any prior knowledge that there has been previously, any stained soil on the *property*?	Yes	(No)	Unk	Yes	No	Unk	Yes	(No)
10a. Are there currently any registered or unregistered storage tanks (above or underground) located on the *property*?	Yes	(No)	Unk	Yes	No	Unk	Yes	(No)
10b. Did you observe evidence or do you have any prior knowledge that there have been previously, any registered or unregistered storage tanks (above or underground) located on the *property*?	Yes	(No)	Unk	Yes	No	Unk	Yes	(No)
11a. Are there currently any vent pipes, fill pipes, or access ways indicating a fill pipe protruding from the ground on the *property* or adjacent to any structure located on the *property*?	Yes	(No)	Unk	Yes	No	Unk	Yes	(No)
11b. Did you observe evidence or do you have any prior knowledge that there have been previously, any vent pipes, fill pipes, or access ways indicating a fill pipe protruding from the ground on the *property* or adjacent to any structure located on the *property*?	Yes	(No)	Unk	Yes	No	Unk	Yes	(No)
12a. Is there currently evidence of leaks, spills or staining by substances other than water, or foul odors, associated with any flooring, drains, walls, ceilings, or exposed grounds on the property?	Yes	(No)	Unk	Yes	No	Unk	Yes	(No)

Question	Owner[7]			Occupants (if applicable)			Observed During Site Visit	
12b. Did you observe evidence or do you have any prior knowledge that there have been previously any leaks, spills, or staining by substances other than water, or foul odors, associated with any flooring drains, walls, ceilings or exposed grounds on the property?	Yes	No	Unk	Yes	No	Unk	Yes	No
13a. If the property is served by a private well or non-public water system, is there evidence or do you have prior knowledge that contaminants have been identified in the well or system that exceed guidelines applicable to the water system?	Yes	No	Unk	Yes	No	Unk	Yes	No
13b. If the property is served by a private well or non-public water system, is there evidence or do you have prior knowledge that the well has been designated as contaminated by any government environmental/health agency?	Yes	No	Unk	Yes	No	Unk	Yes	No
14. Does the *owner* or *occupant* of the *property* have any knowledge of *environmental liens* or governmental notification relating to past or recurrent violations of environmental laws with respect to the *property* or any facility located on the *property*?	Yes	No	Unk	Yes	No	Unk		
15a. Has the *owner* or *occupant* of the *property* been informed of the past existence of *hazardous substances* or *petroleum products* with respect to the *property* or any facility located on the *property*?	Yes	No	Unk	Yes	No	Unk		
15b. Has the *owner* or *occupant* of the *property* been informed of the current existence of *hazardous substances* or *petroleum products* with respect to the *property* or any facility located on the *property*?	Yes	No	Unk	Yes	No	Unk		
15c. Has the *owner* or *occupant* of the *property* been informed of the past existence of environmental violations with respect to the *property* or any facility located on the *property*?	Yes	No	Unk	Yes	No	Unk		
15d. Has the *owner* or *occupant* of the *property* been informed of the current existence of environmental violations with respect to the *property* or any facility located on the *property*?	Yes	No	Unk	Yes	No	Unk		
16. Does the *owner* or *occupant* of the *property* have any knowledge of any *environmental site assessment* of the *property* or facility that indicated the presence of *hazardous substances* or *petroleum products* on, or contamination of, the *property* or recommended further assessment of the *property*?	Yes	No	Unk	Yes	No	Unk		
17. Does the *owner* or *occupant* of the *property* know of any past, threatened, or pending lawsuits or administrative proceedings concerning a release or threatened release of any *hazardous substance* or *petroleum products* involving the *property* by any owner or occupant of the *property*?	Yes	No	Unk	Yes	No	Unk		
18a. Does the *property* discharge waste water (not including sanitary waste or storm water) onto or adjacent to the *property* and/or into a storm water system?	Yes	No	Unk	Yes	No	Unk	Yes	No

Question	Owner[7]			Occupants (if applicable)			Observed During Site Visit	
18b. Does the *property* discharge waste water (not including sanitary waste or storm water) onto or adjacent to the *property* and/or into a sanitary sewer system?	Yes	(No)	Unk	Yes	No	Unk	Yes	(No)
19. Did you observe evidence or do you have any prior knowledge that any *hazardous substances* or *petroleum products*, unidentified waste materials, tires, automotive or industrial batteries, or any other waste materials have been dumped above grade, buried and/or burned on the *property*?	Yes	(No)	Unk	Yes	No	Unk	Yes	(No)
20. Is there a transformer, capacitor, or any hydraulic equipment for which there are any records indicating the presence of PCBs?	Yes	(No)	Unk	Yes	No	Unk	Yes	(No)

Government Records/Historical Sources Inquiry

(See guide, Section 10)

21. Do any of the following Federal government record systems list the property or any property within the search distance noted below:

	Approximate Minimum Search Distance, miles (kilometers)		
Federal NPL site list	1.0 (1.6)	Yes	(No)
Federal CERCLIS list	0.5 (0.8)	Yes	(No)
Federal CERCLIS NFRAP site list	property and adjoining properties	Yes	(No)
Federal RCRA CORRACTS facilities list	1.0 (1.6)	Yes	(No)
Federal RCRA non-CORRACTS TSD facilities list	0.5 (0.8)	Yes	(No)
Federal RCRA generators list	property and adjoining properties	Yes	(No)
Federal ERNS list	property only	Yes	(No)

22. Do any of the following state record systems list the property or any property within the search distance noted below:

	Approximate Minimum Search Distance, miles (kilometers)		
State lists of hazardous waste sites identified for investigation or remediation:			
State — Equivalent NPL	1.0 (1.6)	Yes	(No)
State — Equivalent CERCLIS	0.5 (0.8)	Yes	(No)
State landfill and/or solid waste disposal site lists	0.5 (0.8)	Yes	(No)
State leaking UST lists	0.5 (0.8)	(Yes)	No
State registered UST lists	property and adjoining properties	Yes	(No)

23. Based upon a review of *fire insurance maps* 10.3.1.3 or consultation with the local fire department serving the *property*, all as specified in the guide, are any buildings or other improvements on the *property* or on an *adjoining property* identified as having been used for an industrial use or uses likely to lead to contamination of the *property*? Yes (No)

The *preparer* of the *transaction screen questionnaire* must complete and sign the following. (For definition of "preparer" and "user," see 5.3 or 3.3.28.)

The *Owner* questionnaire was completed by:

Name Joseph R. Taormina
Title Engineer
Firm Charter Oak Environmental Services, Inc.
Address 33 Ledgebrook Drive
Mansfield, CT 06250

one number 860.423.2670
te 10/20/04
Preparer's relationship to site NONE
Preparer's relationship to user (for example, principal, employee, agent, consultant)

e *Occupant* questionnaire was completed by:

Name N/A
Title
n
dress

Phone number
Date
parer's relationship to site
parer's relationship to user (for example, principal, employee, agent, consultant)

The *Site Visit* questionnaire was completed by:

me Joseph R. Taormina
e
Firm
Address

one number
te
Preparer's relationship to site
Preparer's relationship to user (for example, principal, employee, agent, consultant)

e *Government Records* and *Historical Sources Inquiry* questionnaire
was completed by:

Name Joseph R. Taormina
e
n
Address

one number
te
parer's relationship to site
Preparer's relationship to user (for example, principal, employee, agent, consultant)

er's relationship to the site (for example, owner, prospective pur-
ser, lender, etc.)

If the preparer(s) is different from the user, complete the following:

ne of User Wayne A. Taylor
er's address PO Box 1369, 87 Blinman Street, New London, CT 06320

User's phone number 860.857.1654

pies of the completed questionnaires have been filed at:

Copies of the completed questionnaires have been mailed or delivered to:

parer represents that to the best of the preparer's knowledge the above statements and facts are true and correct and to the best of the preparer's actual wledge no material facts have been suppressed or misstated.

Signature _____ Date 10/20/04
nature _____ Date _____
nature _____ Date _____

7. uide to Transaction Screen Questionnaire

The following sets forth the guide to the *transaction screen questionnaire*. The guide accompanies the *transaction scr n questionnaire* to assist the *preparer* in completing the qu ionnaire. Questions found in the *transaction screen questionnaire* are repeated in the guide.

7.2 If the *preparer* completing the *transaction screen questio aire* is familiar with the guide from prior usage, the questionnaire may be completed without reference to the guide.

7.3 The *site visit* portion of the guide considers most of the same questions set forth in the guide to *owner/occupant inquiry* because the *transaction screen process* requires both questions of *owners* and *occupants* of the *property* and observations of the *property* by the *preparer*.

7.4 Prior *environmental site assessment* usage procedures

FirstSearch Technology Corporation

Environmental FirstSearch™ Report

TARGET PROPERTY:

GARDNER AVE

NEW LONDON CT 06320

Job Number: 112.08.04

PREPARED FOR:

Charter Oak Environmental Services, Inc.

33 Ledgebrook Drive

Mansfield, CT 06250

10-22-04

Tel: (781) 320-3720

Fax: (781) 320-3715

Environmental FirstSearch
Search Summary Report

Target Site: GARDNER AVE
NEW LONDON CT 06320

FirstSearch Summary

Database	Sel	Updated	Radius	Site	1/8	1/4	1/2	1/2>	ZIP	TOTALS
NPL	Y	09-13-04	1.00	0	0	0	0	0	0	0
CERCLIS	Y	09-13-04	0.50	0	0	0	0	-	0	0
NFRAP	Y	06-23-04	0.25	0	0	0	-	-	0	0
RCRA TSD	Y	07-12-04	0.50	0	0	0	0	-	0	0
RCRA COR	Y	07-12-04	1.00	0	0	0	0	0	0	0
RCRA GEN	Y	07-12-04	0.25	0	0	0	-	-	0	0
RCRA NLR	Y	07-12-04	0.25	0	0	0	-	-	1	1
ERNS	Y	12-31-03	0.15	0	0	0	-	-	8	8
NPDES	Y	07-17-04	0.25	0	0	0	-	-	5	5
FINDS	Y	07-16-98	0.25	0	0	1	-	-	6	7
TRIS	Y	08-02-04	0.25	0	0	0	-	-	0	0
State Sites	Y	10-12-04	1.00	0	0	0	0	0	6	6
Spills-1990	Y	07-01-04	0.15	0	0	0	-	-	198	198
Spills-1980	N	NA	0.15	-	-	-	-	-	-	-
SWL	Y	01-01-04	0.50	0	0	0	0	-	1	1
Permits	Y	04-08-94	0.25	0	0	0	-	-	5	5
Other	Y	10-12-04	0.25	0	0	0	-	-	1	1
REG UST/AST	Y	10-06-04	0.15	0	0	0	-	-	3	3
Leaking UST	Y	07-30-04	0.50	0	0	0	4	-	3	7
State Wells	N	06-25-01	0.50	-	-	-	-	-	-	-
Aquifers	N	03-15-99	0.50	-	-	-	-	-	-	-
ACEC	N	08-08-00	0.50	-	-	-	-	-	-	-
Wetlands	N	11-20-00	0.50	-	-	-	-	-	-	-
Floodplains	N	06-26-96	0.50	-	-	-	-	-	-	-
Nuclear Permits	Y	04-30-99	0.50	0	0	0	0	-	0	0
Historic/Landmark	N	09-01-02	0.50	-	-	-	-	-	-	-
Federal Land Use	N	10-07-03	0.50	-	-	-	-	-	-	-
Federal Wells	N	05-19-03	0.50	-	-	-	-	-	-	-
Releases(Air/Water)	Y	12-31-03	0.25	0	0	0	-	-	43	43
HMIRS	Y	03-31-03	0.25	0	0	0	-	-	3	3
NCDB	Y	08-30-04	0.25	0	0	1	-	-	5	6
PADS	Y	03-01-04	0.25	0	0	0	-	-	1	1
Federal Other	N	12-31-02	0.25	-	-	-	-	-	-	-
Misc	N	10-12-04	0.25	-	-	-	-	-	-	-
Towers	N	08-16-01	0.25	-	-	-	-	-	-	-
Soils	N	03-18-97	0.25	-	-	-	-	-	-	-
Receptors	Y	01-01-95	0.50	0	0	0	0	-	0	0
- TOTALS -				0	0	2	4	0	289	295

Notice of Disclaimer

Due to the limitations, constraints, inaccuracies and incompleteness of government information and computer mapping data currently available to FirstSearch Technology Corp., certain conventions have been utilized in preparing the locations of all federal, state and local agency sites residing in FirstSearch Technology Corp.'s databases. All EPA NPL and state landfill sites are depicted by a rectangle approximating their location and size. The boundaries of the rectangles represent the eastern and western most longitudes; the northern and southern most latitudes. As such, the mapped areas may exceed the actual areas and do not represent the actual boundaries of these properties. All other sites are depicted by a point representing their approximate address location and make no attempt to represent the actual areas of the associated property. Actual boundaries and locations of individual properties can be found in the files residing at the agency responsible for such information.

Waiver of Liability

Although FirstSearch Technology Corp. uses its best efforts to research the actual location of each site, FirstSearch Technology Corp. does not and can not warrant the accuracy of these sites with regard to exact location and size. All authorized users of FirstSearch Technology Corp.'s services proceeding are signifying an understanding of FirstSearch Technology Corp.'s searching and mapping conventions, and agree to waive any and all liability claims associated with search and map results showing incomplete and or inaccurate site locations.

Environmental FirstSearch
Site Information Report

Request Date: 10-22-04
Requestor Name: JR Taormina
Standard: ASTM

Search Type: COORD
Job Number: 112.08.04

TARGET ADDRESS: GARDNER AVE
NEW LONDON CT 06320

Demographics

Sites: 295 **Non-Geocoded:** 289 **Population:** NA

Radon: 0 - 3.4 PCI/L

Site Location

	Degrees (Decimal)	Degrees (Min/Sec)		UTMs
Longitude:	-72.104658	-72:6:17	**Easting:**	742329.419
Latitude:	41.323169	41:19:23	**Northing:**	4578465.234
			Zone:	18

Comment

Comment:

Additional Requests

Adjacent ZIP Codes: 1 Mile(s)

ZIP Code	City Name	ST	Dist/Dir	Sel
06340	GROTON	CT	0.93 NE	Y
06385	WATERFORD	CT	0.09 SW	Y

Environmental FirstSearch
Sites Summary Report

TARGET SITE: GARDNER AVE
NEW LONDON CT 06320

JOB: 112.08.04

TOTAL: 295 **GEOCODED:** 6 **NON GEOCODED:** 289 **SELECTED:** 4

ID	DB Type	Site Name/ID/Status	Address	Dist/Dir	Map ID
1	FINDS	SOLOMON SCHECHTER ACAD CTD983894593	660 OCEAN AVE NEW LONDON CT 06320	0.25 NE	1
6	NCDB	SOLOMON SCHECHTER ACADEMY NCDB-0801-005469/TSCA	660 OCEAN AVENUE NEW LONDON CT 06258	0.25 NE	1
2	*LUST*	*HERBERT & HARTMAN* *4685/YES*	*539 ALEWIFE PKWY* *NEW LONDON CT 06320*	*0.44 SE*	*2*
3	*LUST*	*HERBERT & HARTMAN RES* *4391/YES*	*539 ALEWIFE PARKWAY* *NEW LONDON CT 06320*	*0.44 SE*	*2*
5	*LUST*	*YAVENER RESIDENCE* *1918/U*	*102 PLANT ST* *NEW LONDON CT 06320*	*0.49 NE*	*4*
4	*LUST*	*MITCHELL COLLEGE - ALLAN LEMERE* *200306620/CLOSED*	*715 MONTUK AVE* *NEW LONDON CT 06320*	*0.50 NE*	*3*

Environmental FirstSearch
Sites Summary Report

TARGET SITE: GARDNER AVE
NEW LONDON CT 06320

JOB: 112.08.04

TOTAL: 295 **GEOCODED:** 6 **NON GEOCODED:** 289 **SELECTED:** 4

ID	DB Type	Site Name/ID/Status	Address	Dist/Dir	Map ID
160	SPILLS	96124/CLOSED	CRYSTAL AVE NEW LONDON CT 06320	NON GC	
159	SPILLS	9603739/CLOSED	LIS AT RACE POINT ROCK NEW LONDON CT 06320	NON GC	
158	SPILLS	9700509/CLOSED	MAIN STREET NEW LONDON CT 06320	NON GC	
157	SPILLS	955515/CLOSED	RIVER AVE/FAIR HARBOR NEW LONDON CT 06320	NON GC	
156	SPILLS	942397/CLOSED	369 N FARMS RD NEW LONDON CT 06320	NON GC	
155	SPILLS	200208560/CLOSED	ROUTE 32 MAIN ENTRANCE NEW LONDON CT	NON GC	
154	SPILLS	200302198/CLOSED	WILLIS ST/ CRYSTAL AVE -CITY H NEW LONDON CT	NON GC	
153	SPILLS	200302667/CLOSED	MAIN ST NEW LONDON CT	NON GC	
152	SPILLS	200304236/CLOSED	THAMES RIVER NEW LONDON CT	NON GC	
151	SPILLS	200304452/CLOSED	BILLARD HALL PARKING LOT NEW LONDON CT	NON GC	
161	SPILLS	911241/CLOSED	HOWARD ST NEW LONDON CT 06320	NON GC	
148	SPILLS	933954/CLOSED	WEST OCEAN AVE UNDERPASS NEW LONDON CT 06320	NON GC	
165	SPILLS	200101457/CLOSED	20 BAY BERRY LANE NEW LONDON CT	NON GC	
146	SPILLS	936881/CLOSED	I-95 N/B EX 83 TO EX 90 NEW LONDON CT 06320	NON GC	
145	SPILLS	95569/CLOSED	BATES WOOD (DUMP) NEW LONDON CT 06320	NON GC	
144	SPILLS	932852/CLOSED	PEQUOT AVE/THAMES RIVER NEW LONDON CT 06320	NON GC	
143	SPILLS	9707001/CLOSED	SHIPYARD LANE NEW LONDON CT 06320	NON GC	
142	SPILLS	9701601/CLOSED	Q PARKING LOT OF U.S. COAST GU NEW LONDON CT 06320	NON GC	
150	SPILLS	924000/CLOSED	EUGENE O NEIL DR NEW LONDON CT 06320	NON GC	
171	SPILLS	9802990/CLOSED	ALE WIFE COVE NEW LONDON CT	NON GC	

Environmental FirstSearch
Sites Summary Report

TARGET SITE: GARDNER AVE
NEW LONDON CT 06320

JOB: 112.08.04

TOTAL: 295 **GEOCODED:** 6 **NON GEOCODED:** 289 **SELECTED:** 4

ID	DB Type	Site Name/ID/Status	Address	Dist/Dir	Map ID
208	SPILLS	9908720/CLOSED	I 395 SOUTH EXIT 78-77 WATERFORD CT 06385	NON GC	
207	SPILLS	200006842/CLOSED	KENYON RD. WATERFORD CT 06385	NON GC	
206	SPILLS	200008583/CLOSED	RT 85 WATERFORD CT 06385	NON GC	
205	SPILLS	200104989/CLOSED	CLARK LN/ POLE 1494 WATERFORD CT 06385	NON GC	
204	SPILLS	200100977/CLOSED	ROPE FERRY RD WATERFORD CT 06385	NON GC	
203	SPILLS	956426/CLOSED	RT 1/FOG PLAIN RD/MINOR AVE WATERFORD CT 06385	NON GC	
202	SPILLS	200109888/CLOSED	GREAT NECK ROAD HARKNESS WATERFORD CT 06385	NON GC	
163	SPILLS	911160/CLOSED	PEARL ST NEW LONDON CT 06320	NON GC	
200	SPILLS	921725/CLOSED	SAVI AVE WATERFORD CT 06385	NON GC	
162	SPILLS	911003/CLOSED	WATER ST NEW LONDON CT 06320	NON GC	
170	SPILLS	9802633/CLOSED	95 NORTH EXITS 82-83 NEW LONDON CT	NON GC	
169	SPILLS	9806630/CLOSED	AMTRACK RIGHT AWAY STATION # 1 NEW LONDON CT	NON GC	
168	SPILLS	9806484/CLOSED	SOUTH WATER ST ON ROAD WAY NEW LONDON CT	NON GC	
167	SPILLS	9808149/CLOSED	US COAST GUARD ACCADMEY, BOILE NEW LONDON CT	NON GC	
166	SPILLS	9808486/CLOSED	EAST MAIN STREET NEW LONDON CT	NON GC	
137	SPILLS	913822/CLOSED	NR ADMIRALTY PIER GATE NEW LONDON CT 06320	NON GC	
164	SPILLS	9592/CLOSED	45 PRESTON ST NEW LONDON CT 06320	NON GC	
141	SPILLS	9702178/CLOSED	CITY PIER NEW LONDON CT 06320	NON GC	
201	SPILLS	200302795/CLOSED	ROPE FERRY RD WATERFORD CT 06385	NON GC	
109	SPILLS	200309009/CLOSED	BANK ST NEW LONDON CT 06320	NON GC	

Environmental FirstSearch
Sites Summary Report

TARGET SITE: GARDNER AVE
NEW LONDON CT 06320

JOB: 112.08.04

TOTAL: 295 **GEOCODED:** 6 **NON GEOCODED:** 289 **SELECTED:** 4

ID	DB Type	Site Name/ID/Status	Address	Dist/Dir	Map ID
118	SPILLS	200106072/CLOSED	CRYSTAL AVE/ POLE # 1179 NEW LONDON CT 06320	NON GC	
117	SPILLS	200109641/CLOSED	CONNECTICUT COLLEGE NEW LONDON CT 06320	NON GC	
116	SPILLS	200200439/CLOSED	MYROCK AVE NEW LONDON CT 06320	NON GC	
115	SPILLS	200200600/CLOSED	410 BUCKLEY PLACE NEW LONDON CT 06320	NON GC	
114	SPILLS	200201120/CLOSED	MOBILE STATION, BEHIND BERLING NEW LONDON CT 06320	NON GC	
113	SPILLS	200205641/CLOSED	VAUXHALL STREET NEW LONDON CT 06320	NON GC	
112	SPILLS	200208700/CLOSED	I95 NORTH BOUND NEW LONDON CT 06320	NON GC	
139	SPILLS	9703098/CLOSED	GARAGE PARKING LOT OFF OF HARR NEW LONDON CT 06320	NON GC	
110	SPILLS	200306408/CLOSED	CT AVE NEW LONDON CT 06320	NON GC	
121	SPILLS	962439/CLOSED	LAMPFIELD RD NEW LONDON CT 06320	NON GC	
108	SPILLS	200400572/CLOSED	MICHAEL ROAD NEW LONDON CT 06320	NON GC	
107	SPILLS	9808484/CLOSED	GARFIELD STREET NEW LONDON CT	NON GC	
106	SPILLS	9808020/CLOSED	US COAST GUARD K-LOT NEW LONDON CT	NON GC	
105	SPILLS	9802525/CLOSED	MILLSTONE UNIT # 3 NEW LONDON CT	NON GC	
104	SPILLS	9805307/CLOSED	AMTRCK RIGHT AWAY #123 & 3598 NEW LONDON CT	NON GC	
103	SPILLS	9800435/CLOSED	PARKING SPACE 0133 & 0130 NEW LONDON CT	NON GC	
19	NPDES	CT0002895/MINOR	NEW LONDON CT	NON GC	
13	ERNS	NRC-654324/MOBILE	BANK ST. NEW LONDON CT 06320	NON GC	
111	SPILLS	200305168/CLOSED	PEQUOT AVE POLE # 207 NEW LONDON CT 06320	NON GC	
129	SPILLS	200102587/CLOSED	RT 1 NEW LONDON CT 06320	NON GC	

Environmental FirstSearch
Sites Summary Report

TARGET SITE: GARDNER AVE
NEW LONDON CT 06320

JOB: 112.08.04

TOTAL: 295 **GEOCODED:** 6 **NON GEOCODED:** 289 **SELECTED:** 4

ID	DB Type	Site Name/ID/Status	Address	Dist/Dir	Map ID
209	SPILLS	9704072/CLOSED	MYROCK AVENUE WATERFORD CT 06385	NON GC	
138	SPILLS	9703099/CLOSED	INT. OF BEAR DR. AND HUNTER LI NEW LONDON CT 06320	NON GC	
149	SPILLS	924929/CLOSED	WILLIAMS ST NEW LONDON CT 06320	NON GC	
136	SPILLS	9902611/CLOSED	33 PAUL REVERE RD NEW LONDON CT 06320	NON GC	
135	SPILLS	9905232/CLOSED	MICHAEL AVE. NEW LONDON CT 06320	NON GC	
134	SPILLS	9907221/CLOSED	WILLIAMS STREET NEW LONDON CT 06320	NON GC	
133	SPILLS	200004705/CLOSED	COLEMAN ST POLE # 10351 NEW LONDON CT 06320	NON GC	
132	SPILLS	200004747/CLOSED	MY ROCK AVE. NEW LONDON CT 06320	NON GC	
119	SPILLS	200106082/CLOSED	THAMES RIVER NEW LONDON CT 06320	NON GC	
130	SPILLS	200102497/CLOSED	2 APT HOUSE NEW LONDON CT 06320	NON GC	
120	SPILLS	200106080/CLOSED	THAMES RIVER NEW LONDON CT 06320	NON GC	
128	SPILLS	200103815/CLOSED	MYROCK AVENUE NEW LONDON CT 06320	NON GC	
127	SPILLS	200104991/CLOSED	ELLIOTT AVE NEW LONDON CT 06320	NON GC	
126	SPILLS	200103674/CLOSED	LONG ISLAND SOUND NEW LONDON CT 06320	NON GC	
125	SPILLS	200100986/CLOSED	WASHINGTON STREET NEW LONDON CT 06320	NON GC	
124	SPILLS	956704/CLOSED	DAY MARKER #29/THAMES RIVER NEW LONDON CT 06320	NON GC	
123	SPILLS	956886/CLOSED	CRYSTAL AVE NEW LONDON CT 06320	NON GC	
122	SPILLS	957035/CLOSED	PEQUOT AVE NEW LONDON CT 06320	NON GC	
140	SPILLS	9900147/CLOSED	MILLSTONE #3 NEW LONDON CT 06320	NON GC	
131	SPILLS	200006373/CLOSED	MILE POST 121.9 - 122 AMTRACK NEW LONDON CT 06320	NON GC	

Environmental FirstSearch
Sites Summary Report

TARGET SITE: GARDNER AVE
NEW LONDON CT 06320

JOB: 112.08.04

TOTAL: 295 **GEOCODED:** 6 **NON GEOCODED:** 289 **SELECTED:** 4

ID	DB Type	Site Name/ID/Status	Address	Dist/Dir	Map ID
274	RELEASES	560888/UNKNOWN (NRC)	THAMES RIVER SMITH COVE NEW LONDON CT	NON GC	
221	SPILLS	9805310/CLOSED	AMTRACK RIGHTAWAY STATION # 11 WATERFORD CT 06385	NON GC	
222	SPILLS	9805308/CLOSED	AMTRACK RIGHT AWAY #117 & 0390 WATERFORD CT 06385	NON GC	
223	SPILLS	9703050/CLOSED	MYROCK AVE WATERFORD CT 06385	NON GC	
224	SPILLS	946981/CLOSED	WATERFORD PKWY NORTH WATERFORD CT 06385	NON GC	
225	SPILLS	945450/CLOSED	47 NEW LONDON TNPK WATERFORD CT 06385	NON GC	
226	SPILLS	92623/CLOSED	34 CAMPERE RD WATERFORD CT 06385	NON GC	
227	SPILLS	937143/CLOSED	GREAT NECK RD WATERFORD CT 06385	NON GC	
228	SPILLS	931418/CLOSED	INDUSTRIAL RD WATERFORD CT 06385	NON GC	
229	SPILLS	92741/CLOSED	LAKE POST RD WATERFORD CT 06385	NON GC	
230	SPILLS	922664/CLOSED	WILLERS AVE WATERFORD CT 06385	NON GC	
220	SPILLS	9903012/CLOSED	BLOCK 7 MILE POST 116 + 4891 WATERFORD CT 06385	NON GC	
273	RELEASES	639622.00/M	SUB BASE / PIER 10 SOUTH NEW LONDON CT	NON GC	
285	RELEASES	NRC-635940/MOBILE	ROPE FERRY ROAD WATERFORD CT 06385	NON GC	
275	RELEASES	NRC-520642/VESSEL	BANK STREET NEW LONDON CT 06320	NON GC	
276	RELEASES	NRC-519033/VESSEL	PIER 8S NEW LONDON CT	NON GC	
277	RELEASES	576658/UNKNOWN (NRC)	THAMES RIVER MILE MARKER UNKNO NEW LONDON CT	NON GC	
278	RELEASES	552130/UNKNOWN (NRC)	THAMES RIVER NEW LONDON CT	NON GC	
279	RELEASES	237142/FIXED FACILITY	NAVIGABLE WATERS NEC NEW LONDON CT	NON GC	
280	RELEASES	209709/UNKNOWN (NRC)	NEW LONDON HARBOR NEW LONDON CT	NON GC	

Environmental FirstSearch
Sites Summary Report

TARGET SITE: GARDNER AVE
NEW LONDON CT 06320

JOB: 112.08.04

TOTAL: 295 **GEOCODED:** 6 **NON GEOCODED:** 289 **SELECTED:** 4

ID	DB Type	Site Name/ID/Status	Address	Dist/Dir	Map ID
281	RELEASES	179474/UNKNOWN (NRC)	BALDWIN BRIDGE BETWEEN OLD SAY NEW LONDON CT	NON GC	
282	RELEASES	179592/MARINE- RELEASED FRO	THAMES RIVER NEW LONDON CT	NON GC	
210	SPILLS	200402021/CLOSED	ROPE FERRY RD RT 156 WATERFORD CT 06385	NON GC	
286	RELEASES	NRC-637585/FIXED	ROPE FERRY RD WATERFORD CT 06385	NON GC	
147	SPILLS	934374/CLOSED	PEQUOT ST NEW LONDON CT 06320	NON GC	
231	SWL	CTSW-CL-01-105/CLOSED	BATES WOODS PARK NEW LONDON CT	NON GC	
213	SPILLS	934475/CLOSED	NIANTIC BAY/MAGO POINT WATERFORD CT 06385	NON GC	
211	SPILLS	200400970/CLOSED	RT 85 WATERFORD CT 06385	NON GC	
212	SPILLS	9800834/CLOSED	MYROCK RD WATERFORD CT 06385	NON GC	
214	SPILLS	943365/CLOSED	RT 85/HARTFORD RD WATERFORD CT 06385	NON GC	
215	SPILLS	913439/CLOSED	DANIELS AVE & THIRD AVE WATERFORD CT 06385	NON GC	
216	SPILLS	961990/OPEN	I-395 N/B WATERFORD CT 06385	NON GC	
217	SPILLS	9700704/CLOSED	I-395 NB WATERFORD WATERFORD CT 06385	NON GC	
218	SPILLS	9604540/CLOSED	BLOOMINGDALE ROAD POLE 2986 WATERFORD CT 06385	NON GC	
219	SPILLS	9605758/CLOSED	I-95 NORTH TRAIL DIESEL FUEL E WATERFORD CT 06385	NON GC	
33	SPILLS	AIR LAND SEA EXPRESS 912681/CLOSED	I-95 EST EX 49 NEW LONDON CT 06320	NON GC	
8	ERNS	AMTRAK 334226/RAILROAD	PEQUOT ST. BRIDGE NEW LONDON CT 06320	NON GC	
34	SPILLS	AMTRAK-SAFETY DEPT. 9804522/CLOSED	MILEPOST 122.8 APPROX. 400 NEW LONDON CT	NON GC	
172	SPILLS	ANTHONY JULIAN/R R CONSTRUCTION CO 951284/CLOSED	RIDGEWOOD AVE WATERFORD CT 06385	NON GC	
173	SPILLS	AS ABOVE 9905098/CLOSED	RICHARDS GROVE RD. WATERFORD CT 06385	NON GC	

Environmental FirstSearch
Sites Summary Report

TARGET SITE: GARDNER AVE
NEW LONDON CT 06320

JOB: 112.08.04

TOTAL: 295 **GEOCODED:** 6 **NON GEOCODED:** 289 **SELECTED:** 4

ID	DB Type	Site Name/ID/Status	Address	Dist/Dir	Map ID
35	SPILLS	AS ABOVE 9900920/CLOSED	EAGLE DRIVE NEW LONDON CT 06320	NON GC	
27	STATE	BAR PROPERTY 2794/SUSPECTED	110 LOGAN ROAD NEW LONDON CT	NON GC	
283	RELEASES	BENNY & CAUSEY TRUCKING 598175/UNKNOWN (NRC)	AMTRAK PROPERTY TO MILLSTONE P WATERFORD CT 06385	NON GC	
174	SPILLS	BENNY CAUSEY 9806714/CLOSED	AMTRAK ROW TRACK 2 NIANTIC PAR WATERFORD CT 06385	NON GC	
244	RELEASES	BETWEEN BUOYS 1 AND 2 AT THE MOUTH NRC-567382/UNKNOWN SHEEN	NEW LONDON CT	NON GC	
36	SPILLS	BILL DOWNIE 961290/CLOSED	30 WEST PUTNAM NEW LONDON CT 06320	NON GC	
245	RELEASES	BOUCHARD COASTWISE MANGT 494718/MARINE- RELEASED FRO	1 NM SOUTH OF BARTLETT REEF & NEW LONDON CT	NON GC	
246	RELEASES	BURRS MARINA 326837/UNKNOWN (NRC)	PEQUOT AVENUE NEW LONDON CT	NON GC	
37	SPILLS	C L&P 91398/CLOSED	OCEAN AVE NEW LONDON CT 06320	NON GC	
38	SPILLS	C. L. & P 9903931/CLOSED	WILLIAMS STREET NEW LONDON CT 06320	NON GC	
241	LUST	CASTELLLO DEMOLITION 200303087/CLOSED	BROAD STREET OLD ROYAL USED CA NEW LONDON CT 06320	NON GC	
39	SPILLS	CASTELLLO DEMOLITION 200303087/CLOSED	BROAD STREET OLD ROYAL USED CA NEW LONDON CT	NON GC	
175	SPILLS	CHERRY HILL CONST. 200303379/CLOSED	RT. 85 WATERFORD CT 06385	NON GC	
40	SPILLS	CITGO 200001010/CLOSED	WILLIAMS STREET CITGO, (HODGES NEW LONDON CT 06320	NON GC	
242	LUST	CITY OF NEW LONDON 9806911/CLOSED	PUMP STATION # 5 – GOVERNER W NEW LONDON CT 06320	NON GC	
41	SPILLS	CITY OF NEW LONDON 9806911/CLOSED	PUMP STATION # 5 -- GOVERNER W NEW LONDON CT	NON GC	
42	SPILLS	CL AND P 200208527/CLOSED	22 FULLMORE DROVE NEW LONDON CT 06320	NON GC	
28	STATE	CL&P 4683/SUSPECTED	WATER STREET NEW LONDON CT	NON GC	
237	OTHER	CL&P 4683/TRANSFER ACT	WATER STREET NEW LONDON CT	NON GC	
295	PADS	CONNECTICUT LGT & PWR NEW LOND CTD981205172/PCB ACTIVITY	MYROCK AVE WATERFORD CT 06385	NON GC	

Environmental FirstSearch
Sites Summary Report

TARGET SITE: GARDNER AVE
NEW LONDON CT 06320

JOB: 112.08.04

TOTAL: 295 **GEOCODED:** 6 **NON GEOCODED:** 289 **SELECTED:** 4

ID	DB Type	Site Name/ID/Status	Address	Dist/Dir	Map ID
43	SPILLS	CONTINENTAL SALT 9701463/CLOSED	CONTINENTAL SALT, ADMIRALTY PI NEW LONDON CT 06320	NON GC	
44	SPILLS	COTE & SONS INC 913013/CLOSED	SULLIVAN FARMS RD PHASE 2 NEW LONDON CT 06320	NON GC	
247	RELEASES	CRYSTAL AVE, TOLL NUMBER 1179, LEWI NRC-576076/FIXED	NEW LONDON CT	NON GC	
232	PERMITS	CT DEPT OF TRANSPORTATION GSW001621/MINOR	ROUTE 32 WATERFORD CT 06385	NON GC	
29	STATE	CT DETROIT DIESEL ALLISON INC. 4237/SUSPECTED	PEARL STREET GROTON CT 06340	NON GC	
45	SPILLS	CT PLATE NUMBER - 79C-458 200306202/CLOSED	NEW LONDON TRANSFER STATION NEW LONDON CT	NON GC	
176	SPILLS	D & W TRANSPORTATION 200207971/CLOSED	MINOR LANE - OFF ROUTE # 1 WATERFORD CT 06385	NON GC	
287	HMIRS	DAHL OIL CO 1997010198/HIGHWAY (FOR HIRE)	RTE 32 SOUTH BOUND NEW LONDON CT 06320	NON GC	
10	ERNS	DAHL OIL CO 519758/HIGHWAY RELATED	RT 32 SOUTH NEW LONDON, CT NEW LONDON CT 06320	NON GC	
9	ERNS	DAHL OIL CO 519214/UNKNOWN	RT 32 SOUTH NEW LONDON, CT NEW LONDON CT 06320	NON GC	
288	HMIRS	DART TRUCKING CO INC 1993120948/HIGHWAY (FOR HIRE)	RT 85 WATERFORD CT 06385	NON GC	
46	SPILLS	DDLC-+ 200400875/CLOSED	535 EAST MAIN STREET NEW LONDON CT	NON GC	
30	STATE	DEPOT ROAD 1659/SUSPECTED	DEPOT ROAD GROTON CT 06340	NON GC	
177	SPILLS	DOT 9704358/CLOSED	ROUTE 32 WATERFORD CT 06385	NON GC	
31	STATE	DOT BRIDGE PROJCT #58-251 1369/SUSPECTED	US ROUTE 1 GROTON CT 06340	NON GC	
284	RELEASES	EAST SHORE OF NIATIC BAY NRC-703937/FIXED	DOMINION NUCLEAR CONNECTICUT R WATERFORD CT 06385	NON GC	
248	RELEASES	ELECTRIC BOAT CORPORATION 639622/MARINE- RELEASED FRO	SUB BASE / PIER 10 SOUTH NEW LONDON CT	NON GC	
47	SPILLS	EMPIRE PAVING 952149/CLOSED	EVERGREEN ST/SEWER JOB NEW LONDON CT 06320	NON GC	
48	SPILLS	ERNEST BOGGS 9903032/CLOSED	HENLY CIRCLE NEW LONDON CT 06320	NON GC	
20	NPDES	FIVECOR PARTNERSHIP CT0026735/MINOR	WATERFORD CT 06385	NON GC	

Environmental FirstSearch
Sites Summary Report

TARGET SITE: GARDNER AVE
NEW LONDON CT 06320

JOB: 112.08.04

TOTAL: 295 **GEOCODED:** 6 **NON GEOCODED:** 289 **SELECTED:** 4

ID	DB Type	Site Name/ID/Status	Address	Dist/Dir	Map ID
249	RELEASES	FRONTAGE RD. INTERSECTION OF 95 NOR NRC-582029/MOBILE	NEW LONDON CT	NON GC	
49	SPILLS	GILBERTO G TORRES 911182/CLOSED	EUGENE O NEAL DR NEW LONDON CT 06320	NON GC	
178	SPILLS	HANDEL S CORP 941146/CLOSED	262 WEST TOWN ST WATERFORD CT 06385	NON GC	
25	FINDS	HOLDEN TRUCKING INC HERB CT0001988732	DIMMOCK RD WATERFORD CT 06385	NON GC	
250	RELEASES	HOWARD ST. NRC-573704/UNKNOWN SHEEN	NEW LONDON CT	NON GC	
251	RELEASES	I - 95 / FRONTAGE ROAD EXIT NRC-526477/MOBILE	NEW LONDON CT	NON GC	
179	SPILLS	KARL M JENSEN 935825/CLOSED	WATERFORD PKWY NORTH WATERFORD CT 06385	NON GC	
50	SPILLS	LAWN TRACTOR 200404208/CLOSED	USCG ACADEMY NEW LONDON CT	NON GC	
51	SPILLS	LEHIGH OIL CO. 9906030/CLOSED	SMITH ST. NEW LONDON CT 06320	NON GC	
252	RELEASES	MCCARTHY FUEL SERVICES 403156/HIGHWAY RELATED	BANK AND CAPTAIN S WALK @ STOR NEW LONDON CT	NON GC	
289	HMIRS	METAL RECOVERY TRANSPORTATION 2003110220/HIGHWAY (FOR HIRE)	I 95 SOUTH WATERFORD CT 06385	NON GC	
14	ERNS	MILLSTONE NUCLEAR POWER PLANT 548970/FIXED FACILITY	UNKNOWN HARTFORD CT 06385	NON GC	
253	RELEASES	MOUTH OF THE THAMES RIVER. BETWEEN NRC-647200/UNKNOWN SHEEN	NEW LONDON CT	NON GC	
52	SPILLS	MRS WRIGHT 925742/CLOSED	79 YATES NEW LONDON CT	NON GC	
180	SPILLS	MV ACCIDENT 200203417/CLOSED	RT 85 WATERFORD CT 06385	NON GC	
53	SPILLS	MVA 200308419/CLOSED	95 N/B BET 83 & 85 NEW LONDON CT 06320	NON GC	
254	RELEASES	MYROCK AVE NRC-521356/MOBILE	NEW LONDON CT	NON GC	
181	SPILLS	MYSTIC RIVER MARINA 200202883/CLOSED	QUARRY RD STONINGTON CT 06385	NON GC	
182	SPILLS	N.U.W.C. 9606368/CLOSED	39 SMITH ST. WATERFORD CT 06385	NON GC	
238	UST	NATIONAL RAILROAD PASSENGER CORP. 12307	RAILROAD INTERSECTING WALBACH NEW LONDON CT 06320	NON GC	

Environmental FirstSearch
Sites Summary Report

TARGET SITE: GARDNER AVE
NEW LONDON CT 06320

JOB: 112.08.04

TOTAL: 295 **GEOCODED:** 6 **NON GEOCODED:** 289 **SELECTED:** 4

ID	DB Type	Site Name/ID/Status	Address	Dist/Dir	Map ID
255	RELEASES	NAVAL UNDERSEA WARFARE 393898/HIGHWAY RELATED	DODGE POND NEW LONDON CT	NON GC	
54	SPILLS	NEW LONDON DEVELOPMENT CORP/SORDONI 200200206/CLOSED	SMITH ST NEW LONDON CT	NON GC	
239	UST	NEW LONDON GARAGE 7106 01830	VAUXHALL ST EXT NEW LONDON CT 06320	NON GC	
256	RELEASES	NEW LONDON HARBOR NRC-576137/VESSEL	IN FRONT OF COAST GUARD ACADEM NEW LONDON CT	NON GC	
55	SPILLS	NEW LONDON SEAFOOD 200206701/CLOSED	THAMES RIVER NEW LONDON CT	NON GC	
257	RELEASES	NEW LONDON SEWER TREATMENT PL. 424475/FIXED FACILITY	TRUMBULL ST. NEW LONDON CT 06320	NON GC	
258	RELEASES	NEW LONDON SUBMARINE BASE NRC-642030/UNKNOWN SHEEN	PIER 32 SOUTH NEW LONDON CT	NON GC	
56	SPILLS	NEW LONDON UTILITIES 9706617/CLOSED	BAYONET ST. NEW LONDON CT 06320	NON GC	
16	NPDES	NEW LONDON-RIVERSIDE CT0101311/MINOR	NEW LONDON CT	NON GC	
259	RELEASES	NORTH EAST UTILITIES 447911/FIXED FACILITY	SHERMAN RD NEW LONDON CT	NON GC	
183	SPILLS	NORTHEAST CORRIDOR FOUNDATION 9804716/CLOSED	AMTRAK MP119+4437-4877 NEA WATERFORD CT 06385	NON GC	
63	SPILLS	NORTHEAST UTILITIES 943456/CLOSED	HUNTINGTON ST NEW LONDON CT 06320	NON GC	
62	SPILLS	NORTHEAST UTILITIES 944147/CLOSED	BEAR HARBOR RD/OCEAN AVE NEW LONDON CT 06320	NON GC	
61	SPILLS	NORTHEAST UTILITIES 943437/CLOSED	STATE ST NEW LONDON CT 06320	NON GC	
60	SPILLS	NORTHEAST UTILITIES 925051/CLOSED	GOVERNOR WINTHROP BLVD NEW LONDON CT 06320	NON GC	
59	SPILLS	NORTHEAST UTILITIES 942606/CLOSED	JEFFERSON AVE NEW LONDON CT 06320	NON GC	
58	SPILLS	NORTHEAST UTILITIES 933520/CLOSED	29 WHALE ST NEW LONDON CT 06320	NON GC	
57	SPILLS	NORTHEAST UTILITIES 922205/CLOSED	WILLIAMS ST NEW LONDON CT 06320	NON GC	
186	SPILLS	NORTHEAST UTILITIES 935701/CLOSED	CONSHIRE DRIVE WATERFORD CT 06385	NON GC	
185	SPILLS	NORTHEAST UTILITIES 94783/CLOSED	RT 156 WATERFORD CT 06385	NON GC	

Environmental FirstSearch
Sites Summary Report

TARGET SITE: GARDNER AVE
NEW LONDON CT 06320

JOB: 112.08.04

TOTAL: 295 **GEOCODED:** 6 **NON GEOCODED:** 289 **SELECTED:** 4

ID	DB Type	Site Name/ID/Status	Address	Dist/Dir	Map ID
184	SPILLS	NORTHEAST UTILITIES 925813/CLOSED	CROSS RD WATERFORD CT 06385	NON GC	
290	NCDB	NORTHEAST UTILITIES SPILL/FIRE NCDB-0801-005345/TSCA	HEMPSTEAD SUBSTATION NEW LONDON CT 06320	NON GC	
291	NCDB	NORTHEAST UTILITIES/FIRE NCDB-0801-005475/TSCA	HEMPSTEAD STATION NEW LONDON CT 06320	NON GC	
187	SPILLS	NORTHEAST UTILTIES 954538/CLOSED	VAUXHALL ST EXT WATERFORD CT 06385	NON GC	
21	FINDS	NU CT0000912899	MOCKINGBIRD LN NEW LONDON CT 06320	NON GC	
233	PERMITS	O NEILL THEATER UI0000253/MINOR	ROUTE 214 WATERFORD CT 06385	NON GC	
234	PERMITS	OSWEGATCHIE AREA GSW000358/MINOR	TOWN OF WATERFORD WATERFORD CT 06385	NON GC	
64	SPILLS	PASQAULINI CONSTR 943473/CLOSED	BANK ST NEW LONDON CT 06320	NON GC	
65	SPILLS	PRIVATE CONTRACTOR 9800954/CLOSED	EAGLE DR. NEW LONDON CT	NON GC	
188	SPILLS	PRIVATE VEHICLE 9908017/CLOSED	RT.213 - RT.156 - RT.1 . WATERFORD CT 06385	NON GC	
66	SPILLS	PUBLIC UTILITIES 200204170/CLOSED	LAUREL DRIVE NEW LONDON CT 06320	NON GC	
189	SPILLS	R.J. GUERRERA 9807872/CLOSED	ROPE FERRY RD. WATERFORD CT 06385	NON GC	
260	RELEASES	REINAUER TRANSPORT CO 295892/MARINE- RELEASED FRO	NEW LONDON CT	NON GC	
67	SPILLS	REINAUER TRANSPORTATION CO 926456/CLOSED	BLACK LEDGE L I S NEW LONDON CT 06320	NON GC	
68	SPILLS	RICHARD LANPARELLI 200400315/CLOSED	4 LAURIER LANE NEW LONDON CT	NON GC	
235	PERMITS	RIDGEWOOD PARK AREA GSW000367/MINOR	CONSTRUCTION SITE WATERFORD CT 06385	NON GC	
69	SPILLS	ROADWAY EXPRESS 9701846/CLOSED	264 NORTH FRONTAGE ROAD NEW LONDON CT 06320	NON GC	
240	UST	ROLAND S MARINE 03214	FIRST ST. WATERFORD CT 06385	NON GC	
190	SPILLS	S & N TRUCKING 941891/CLOSED	VAUXHAUL ST WATERFORD CT 06385	NON GC	
72	SPILLS	SAA 200300718/CLOSED	WESTWOOD AVE NEW LONDON CT 06320	NON GC	

Environmental FirstSearch
Sites Summary Report

TARGET SITE: GARDNER AVE
NEW LONDON CT 06320

JOB: 112.08.04

TOTAL: 295 **GEOCODED:** 6 **NON GEOCODED:** 289 **SELECTED:** 4

ID	DB Type	Site Name/ID/Status	Address	Dist/Dir	Map ID
71	SPILLS	SAA 200204080/CLOSED	MYROCK AVE NEW LONDON CT	NON GC	
191	SPILLS	SAA 9908563/CLOSED	MY ROCK AVENUE, CL&P SERVICE C WATERFORD CT 06385	NON GC	
73	SPILLS	SAA 200200363/CLOSED	HAWTHORNE DRIVE NEW LONDON CT 06320	NON GC	
74	SPILLS	SAA 9902244/CLOSED	7379 NATHAN HALE ROAD NEW LONDON CT 06320	NON GC	
75	SPILLS	SAA 200005257/CLOSED	WILLIAM STREET NEW LONDON CT 06320	NON GC	
76	SPILLS	SAA 9704582/CLOSED	HEMPSTEAD STREET SUB STATION NEW LONDON CT 06320	NON GC	
77	SPILLS	SAA 200403117/CLOSED	USCGA NEW LONDON CT	NON GC	
78	SPILLS	SAA 200206561/CLOSED	ROUTE 12 AND CRYSTAL LAKE ROAD NEW LONDON CT	NON GC	
192	SPILLS	SAA 200000572/CLOSED	ROPE FERRY RD. WATERFORD CT 06385	NON GC	
193	SPILLS	SAA 200400151/CLOSED	MULLEN HILL ROAD WATERFORD CT 06385	NON GC	
70	SPILLS	SAA 9805758/CLOSED	CAMBELL DR. NEW LONDON CT	NON GC	
80	SPILLS	SAME 9806551/CLOSED	AMTRACK MILE POST 123 +0118- + NEW LONDON CT	NON GC	
194	SPILLS	SAME 200208485/CLOSED	ROPE FERRY RD. WATERFORD CT 06385	NON GC	
84	SPILLS	SAME 9807324/CLOSED	BIBB DR NEW LONDON CT	NON GC	
83	SPILLS	SAME 9807323/CLOSED	EAGLE DR NEW LONDON CT	NON GC	
81	SPILLS	SAME 200104253/CLOSED	G.A. 10 NEW LONDON SUPERIOR CO NEW LONDON CT 06320	NON GC	
79	SPILLS	SAME 9805386/CLOSED	WILLIAMS ST NEW LONDON CT	NON GC	
82	SPILLS	SAME 200004491/CLOSED	HARRIET LANE/US COAST GUARD AC NEW LONDON CT 06320	NON GC	
26	FINDS	SEALY WINCHESTER CT0002026011	MAIN ST WATERTOWN CT 06385	NON GC	
294	NCDB	SEALY / WINCHESTER NCDB-0801-005291/TSCA	MAIN ST WATERTOWN CT 06385	NON GC	

Environmental FirstSearch
Sites Summary Report

TARGET SITE: GARDNER AVE
NEW LONDON CT 06320

JOB: 112.08.04

TOTAL: 295 **GEOCODED:** 6 **NON GEOCODED:** 289 **SELECTED:** 4

ID	DB Type	Site Name/ID/Status	Address	Dist/Dir	Map ID
7	RCRANLR	SHERWIN WILLIAMS CO 5402 THE CTD000842336/NLR	282 BRIDGE APPROACH NEW LONDON CT 06320	NON GC	
22	FINDS	SHERWIN WILLIAMS CO 5402 THE CTD000842336	282 BRIDGE APPROACH NEW LONDON CT 06320	NON GC	
195	SPILLS	SNET TRUCK 200007143/CLOSED	RT 1 / 316 RT 1 TO WILLETTS AV WATERFORD CT 06385	NON GC	
196	SPILLS	STOLT TERMINALS 913549/CLOSED	I 95 N/B REST AREA WATERFORD CT 06385	NON GC	
236	PERMITS	SUMMIT PARK GSW001312/MINOR	WATERFORD PARKWAY SOUTH WATERFORD CT 06385	NON GC	
23	FINDS	TERRY CORP MARINE DI CTD983875329	P O BOX 350 NEW LONDON CT 06320	NON GC	
243	LUST	TEXACO STATION 3146-3149/YES	ROUTE 156 WATERFORD CT 06385	NON GC	
261	RELEASES	THAMES RIVER /ADJACTENT TO EAGLE PI NRC-534878/VESSEL	NEW LONDON CT 06320	NON GC	
11	ERNS	THE ABOVE GROUND STORAGE IS LOCATED NRC-590136/STORAGE TANK	NEXT TO THE MAIN STATION BUILD NEW LONDON CT 06320	NON GC	
197	SPILLS	TOWN OF WATERFORD 9604059/CLOSED	GURLEY ROAD WATERFORD CT 06385	NON GC	
85	SPILLS	TRU GREEN CHEMLAWN 200107924/CLOSED	BROAD ST. IN FRONT OF COURT HO NEW LONDON CT	NON GC	
32	STATE	TYPO / GRAPHICS 880/SUSPECTED	P.O. BOX 305 GROTON CT 06340	NON GC	
292	NCDB	U.S. COAST GUARD ACADEMY/ENGR. DIV. NCDB-0801-001507/TSCA	HAMILTON HALL NEW LONDON CT 06320	NON GC	
293	NCDB	U.S. COAST GUARD ACADEMY/ENGR. DIV. NCDB-0801-001508/TSCA	HAMILTON HALL NEW LONDON CT 06320	NON GC	
86	SPILLS	U.S. NAVY 200304203/CLOSED	SUB BASE F.D. CRYSTAL LAKE RD NEW LONDON CT	NON GC	
17	NPDES	UNIVERSITY OF CONNECTICUT MARINE SC CT0028631/MINOR	NEW LONDON CT	NON GC	
87	SPILLS	UNK 9803776/CLOSED	GRIFFIN RD. STATE PIER NEW LONDON CT	NON GC	
88	SPILLS	UNKN 9907547/CLOSED	RT 32SB NEAR CONN COLLEGE & U NEW LONDON CT 06320	NON GC	
15	ERNS	UNKNOWN 424933/PIPELINE RELATED	RTE. 85 IN FRONT OF THE TOWN M WATERFORD CT 06385	NON GC	
93	SPILLS	UNKNOWN 200303053/CLOSED	US CG ACADEMY NEW LONDON CT	NON GC	

Environmental FirstSearch
Sites Summary Report

TARGET SITE: GARDNER AVE
NEW LONDON CT 06320

JOB: 112.08.04

TOTAL: 295 **GEOCODED:** 6 **NON GEOCODED:** 289 **SELECTED:** 4

ID	DB Type	Site Name/ID/Status	Address	Dist/Dir	Map ID
97	SPILLS	UNKNOWN 9808827/CLOSED	ACCESS ROAD, CAMPBELL HALL NEW LONDON CT	NON GC	
91	SPILLS	UNKNOWN 200104774/CLOSED	THAMES RIVER NEW LONDON CT 06320	NON GC	
98	SPILLS	UNKNOWN 9807374/CLOSED	HARIET LANE COAST GUARD ACADE NEW LONDON CT	NON GC	
89	SPILLS	UNKNOWN 9805492/CLOSED	DIRT PATH NORTH OF SMITH RD 1/ NEW LONDON CT	NON GC	
96	SPILLS	UNKNOWN 200105424/CLOSED	SHAWS COVE HOWARD ST CULVERT N NEW LONDON CT	NON GC	
95	SPILLS	UNKNOWN 200105773/CLOSED	COLE ST. AT HODGES SQUARE NEW LONDON CT	NON GC	
94	SPILLS	UNKNOWN 200203296/CLOSED	SHAW COVE NEW LONDON CT	NON GC	
92	SPILLS	UNKNOWN 200307074/CLOSED	CAPTAINS WALK ON BANK STREET NEW LONDON CT	NON GC	
90	SPILLS	UNKNOWN 200106257/CLOSED	US COAST GUARD ACADAMY WATERFR NEW LONDON CT 06320	NON GC	
99	SPILLS	UNKNOWN AT THIS TIME 200305142/CLOSED	SHAW COVE, OFF HOWARD ST NEW LONDON CT	NON GC	
263	RELEASES	UNKNOWN SHEEN INCIDENT NRC-650385/UNKNOWN SHEEN	NEW LONDON CT	NON GC	
262	RELEASES	UNKNOWN SHEEN INCIDENT NRC-531342/UNKNOWN SHEEN	A DOCK AT PILOTS POINT MARINA NEW LONDON CT	NON GC	
24	FINDS	US COAST GUARD LEDGE LIGHT STA CT9690308193	NEW LONDON LEDGE NEW LONDON CT 06320	NON GC	
100	SPILLS	US GOVERNMENT 200201366/CLOSED	NAVAL UNDERSEA WARFARE CENTER NEW LONDON CT	NON GC	
264	RELEASES	US NAVY 591157/MARINE- RELEASED FRO	USS CITY OF CORPUS CHRISTI / P NEW LONDON CT	NON GC	
12	ERNS	US NAVY 591157/UNKNOWN	USS CITY OF CORPUS CHRISTI / P NEW LONDON CT	NON GC	
101	SPILLS	USCG 200301780/CLOSED	COAST GUARD ACADEMY NEW LONDON CT	NON GC	
102	SPILLS	USCG ACADEMY, POV 200303990/CLOSED	MOHEGAN AVE, USCG ACADEMY NEW LONDON CT	NON GC	
265	RELEASES	USCG-ACADEMY 390925/FIXED FACILITY	WATERFRONT OF THAMES RIVER NEW LONDON CT	NON GC	
266	RELEASES	USN NAVAL SUB BASE 436709/MARINE- RELEASED FRO	PIER 6 SOUTH NEW LONDON CT	NON GC	

Environmental FirstSearch
Sites Summary Report

TARGET SITE: GARDNER AVE
NEW LONDON CT 06320

JOB: 112.08.04

TOTAL: 295 **GEOCODED:** 6 **NON GEOCODED:** 289 **SELECTED:** 4

ID	DB Type	Site Name/ID/Status	Address	Dist/Dir	Map ID
267	RELEASES	USN- SUB BASE NEW LONDON 556093/MARINE- RELEASED FRO	NAVAL SUB BASE PIER:32 NORTH NEW LONDON CT	NON GC	
268	RELEASES	USN-NAVY 584600/FIXED FACILITY	SUBMARINE BASE NEW LONDON NEW LONDON CT	NON GC	
269	RELEASES	USN-US NAVY 544304/MARINE- RELEASED FRO	SUB BASE NEW LONDON NEW LONDON CT	NON GC	
18	NPDES	USS FULTON CT0021385/MINOR	NEW LONDON CT	NON GC	
198	SPILLS	WATERFORD P.W.D. 9904793/CLOSED	MISSVANCT. & COIT CT. WATERFORD CT 06385	NON GC	
199	SPILLS	WATERFORD PUBLIC WORKS 955752/CLOSED	ROPE FERRY RD WATERFORD CT 06385	NON GC	
270	RELEASES	WILLIAM S OIL TRUCK CO 203912/HIGHWAY RELATED	CORNER OF BANK AND HOWARD ST. NEW LONDON CT	NON GC	
271	RELEASES	WINTHROP COVE, NEW LONDON HARBOR, T NRC-635365/VESSEL	WINTHROP COVE OFF WATER ST. NEW LONDON CT	NON GC	
272	RELEASES	WSCGC EAGLE 165272/MARINE- RELEASED FRO	ROUTE 32 NEW LONDON CT	NON GC	

Environmental FirstSearch
Site Detail Report

TARGET SITE: GARDNER AVE
NEW LONDON CT 06320

JOB: 112.08.04

LEAKING UNDERGROUND STORAGE TANKS

SEARCH ID: 2 **DIST/DIR:** 0.44 SE **MAP ID:** 2

NAME: HERBERT & HARTMAN
ADDRESS: 539 ALEWIFE PKWY
NEW LONDON CT 06320
CONTACT:

REV:
ID1: 4685
ID2:
STATUS: YES
PHONE:

REPORT DATE: 12-05-95
MATERIAL: STEEL
LOW CAPACITY: 275
PRODUCT: HF2

FED REG:
NUMBER OF TANKS: 1
HIGH CAPACITY: 275

TANK REMOVED:
TANK RELEASE:
UNCONTROLLED RELEASE: YES
PIPING RELEASE:
EMERGENCY:
OVERFILL RELEASE: YES

REMEDIATION: REPLACE LINE
REFERRED:
COMMENT:

COMPLETE: YES

LEAKING UNDERGROUND STORAGE TANKS

SEARCH ID: 3 **DIST/DIR:** 0.44 SE **MAP ID:** 2

NAME: HERBERT & HARTMAN RES
ADDRESS: 539 ALEWIFE PARKWAY
NEW LONDON CT 06320
CONTACT:

REV:
ID1: 4391
ID2:
STATUS: YES
PHONE:

REPORT DATE: 02-05-95
MATERIAL: STEEL
LOW CAPACITY: 275
PRODUCT: HF2

FED REG: NO
NUMBER OF TANKS: 1
HIGH CAPACITY: 275

TANK REMOVED:
TANK RELEASE:
UNCONTROLLED RELEASE: YES
PIPING RELEASE:
EMERGENCY:
OVERFILL RELEASE: YES

REMEDIATION: REPLACE LINE
REFERRED:
COMMENT:

COMPLETE: YES

Environmental FirstSearch
Site Detail Report

TARGET SITE: GARDNER AVE
NEW LONDON CT 06320

JOB: 112.08.04

LEAKING UNDERGROUND STORAGE TANKS

SEARCH ID: 5 **DIST/DIR:** 0.49 NE **MAP ID:** 4

NAME: YAVENER RESIDENCE
ADDRESS: 102 PLANT ST
NEW LONDON CT 06320
CONTACT:

REV:
ID1: 1918
ID2:
STATUS: U
PHONE:

REPORT DATE: 10-18-91
MATERIAL: STEEL
LOW CAPACITY: 275
PRODUCT: HF2

FED REG: NO
NUMBER OF TANKS: 1
HIGH CAPACITY: 275

TANK REMOVED:
TANK RELEASE:

UNCONTROLLED RELEASE: YES
PIPING RELEASE:

EMERGENCY:
OVERFILL RELEASE: YES

REMEDIATION: PUMPED
REFERRED:
COMMENT:

COMPLETE: U

Environmental FirstSearch
Site Detail Report

TARGET SITE: GARDNER AVE
NEW LONDON CT 06320

JOB: 112.08.04

LEAKING UNDERGROUND STORAGE TANKS

SEARCH ID: 4 **DIST/DIR:** 0.50 NE **MAP ID:** 3

NAME: MITCHELL COLLEGE - ALLAN LEMERE
ADDRESS: 715 MONTUK AVE
NEW LONDON CT 06320

CONTACT: NO RESPONSE

REV: 7/30/04
ID1: 200306620
ID2:
STATUS: CLOSED
PHONE:

SITE INFORMATION

DATE OF RELEASE:	9/10/2003
TIME OF RELEASE:	
DISHCHARGER:	MITCHELL COLLEGE - ALLAN LEMERE saa SAA CT
DISCHARGER S PHONE:	
ACCEPTS RESPONSIBILITY:	YES
MATERIAL RELEASED (GAL):	#2 FUEL OIL 0
CAUSE OF INCIDENT:	3 - INGROUND TANK FAILURE
OTHER:	
REPORT TIME:	9/10/2003 11:20:59 AM
REPORTED BY:	FI ALAN BEBE
REPORTER S PHONE:	6254186
AGENCY NOTIFIED:	3 - LOCAL FIRE MARSHAL
OTHER:	
DEP BUREAU:	
DEP DIVISIPN:	
AGENCY NOTIFIED:	9 - DEP
OTHER:	
DEP BUREAU:	BUREAU OF WASTE MANAGEMENT
DEP DIVISIPN:	OIL AND CHEMICAL SPILL RESPONSE
ACTION TAKEN:	17 - REMOVED TANK
OTHER:	
ACTION TAKEN:	18 - SOIL REMOVED
OTHER:	
EMERGENCY MEASURES:	550 GAL LUST, SAMPLES TAKEN AT SCENE, CONTAMINATION ESTIMATED AT 3-4 TONS
RELEASE CLASS:	6 - PRIVATE
MEDIA AFFECTED:	6 - OTHER
WATERBODY AFFECTED:	9 - OTHER

Environmental FirstSearch
Street Name Report for Streets within .25 Mile(s) of Target Property

TARGET SITE: GARDNER AVE
NEW LONDON CT 06320

JOB: 112.08.04

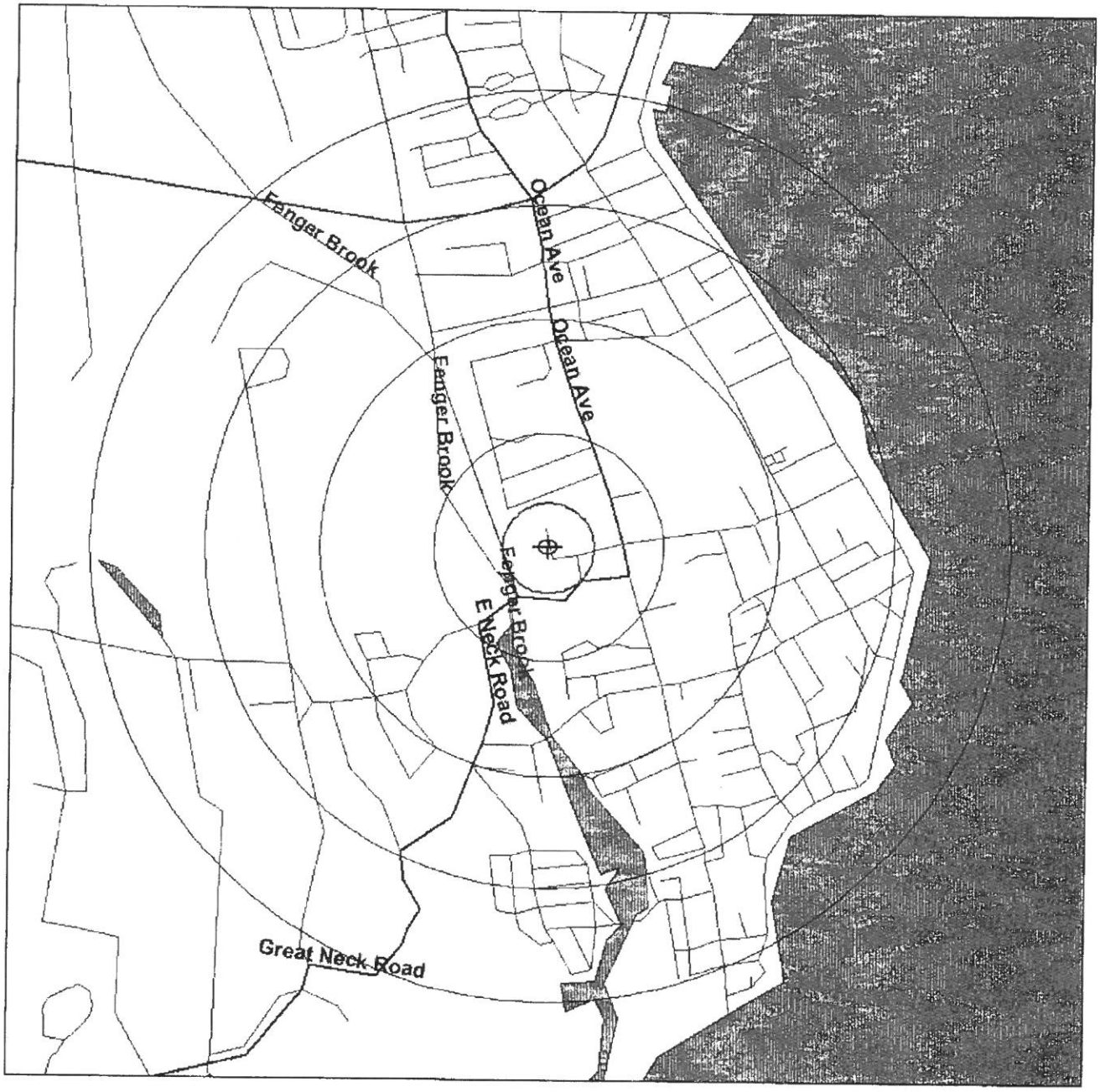
Street Name	Dist/Dir	Street Name	Dist/Dir
Beech Dr	0.25 SE		
Conrad Nasetta Ln	0.07 SE		
E Neck Rd	0.23 SW		
EAST Neck Rd	0.23 SW		
Eastridge Rd	0.18 NE		
Gardner Ave	0.03 SE		
Georgetown Rd	0.01 NE		
Mansfield Rd	0.11 NW		
Nautilus Dr	0.12 NW		
Niles Hill Rd	0.09 SE		
Nob Hill Rd	0.25 NW		
Ocean Ave	0.16 NE		
Westridge Rd	0.17 NW		

Environmental FirstSearch

1 Mile Radius

ASTM Map: NPL, RCRACOR, STATE Sites

GARDNER AVE, NEW LONDON CT 06320



Source: 1999 U.S. Census TIGER Files

Target Site (Latitude: 41.323169 Longitude: -72.104658) .....

Identified Site, Multiple Sites, Receptor .....

NPL, Solid Waste Landfill (SWL) or Hazardous Waste .....

Railroads .....

Black Rings Represent 1/4 Mile Radii; Red Ring Represents 500 ft. Radius

Environmental FirstSearch

.5 Mile Radius

ASTM Map: CERCLIS, RCRATSD, LUST, SWL

GARDNER AVE, NEW LONDON CT 06320

Source: 1999 U.S. Census TIGER Files

Target Site (Latitude: 41.323169 Longitude: -72.104658) .....

Identified Site, Multiple Sites, Receptor .....

NPL, Solid Waste Landfill (SWL) or Hazardous Waste .....

Railroads .....

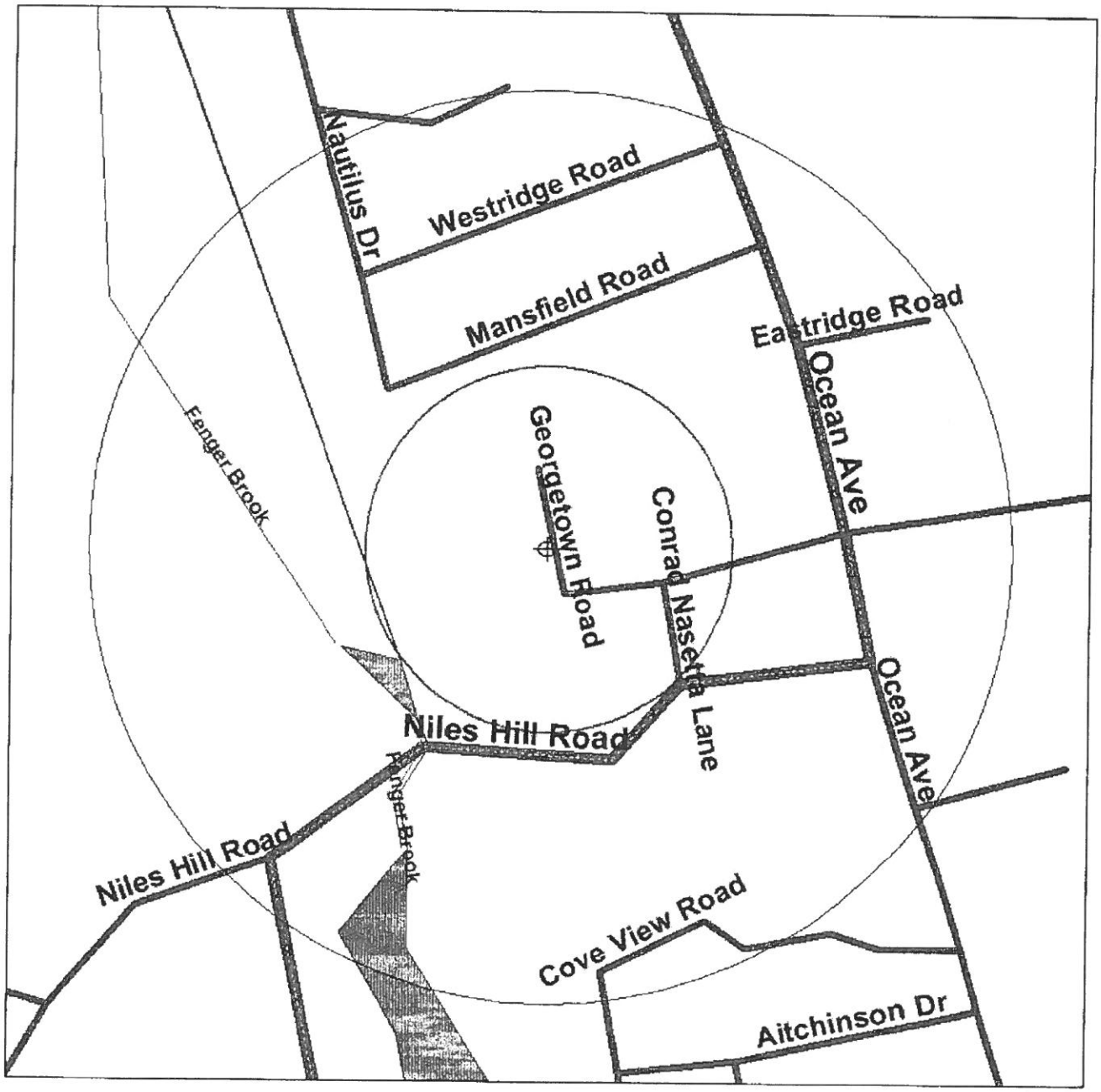
Black Rings Represent 1/4 Mile Radii; Red Ring Represents 500 ft. Radius

Environmental FirstSearch

.25 Mile Radius

ASTM Map: RCRAGEN, ERNS, UST

GARDNER AVE, NEW LONDON CT 06320



Source: 1999 U.S. Census TIGER Files

Target Site (Latitude: 41.323169 Longitude: -72.104658) .....

Identified Site, Multiple Sites, Receptor .....

NPL, Solid Waste Landfill (SWL) or Hazardous Waste .....

Railroads .....

Black Rings Represent 1/4 Mile Radii; Red Ring Represents 500 ft. Radius

Environmental FirstSearch

.25 Mile Radius

Non-ASTM Map: FINDS, NCDB

GARDNER AVE, NEW LONDON CT 06320

Source: 1999 U.S. Census TIGER Files

Target Site (Latitude: 41.323169 Longitude: -72.104658) .....

Identified Site, Multiple Sites, Receptor .....

NPL, Solid Waste Landfill (SWL) or Hazardous Waste .....

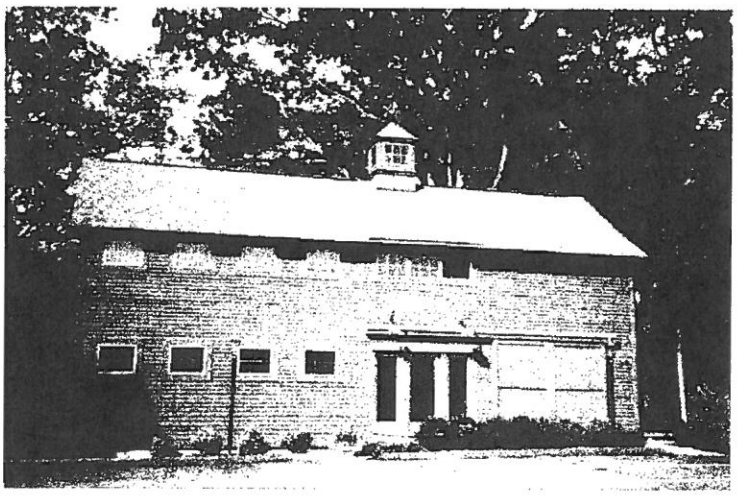
National Historic Sites and Landmark Sites .....

Railroads .....

Black Rings Represent 1/4 Mile Radii; Red Ring Represents 500 ft. Radius

SOIL STOCKPILE INVESTIGATION
FOR
47 GARDNER AVENUE
NEW LONDON, CONNECTICUT

PREPARED FOR:
SAVINGS INSTITUTE BANK AND TRUST COMPANY
803 MAIN STREET
WILLIMANTIC, CONNECTICUT



CHARTER OAK ENVIRONMENTAL SERVICES, INC.
33 Ledgebrook Drive
Mansfield, CT 06250
Telephone: (860) 423-2670 Facsimile: (860) 423-2675
Email: charteroak@charteroak.net

CHARTER OAK
ENVIRONMENTAL SERVICES, INC.

November 22, 2004

Mr. Steven Bishop
Savings Institute Bank & Trust Company
803 Main Street
Willimantic, CT 06226

Re: Soil Stockpile Investigation
Lot 47 Gardner Avenue Parcel
New London, Connecticut

Dear Mr. Bishop:

This letter presents the results of an investigation conducted by Charter Oak Environmental Services, Inc. (Charter Oak) concerning a soil stockpile on the above-referenced property. The Savings Institute Bank & Trust Company retained Charter Oak on behalf of Wayne A. Taylor of New England Development Associates, LLC (NEDA), the current property owner. This investigation was conducted in response to potential environmental concerns identified in the Environmental Transaction Screening Report for Lot 47 Gardner Avenue in New London, Connecticut, dated October 26, 2004, and prepared by Charter Oak.

Mr. Taylor did not know the origin of the soil pile. He said that he believes the soil stockpile was generated by the developer of the adjacent property during the construction of the condominiums on that parcel. The objective of this soil investigation was to ascertain the soil's origin and, if necessary, test it for substances regulated under the Connecticut Remediation Standard Regulations (RSRs).

INVESTIGATION OF SOIL ORIGIN

Charter Oak was unable to interview persons with direct knowledge concerning the development of the adjacent parcel or generation of the soil stockpile. Charter Oak attempted to contact the previous owner of the subject parcel, the previous owner of the adjacent parcel, and the developer of the condominiums on the adjacent parcel. The two properties were previously owned by trusts and companies that were unable to be traced. The current owner of the adjacent parcel did not have contact information for the previous owners. The individuals that were able to be reached did not have any information concerning the stockpile.

33 LEDGEBROOK DRIVE MANSFIELD, CT 06250
PHONE: 860-423-2670 FAX: 860-423-2675 charteroak@charteroak.net www.charteroak.net

CHARTER OAK
ENVIRONMENTAL SERVICES, INC.

SOIL STOCKPILE SAMPLING

On November 2, 2004, Charter Oak sampled the soil stockpile while accompanied by Mr. Taylor. Charter Oak collected one composite soil sample from the stockpile. This composite sample was composed of aliquots of soil collected from six different locations throughout the stockpile in order to generate a sample that is representative of the stockpile's average characteristics. Each aliquot was collected using a soil auger from a depth of approximately 2 feet below grade. The soil was brown with some organic material. No odor was detected and no anthropogenic materials were observed. The soil stockpile is located in the southeast portion of the parcel, near the corner of Georgetown Road and Gardner Avenue. It has the approximate dimensions of 20 feet by 20 feet and, according to Mr. Taylor, it is reportedly three or four feet deep. Therefore, the soil stockpile has an approximate volume of 60 yards. The approximate location of the soil stockpile and the aliquot locations are illustrated on Figure 1.

The soil stockpile composite sample, SP-1, was analyzed for the following substances regulated under the RSRs:

- Total Petroleum Hydrocarbons
- Polychlorinated Biphenyls
- Volatile Organic Compounds
- Organo-Chlorine Pesticides
- Lead, Total
- Lead, Leachable

This list of analyses is less than the list proposed in Charter Oak's scope of work, dated October 27, 2004. The Semi-Volatile Organic Compounds and metals other than Lead were eliminated from the analytical program because anthropogenic materials, such as ash or cinders, were not observed in the soil stockpile.

The sample was analyzed by a Connecticut-certified laboratory. The summary table below compares the detections to the RSR criteria:

SP-1 Sample Constituent	Analytical Result [mg/kg]	RSR Criteria	
		Residential DEC [mg/kg]	GA PMC [mg/kg]
Total Petroleum Hydrocarbons	140	500	500
Volatile Organic Compounds			
Naphthalene	0.012	NE	NE
Total Lead	29	400	NE

NE = None Established

As displayed, Total Petroleum Hydrocarbons (TPH), Naphthalene, and Total Lead were all detected at levels below the RSR criteria. Polychlorinated Biphenyls, Organo-Chlorine Pesticides, Leachable Lead, and Volatile Organic Compounds other than Naphthalene were not detected. The laboratory analytical reports are attached.

The soil stockpile does not exceed the RSR soil criteria. Based on information provided to Charter Oak, this parcel is not subject to the RSRs. However, this soil stockpile does fit the definition of polluted soil as established by the RSRs due to the detection of man-made constituents, such as TPH, above the concentrations found in natural soil. Therefore, Charter Oak recommends that Mr. Taylor and NEDA follow the guidelines for reusing polluted soil outlined in Section 22a-133k-2(h)(3) of the RSRs when managing the soil stockpile. Charter Oak makes this recommendation as a "Best Management Practice." The RSR requirements for the reuse of polluted soil are summarized as follows:

1) Do not place the soil below the water table;
2) Do not place the soil in an area subject to erosion; and,
3) Develop a map displaying the placement, location, and depth of the soil where it will be reused and keep this map in your records for the parcel.

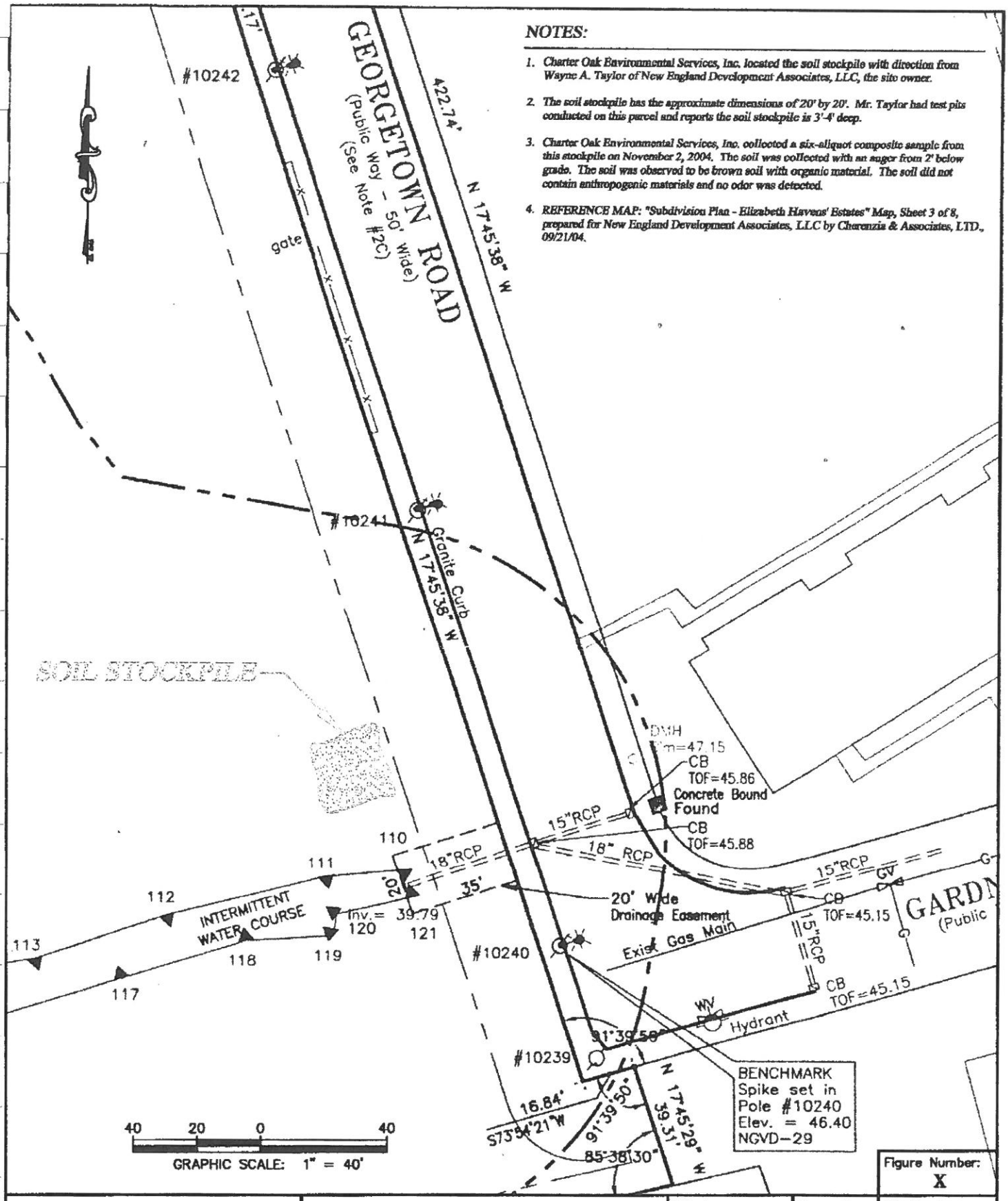
Please feel free to contact us with any questions or concerns.

Sincerely,

CHARTER OAK ENVIRONMENTAL SERVICES, INC.

JR Taormina
Engineer

Attachments



CHARTER OAK

Soil Stockpile Location Map

Lot 47 Gardner Avenue Parcel
New London, CT

Client: Savings Institute	Drawn By: JRT	Job Number: 112.08.04	Figure Number: X
CAD File: 112081108004001.dwg	Checked By: CJM	Date: 11/02/04	

COMPLETE ENVIRONMENTAL TESTING, INC.

80 Lupes Drive
Stratford, CT 06615

Tel: (203) 377-9984
Fax: (203) 377-9952
e-mail: cet@cetlabs.com

November 12, 2004

Mr. Carl Mohrbacher
Charter Oak Environmental
33 Ledgebrook Drive
Mansfield, CT 06250

Project: Gardner Ave, New london
Project #: 112-08.04
CET #: 04110126
Soil: SP-1
Collection Date(s): 11/2/04

PREP ANALYSIS:

Acid Digestion of Soils [EPA 3050B]

	SP-1
Acid Digestion of Soils	Completed [11/10/04]

Accelerated Solvent Ext.- Pest [EPA 3545]

	SP-1
Accelerated Solvent Ext.- Pest	Completed [11/5/04]

Closed System P&T Extraction [EPA 5035]

	SP-1
Closed System P&T Extraction	Completed [11/10/04]

SPLP, Metals [EPA 1312]

	SP-1
SPLP, Metals	Completed [11/10/04]

NOTES:
[ ] Indicates Date Prep Test Completed; ND is Not Detected.

ANALYSIS:

Total Petroleum Hydrocarbons [EPA 418.1] Units: mg/kg Analysis Date: 11/4/04

	SP-1
Total Petroleum Hydrocarbons	140

Total Solids [EPA 160.3 mo] Units: percent Analysis Date: 11/4/04

	SP-1
Total Solids	86

Total Metals [EPA 6010] Units: mg/kg (Dry Wt) Analysis Date: 11/10/04

	SP-1
Lead	29

SPLP Metals by ICP/MS [EPA 6020A] Units: mg/l Analysis Date: 11/10/04

	SP-1
Lead	ND < 0.013

EPA 8081A Chlorinated Pesticides [EPA 8081A] Units: ug/kg (Dry Wt) Analysis Date: 11/7/04

	SP-1
Alpha-BHC	ND < 50
Gamma-BHC	ND < 20
Heptachlor	ND < 13
Aldrin	ND < 36
Beta-BHC	ND < 50
Delta-BHC	ND < 50
Heptachlor Epoxide	ND < 20
Endosulfan I	ND < 50
4,4-DDE	ND < 20
Dieldrin	ND < 7.0
Endrin	ND < 50
4,4-DDD	ND < 30
Endosulfan II	ND < 50
4,4-DDT	ND < 20
Endrin Aldehyde	ND < 50
4,4-Methoxychlor	ND < 50
Endosulfan Sulfate	ND < 50
Endrin Ketone	ND < 50
Chlordane	ND < 66
Toxaphene	ND < 200

Notes:
[ ]Indicates Date Prep Test Completed; ND is Not Detected.

Volatile Organics [EPA 8260] Units: ug/kg (Dry Wt) Analysis Date: 11/11/04

	SP-1
Dichlorodifluoromethane	ND < 25
Chloromethane	ND < 5.0
Vinyl Chloride	ND < 5.0
Bromomethane	ND < 10
Chloroethane	ND < 10
Trichlorofluoromethane	ND < 25
1,1-Dichloroethene	ND < 5.0
Methylene Chloride	ND < 25
Methyl-t-Butyl Ether (MTBE)	ND < 10
trans-1,2-Dichloroethene	ND < 5.0
1,1-Dichloroethane	ND < 5.0
2,2-Dichloropropane	ND < 5.0
cis-1,2-Dichloroethene	ND < 5.0
Bromochloromethane	ND < 5.0
Chloroform	ND < 5.0
1,1,1-Trichloroethane	ND < 5.0
Carbon Tetrachloride	ND < 5.0
1,1-Dichloropropene	ND < 5.0
Benzene	ND < 1.0
1,2-Dichloroethane	ND < 5.0
Trichloroethene	ND < 5.0
1,2-Dichloropropane	ND < 5.0
Dibromomethane	ND < 5.0
Bromodichloromethane	ND < 5.0
cis-1,3-Dichloropropene	ND < 5.0
Toluene	ND < 5.0
trans-1,3-Dichloropropene	ND < 5.0
1,1,2-Trichloroethane	ND < 5.0
Tetrachloroethene	ND < 5.0
1,3-Dichloropropane	ND < 5.0
Dibromochloromethane	ND < 5.0
1,2-Dibromoethane	ND < 5.0
Chlorobenzene	ND < 5.0
1,1,1,2-Tetrachloroethane	ND < 5.0
Ethylbenzene	ND < 5.0
m+p Xylenes	ND < 5.0
o-Xylene	ND < 5.0
Styrene	ND < 5.0
Bromoform	ND < 5.0
Isopropylbenzene	ND < 5.0
1,1,2,2-Tetrachloroethane	ND < 5.0
Bromobenzene	ND < 5.0
1,2,3-Trichloropropane	ND < 5.0
n-Propylbenzene	ND < 5.0
2-Chlorotoluene	ND < 5.0
4-Chlorotoluene	ND < 5.0
1,3,5-Trimethylbenzene	ND < 5.0
tert-Butylbenzene	ND < 5.0
1,2,4-Trimethylbenzene	ND < 5.0
sec-Butylbenzene	ND < 5.0

Notes:
[ ]Indicates Date Prep Test Completed; ND is Not Detected.

Volatile Organics [EPA 8260] Units: ug/kg (Dry Wt) Analysis Date: 11/11/04

	SP-1
1,3-Dichlorobenzene	ND < 5.0
4-Isopropyltoluene	ND < 5.0
1,4-Dichlorobenzene	ND < 5.0
1,2-Dichlorobenzene	ND < 5.0
n-Butylbenzene	ND < 5.0
1,2-Dibromo-3-Chloropropane	ND < 5.0
1,2,4-Trichlorobenzene	ND < 5.0
Hexachlorobutadiene	ND < 5.0
Naphthalene	12
1,2,3-Trichlorobenzene	ND < 5.0

Sincerely,

David Ditta
Laboratory Director

Notes:
[ ]Indicates Date Prep Test Completed; ND is Not Detected.

CHAIN OF CUSTODY

CET
COMPLETE ENVIRONMENTAL TESTING, INC.

80 Lupes Drive
Stratford, CT 06615
Tel (203) 377-9984
Fax (203) 377-9952

COMPANY NAME AND ADDRESS: CHARTER OAK ENVIRONMENTAL

REPORT TO:	PROJECT #:	PROJECT LOCATION:	PURCHASE ORDER #:	SAMPLED BY:
MOHRBACHER	112.08.04	GARDNER AVE, NEW LONDON		JRT

RELINQUISHED BY:	DATE	TIME	RECEIVED BY:	DATE	TIME
	11/02/04	1802	FRIDGE	11/02/04	1802
	11/3/04	1215		11/3/04	1215
	11/3/04	1515		11/3/04	1515

SAMPLE I.D.	DATE	TIME	SAMPLE MATRIX	PRIORITY TURNAROUND: SAME DAY	24 HR	2-3 DAY	STANDARD TURNAROUND	# OF CONTAINERS	TPH 418.1	VOCs 8260	PEST 8081	TOTAL PB	SPLP PB
SP-1	11/02/04	1521	SOIL				✓	5	X	X	X	X	X

ANALYSIS REQUIRED

SPECIAL INSTRUCTIONS: PLEASE FAX RESULTS TO CASE MGMT BY 11/10/04

COMMENTS:

REV. 4/02

COMPLETE ENVIRONMENTAL TESTING, INC.

80 Lupes Drive
Stratford, CT 06615

Tel: (203) 377-9984
Fax: (203) 377-9952
e-mail: cet@cetlabs.com

November 18, 2004

Mr. Carl Mohrbacher
Charter Oak Environmental
33 Ledgebrook Drive
Mansfield, CT 06250

Project: Gardner Ave, New London
Project #: 112.08.04
CET #: 04110575
Soil: SP-1
Collection Date(s): 11/2/04

PREP ANALYSIS:

Ultrasonic Extraction PCB and Pe [EPA 3550B]

	SP-1
Ultrasonic Extraction PCB and Pest	Completed [11/17/04]

ANALYSIS:

Total Solids [EPA 160.3 mo] Units: percent Analysis Date: 11/16/04

	SP-1
Total Solids	86

NOTES:
[ ] Indicates Date Prep Test Completed; ND is Not Detected.

EPA 8082 PCBs [EPA 8082] Units: mg/kg (Dry Wt) Analysis Date: 11/17/04

	SP-1
PCB-1016	ND < 0.50
PCB-1221	ND < 0.50
PCB-1232	ND < 0.50
PCB-1242	ND < 0.50
PCB-1248	ND < 0.50
PCB-1254	ND < 0.50
PCB-1260	ND < 0.50

Sincerely,

David Ditta
Laboratory Director

Notes:
[ ]Indicates Date Prep Test Completed; ND is Not Detected.

COMPLETE ENVIRONMENTAL TESTING, INC.

80 Lupes Drive
Stratford, CT 06615
Tel (203) 377-9984
Fax (203) 377-9952

CHAIN OF CUSTODY

COMPANY NAME AND ADDRESS	REPORT TO:	PROJECT #:	PROJECT LOCATION:	PURCHASE ORDER #:	SAMPLED BY:
CHARTER OAK ENVIRONMENTAL	MOHRBACHER	112.08.04	GARDNER AVE, NEW LONDON		JRT

RELINQUISHED BY:	DATE	TIME	RECEIVED BY:	DATE	TIME
	11/02/04	1802	FRIDGE	11/02/04	1802
RELINQUISHED BY:	DATE	TIME	RECEIVED BY:	DATE	TIME
	11/3/04	1215		11/3/04	1215
RELINQUISHED BY:	DATE	TIME	RECEIVED BY:	DATE	TIME

SAMPLE I.D.	DATE	TIME	SAMPLE MATRIX	PRIORITY TURNAROUND: SAME DAY	24 HR	2-3 DAY	STANDARD TURNAROUND	# OF CONTAINERS	TPH 418.1	VOCs 8260	PEST 8081	TOTAL PB	SPLP PB	PCBs JRT 11/15/04
SP-1	11/02/04	1521	SOIL				✓	5	X	X	X	X	X	X

ANALYSIS REQUIRED

SPECIAL INSTRUCTIONS

PLEASE FAX RESULTS TO CASE ACCEPTS BY 11/10/04

COMMENTS

REV. 4/02

LIGHTING REPORT
FOR
ELIZABETH HAVEN'S ESTATES
GEORGETOWN ROAD
NEW LONDON, CT

Prepared for New England Development Associates, L.L.C.

By Cherenzia and Associates, Ltd
500 Bridge Street
Groton, CT 06340

April 26, 2005

Elizabeth Haven's Estates is a proposed 31-unit town home development to be located on Georgetown Road in New London. Presently, Georgetown road is lit by existing municipal streetlights, and so this report covers only the private areas of the development.

Because this is a residential development lower lighting levels are used, than would be used in a commercial or institutional space. A 0.5-foot candles light spread per the National Light Standard is recommended for residential compound lighting levels.

For this project, three types of exterior light fixtures are used. For parking areas and drive areas away from buildings, "shoebox" style, full cutoff fixtures on 14-foot tall poles are used. For illumination of driveways and parking areas next to buildings, building mounted sconce down lights are used. For individual residential sidewalks, old-fashioned light fixtures with milk glass and a fluorescent bulb, mounted on poles to provide a 7-foot height, are used. The same fixtures, only wall mounted, are used to illuminate decks, front doors, and garage entries.

Non-glare, fill cut-off fixtures are required in New London to prevent glare, and to prevent light from "leaking" onto adjoining properties. The light spacing used for this project is not meant to provide commercial-style, full lighting coverage. Placement is meant to provide security at home entrances, and lighting on driveways and parking areas sufficient to provide directional guidelines on maneuvering though the development. Placement is also meant to provide atmosphere, particularly with the pole mounted residential lights. There are no "common" parking areas that require lighting similar to that used for commercial areas.

The EMCO Pole mounted down light is specified with a 175 metal halide bulb and a type 4 forward throw light distribution. This light is installed on a 14' tall pole with either a single, or a double installation at 90 degrees. A 175w Metal halide bulb is rated at 13,000 lumens and the IES distribution is attached to this report and found on the lighting plan. This is a commercial rated fixture.

The building mounted Sconce down light is a Gardco 101 Performance Sconce with a 100-watt metal halide bulb, forward throw lighting distribution, mounted at 14' above the ground. These lights are used to illuminate driveways next to buildings. A-100 watt metal halide bulb is rated at 9000 lumens, and the IES distribution is attached to this report, and found on the lighting plan.

The fixtures chosen for the town homes are residential grade fluorescent fixtures with milk glass enclosures. The fixtures specified are by Thomas lighting and are model PL9060-7 Hawthorne pole light mounted on 7'poles, and PL9460-7 Hawthorne wall mounted lights. The bulbs for both of these are energy saving 23-watt compact fluorescent bulbs. These fixtures were chosen because they have solid tops, to help maintain the "dark sky" standards, and the soft light emitted by the fluorescent lamp is further diffused by a milk glass enclosure, resulting in a very low glare unit, necessary, since residential fixtures are located just above eye level.

IES lighting distribution charts are not prepared for most residential grade fixtures. We could find no charts available for this type of fixture from any manufacturer. (As an analogy, it is a little like trying to get a Military spec for a toaster. If you *can* find one, the toaster will be too big and expensive for your use). In order to estimate the lighting distribution available, we found a large commercial fixture meant to illuminate a parking lot in the same shape as the residential fixture. The fixture we found was a Gar decorative post top, meant for a 150 w lamp. A 23-watt fluorescent bulb has a rating of 1380 lumens. Using the "Footprint" lighting software, we adjusted the lumens down to 1380, and used the resulting light spread shown in the attachment. The width of the distribution modeled was 20 feet, but the pattern was distorted by applying a ten-fold reduction in lumens to the original IES distribution. We kept the width, and estimated the distribution as an oval for the plans. Although the pattern of light distribution may vary slightly from that shown on the plans for these units, it can be seen that residential-grade light fixtures provide very low lighting levels, and will not be a glare issue.

Attachments:
Specification and order sheets, and IES distribution grids for

- EMCO Pole mounted down light
- Gardco 101 Performance Sconce
- Thomas Lighting, Hawthorne fluorescent fixture wall and pole lights for residences.

Ecolume Arm Mount Specifications

GENERAL DESCRIPTION: Each EMCO Ecolume is a sharp cutoff luminaire for high intensity discharge lamps. Internal components are totally enclosed, rain-tight, dust-tight, and corrosion resistant. No venting of the optical system or electrical components is required or permitted. Lamping requires no lifting or hinging of the luminaire housing, disturbing wiring or exposing uninsulated live parts.

HOUSING: The housing wrapper is one-piece dieformed aluminum with an integral reinforcing spline and no welded corners. Silicone seals provide a weathertight seal at all points of material transition.

LENS: A mitered, extruded anodized aluminum door frame retains the optically clear, heat and impact resistant tempered flat glass in a sealed manner using hollow section, high compliance, memory retentive extruded silicone rubber. A non-yellowing drop acrylic lens is provided standard on 14" and 18" vertical lamp and a sag glass lens is provided on 23" vertical lamp luminaires. A single flush captive fastener permits easy access to the luminaire.

OPTICAL SYSTEMS: The segmented reflector system consists of two levels of highly specular aluminum facets precisely aligned to achieve specified photometric distributions. The entire optical system is field rotatable in 90° increments. The position-oriented mogul base socket is glazed porcelain with a nickel plated screw shell. A lamp stabilizer is standard on 3H and QH 400W MH units.

ELECTRICAL: Each high power factor ballast is the separate component type capable of providing reliable lamp starting to -20°F. The quad tap (120V/208V/240V/277V) ballast is mounted on a unitized tray and prewired with quick electrical disconnects to the supply wire and the socket assembly. Entire ballast assembly is secured within the luminaire, above the reflector system.

High Pressure Sodium ballasts operate lamps within ANSI trapezoidal limits.

Metal Halide ballasts are medium regulation autotransformer providing +10% power regulation with +10% variation from rated input voltage. Component-to-component wiring within the luminaire will carry no more than 80% of rated current and is listed by UL for use at 600 VAC at 150° or higher. Plug disconnects are listed by UL for use at 600 VAC, 15A or higher.

FINISH: Each luminaire receives a fade and abrasion resistant, electrostatically applied, thermally cured, triglycidal isocyanurate (TGIC) powdercoat finish. Optional finishes may vary.

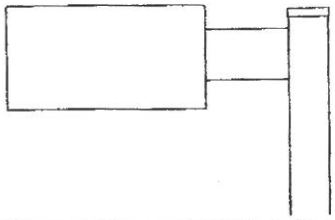
LABELS: All luminaires bear UL Wet Location and IBEW labels.

EMCO Lighting reserves the right to change materials or modify the design of its product without notification, as part of the company's continuing product improvement program.

Notes:

Job: Elizabeth Havens Estates
Type:

ECOLUME ECA/ECW



The Ecolume ECA/ECW is a rectilinear arm-mounted area luminaire. The precision segmented optical systems provide required light levels, even illumination, wide pole spacings and glare control. The housing is dieformed and the door frame is extruded aluminum. The Ecolume luminaire is completely sealed and gasketed, preventing intrusion from moisture, insects and contaminants.

ORDERING

Flat glass lens luminaires meet IESNA Full Cutoff criteria. Sag lens luminaires meet IESNA Cutoff or Semi-Cutoff criteria.

PREFIX	CONFIGURATION	DISTRIBUTION	WATTAGE	VOLTAGE	FINISH	OPTIONS
ECA14	1 or 2	FH	100 MH	120	BRP	

Enter the order code into the appropriate box above. Note: Gardco reserves the right to refuse a configuration. Not all combinations and configurations are valid. Refer to notes below for exclusions and limitations. For questions or concerns, please consult the factory.

PREFIX

ECA14	14" Square Arm Mount Luminaire	**ECW14**	14" Square Direct Wall Mount Luminaire
ECA18	18" Square Arm Mount Luminaire	**ECW18**	18" Square Direct Wall Mount Luminaire
ECA23	23" Square Arm Mount Luminaire	**ECW23**	23" Square Direct Wall Mount Luminaire
		ECWA14	14" Square Wall Mount w/Arm
		ECWA18	18" Square Wall Mount w/Arm
		ECWA23	23" Square Wall Mount w/Arm

Arm mounting on round poles is designed to mount to poles measuring 3.5" OD or larger.

CONFIGURATION

1	Single Assembly
2	Twin Assembly
2@90	Twin Assembly at 90°
3	Triple at 90°
3@120	Triple at 120°
4	Quad Assembly

Use "1" for ECW and ECWA wall mounted units

DISTRIBUTION

Horizontal Lamp

2H	Type II
3H	Type III
FH	Type IV Forward Throw
QH	Type V

Vertical Lamp

3V[1,2,3]	Type III Vertical Lamp
FV[1,3]	Type IV Forward Throw Vertical Lamp
QV[1,2,3]	Type V Vertical Lamp
3V-RNC[1,2]	Type III Vertical Lamp, Reduced Nadir Candlepower *(23" only)*
QV-RNC[1,2]	Type V Vertical Lamp, Reduced Nadir Candlepower *(23" only)*

RNC (Reduced Nadir Candlepower) option should be specified only in applications requiring extreme maximum to minimum uniformity ratios (5 to 1 or lower). Reduced luminaire efficiency will result in lower average footcandle levels.

3SV[1]	Type III Vertical Lamp Mallmaster Semi-cutoff *(23" only)*
QSV[1]	Type V Vertical Lamp Mallmaster Semi-cutoff *(23" only)*

1. 14"/18" vertical lamp optics are supplied standard w/high temperature resistant thermoplastic sag lens. 23" vertical lamp optics are supplied standard with sag glass.
2. 18" and 23" 3V/QV optical systems feature an upper (factory set) sharp cutoff socket position. For wider spacings, a lower (field adjustable) semi-cutoff socket position may be set.
3. 14" vertical lamp optics require a medium base lamp. N/A with 480V.

WATTAGE

14"	*18"*	*23"*
70 HPS[4]	**250 HPS**	**750 HPS**
100 HPS[4]	**400 HPS**	**1000 HPS**
150 HPS[4]	**250 MH**	**1000 MH**
100 MH[7]	**400 MH**	**750 PSMH**[11,12]
150 MH[7]	**250 PSMH**[8]	**1000 PSMH**[12]
175 MH[4]	**320 PSMH**[9]	
200MH[5]	**350 PSMH**	
175PSMH[5]	**400 PSMH**[10]	

4. Requires mogul base lamps in horizontal optics and medium base lamps in vertical optics. N/A w/480V.
5. Requires mogul base lamps in horizontal optics and medium base lamps in vertical optics.
6. Vertical Lamp optics only. Medium base lamps only. M137 or M152.
7. Requires Medium Base Lamp in all optics.
8. M138 or M153
9. M132 or M154
10. M135 or M155
11. M149 only
12. Available with vertical lamp optics only.

VOLTAGE

120	**347**
208	**480**
240	**QUAD**
277	*120/208/240/277 factory tied to 277V*

FINISH

BRP	Bronze Paint
BLP	Black Paint
WP	White Paint
NP	Natural Aluminum Paint
OC	Optional Color Paint *Specify RAL designation ex: OC-RAL7024*
SC	Special Color Paint *Specify. Must supply color chip.*

OPTIONS

HS	Internal House Side Shield *(Supplied standard for FH/FV)*
F	Fusing
LF	In-Pole/In-Line Fusing *(Kit includes In-Line Fuses)*
PCT	Locking Type Photocontrol Receptacle w/Photocontrol *Not available with 480V*
PCR	Locking Type Photocontrol Receptacle
PCB	Button Photocontrol
MF	Mast Arm Fitter *(18" & 23" units only)*
AP	Adjustable Knuckle - Pole Mount *Only available with single and twin luminaires @ 180°*
AT	Adjustable Knuckle - Tenon Mount *(N/A w/23" units)*
PTF2	Pole Top Filter 2 ⅜" X 4"
PTF3	Pole Top Filter 3" - 3½" X 6"
PTF4	Pole Top Filter 3½" - 4" X 6"
ACR	Acrylic Sag Lens *(in lieu of glass - N/A w/23" units)*
POLY	Polycarbonate Sag Lens *(in lieu of glass - N/A w/23" units)*
QS	Quartz Standby

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ECOLUME ECA/ECW

SPECIFICATIONS

GENERAL DESCRIPTION: Each EMCO Ecolume is a sharp cutoff luminaire for high intensity discharge lamps. Internal components are totally enclosed, rain-tight, dust-tight, and corrosion resistant. No venting of the optical system or electrical components is required or permitted. Lamping requires no lifting or hinging of the luminaire housing, disturbing wiring or exposing uninsulated live parts.

HOUSING: The housing wrapper is one-piece dieformed aluminum. The housing has an integral reinforcing spine and no welded corners. Silicone seals provide a weathertight seal at all points of material transition.

LENS: A mitered, extruded anodized aluminum door frame retains the optically clear, heat and impact resistant tempered flat glass in a sealed manner using hollow section, high compliance, memory retentive extruded silicone rubber. A non-yellowing drop acrylic lens is provided standard on 14" and 18" vertical lamp and a sag glass lens is provided on 23" vertical lamp luminaires. A single flush 1/4 turn captive fastener permits easy access to the luminaire.

OPTICAL SYSTEMS: The segmented reflector system consists of two levels of highly specular aluminum facets precisely aligned to achieve specified photometric distributions. The entire optical system is field rotatable in 90° increments. The position-oriented mogul base socket is glazed porcelain with a nickel plated screw shell. A lamp stabilizer is standard on 3H and QH 400W MH units.

ELECTRICAL: Each high power factor ballast is the separate component type, capable of providing reliable lamp starting down to -20° F. The ballast is mounted on a unitized tray and secured within the luminaire, above the reflector system. Component-to-component wiring within the luminaire will carry no more than 80% of rated current and is listed by UL for use at 600 VAC at 150°C or higher. Plug disconnects are listed by UL for use at 600 VAC, 15A or higher.

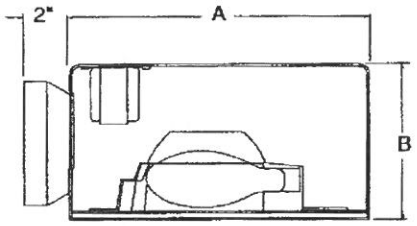
FINISH: Each luminaire receives a fade and abrasion resistant, electrostatically applied, thermally-cured polyester powder finish after fabrication.

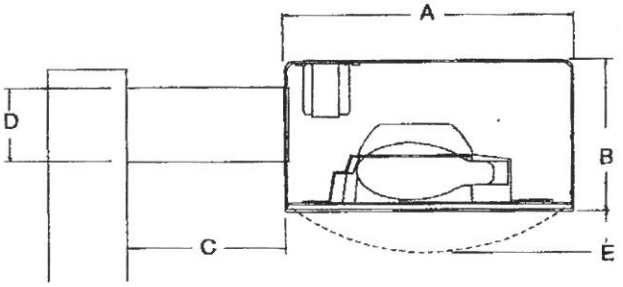
LABELS: All fixtures bear UL or CUL (where applicable) Wet Location labels.

DIMENSIONS

Ecolume EPA (Effective Projected Area) Ft^2

	Single Arm	Twin 180°	Quad	Single Fixture Weight
14" units	1.1	2.2	2.7	30 lbs
18" units	1.9	3.8	4.8	50 lbs
23" units	3.6	7.3	8.8	90 lbs



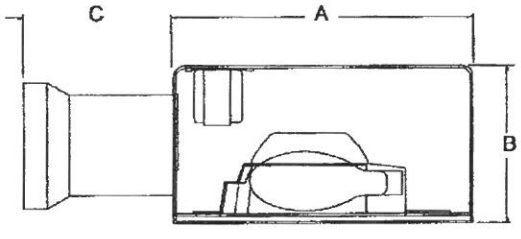


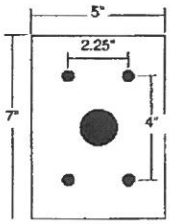
WALL MOUNT

	ECW14	ECW18
A	14" sq	18" sq
B	7"	10"
C	8"	11"

ARM MOUNT

		ECA14	ECA18	ECA23
A		14" sq	18" sq	23" sq
B		7"	10"	14.5"
C	Arm Length	6"	9"	12"
D	Arm Height	5"	5"	8"
E	Drop Lens	2"	4"	6.5"





EMCO Lighting reserves the right to change materials or modify the design of its product without notification as part of the company's continuing product improvement program.

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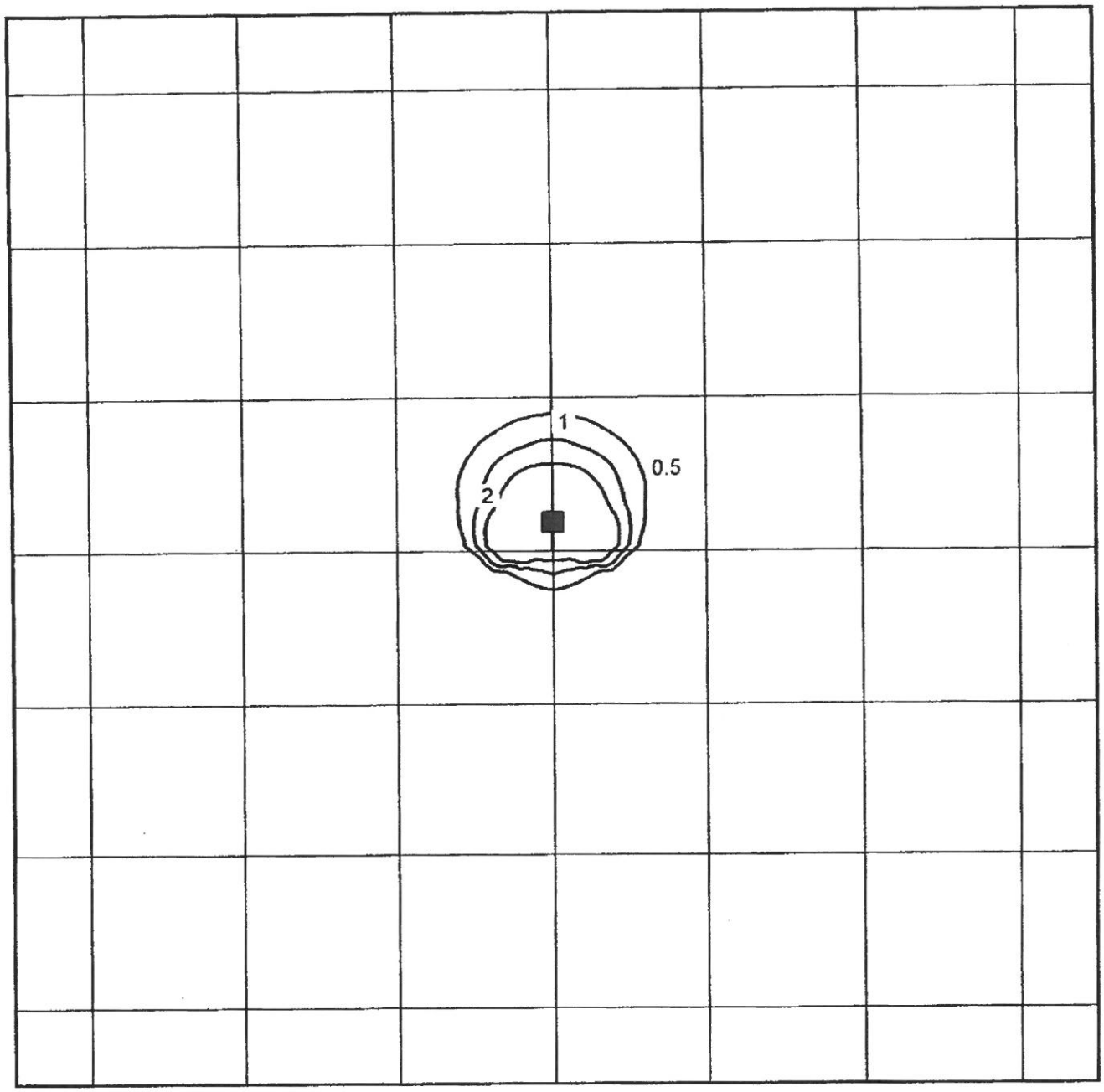
ECFH17M.ies
EMCO LIGHTING
ECA14-FH-175MH
CLEAR FLAT GLASS LENS
CLEAR 175MH/HOR PRORATED TO 1000 LUMENS

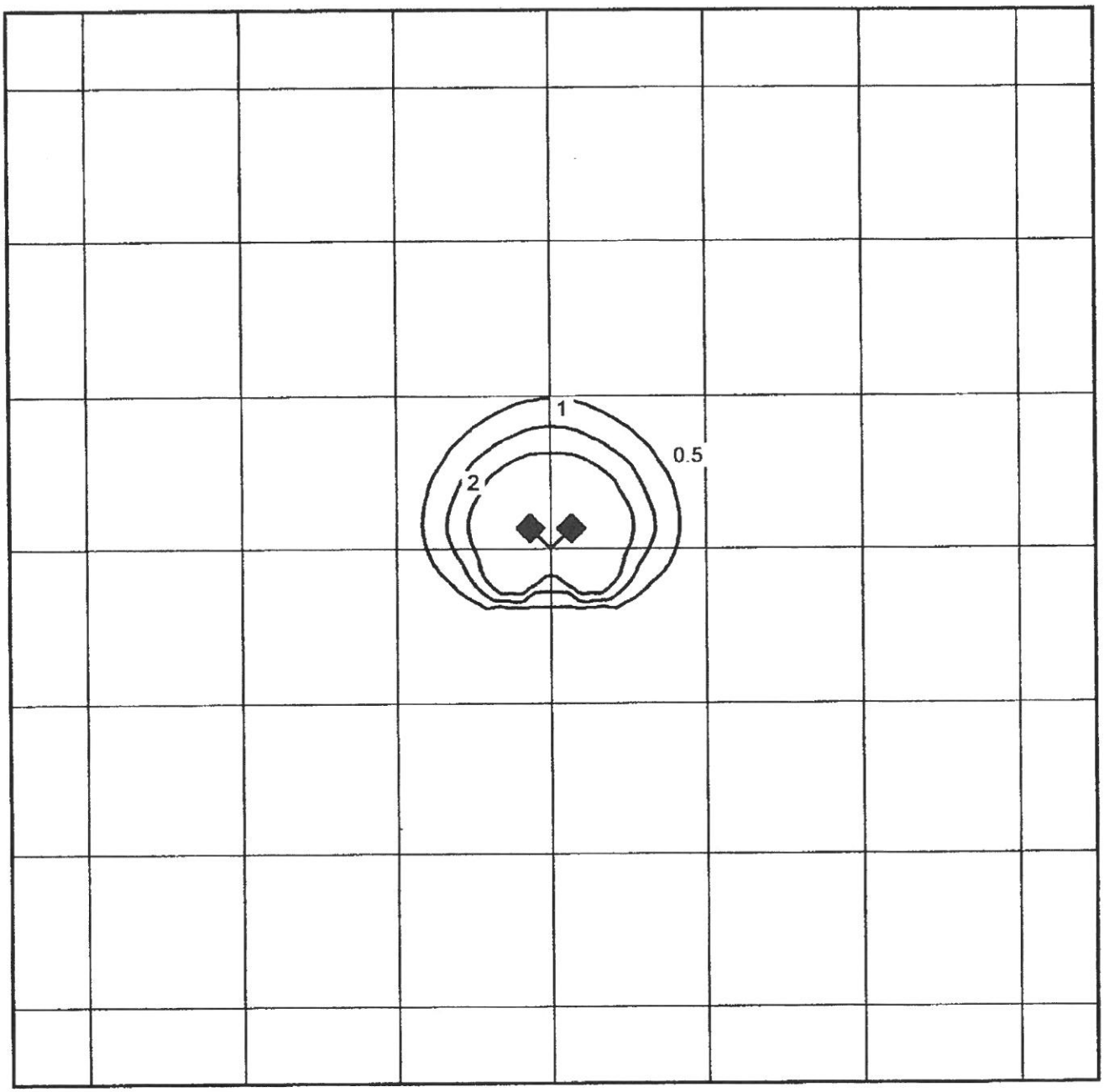


LUMENS PER LAMP = 13000
LIGHT LOSS FACTOR = 0.72
OPTICAL HEIGHT = 14 FEET
ARM LENGTH = 1 FEET
TILT = 0 DEGREES FROM NADIR

40 FEET BETWEEN GRIDLINES
MAXIMUM ILLUMINANCE = 7.9 FOOTCANDLES

Footprints™ by Gardco Lighting

ECFH17M.ies
EMCO LIGHTING
ECA14-FH-175MH
CLEAR FLAT GLASS LENS
CLEAR 175MH/HOR PRORATED TO 1000 LUMENS



LUMENS PER LAMP = 13000
LIGHT LOSS FACTOR = 0.72
OPTICAL HEIGHT = 14 FEET
ARM LENGTH = 1 FEET
TILT = 0 DEGREES FROM NADIR

40 FEET BETWEEN GRIDLINES
MAXIMUM ILLUMINANCE = 15.2 FOOTCANDLES

Footprints™ by Gardco Lighting

101 Square Wedge Downlight Specifications

GENERAL: Each Gardco 101 Line luminaire is a wall mounted cutoff luminaire for high intensity discharge or compact fluorescent lamps. Internal components are totally enclosed in a rain-tight, dust-tight and corrosion resistant housing. The housing, back plate and door frame are diecast aluminum. A choice of three (3) optical systems is available. Luminaires are suitable for wet locations (damp locations if inverted).

HOUSING: Single-piece soft trapezoidal housings are diecast aluminum. A memory retentive gasket seals the housing with the doorframe to exclude moisture, dust, insects and pollutants from the optical system. A black, diecast ribbed backplate dissipates heat for longer lamp and ballast life.

DOOR FRAME: A single-piece diecast aluminum door frame integrates to the housing form. The door frame is hinged closed and secured to the housing with two (2) captive stainless steel fasteners. The heat and impact resistant 1/8" tempered glass lens and one-piece gasket are mechanically secured to the door frame with four (4) galvanized steel retainers.

OPTICAL SYSTEMS: Reflectors are composed of specular extruded and faceted Alzak® components, electropolished, anodized and sealed. Reflector segments are set in arc tube image duplicating patterns to achieve the wide throw (IES Type II), forward throw (IES Type IV) or medium throw downlight distributions.

ELECTRICAL: Each high power factor ballast is the separate component type, capable of providing reliable lamp starting down to -20° F. Component-to-component wiring within the luminaire will carry no more than 80% of rated current and is listed by UL for use at 600 VAC at 150°C or higher. Plug disconnects are listed by UL for use at 600 VAC, 15A or higher.

Standard and dimming fluorescent units have a starting temperature of 0°F (-18°C). Dimming range is 15% to 100% Standard fluorescent ballasts are solid state. Consult factory for magnetic.

LAMPHOLDER: Pulse rated medium base sockets are glazed porcelain with nickel plated screw shell. Fluorescent sockets are high temperature plastic (PBT) with brass alloy contacts.

FINISH: Each standard color luminaire receives a fade and abrasion resistant, electrostatically applied, thermally cured, triglycidal isocyanurate (TGIC) textured polyester powdercoat finish. Units are thoroughly cleaned and provided with a patented chromate acid pretreatment. Standard colors include bronze (BRP), black (BLP), white (WP), natural aluminum (NP) and beige (BGP). Consult factory for specs on custom colors.

LABELS: All fixtures bear UL or CSA/CUL (where applicable) labels. Lens down application is Wet Location and lens up is Damp Location, except when using the optional inverted Wet Location components.

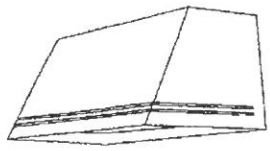
As part of continuing quality improvement programs, Gardco Lighting reserves the right to change materials or modify the design of its product without notification.

Notes:

Job: Elizabeth Havens Estates
Type:

100 LINE

101 PERFORMANCE SCONCE



The Gardco 101 Trapezoidal Wedge high performance sconce offers an excellent alternative to unsightly wall mounted fixtures. These architecturally refined luminaires are designed to integrate naturally to wall surfaces. The 101 luminaires are available with three (3) different distribution patterns - a wide throw, a medium throw and a forward throw. Each luminaire is designed to accept sources up to 175MH. Housings are sealed throughout, completely excluding moisture, dust, insects and contaminants.

ORDERING

101 Luminaires installed in the normal downlight position with no uptilit meet IESNA Full Cutoff criteria.

PREFIX	DISTRIBUTION	WATTAGE	VOLTAGE	FINISH	OPTIONS
101	FT	100 MH	120	BRP	

Enter the order code into the appropriate box above. Note: Gardco reserves the right to refuse a configuration. Not all combinations and configurations are valid. Refer to notes below for exclusions and limitations. For questions or concerns, please consult the factory.

PREFIX

101	Trapezoidal Wedge
101EM	Emergency Sconce
101EMR	Remote Emergency Sconce

Refer to configuration Chart below for available combinations

DISTRIBUTION

FT	Forward Throw *Not Available with Fluorescent Lamps*
WT	Wide Throw *Not Available with Fluorescent Lamps*
MT	Medium Throw

WATTAGE AND VOLTAGE

LAMP/VOLTAGE CHART - 101

Voltage:	120	208	240	277	347	480
E17						
50MH	●			●		
70MH	●			●	●	
100MH	●	●	●	●	●	●
150MH	●	●	●	●	●	
175MH	●	●	●	●	●	●
35HPS	●					
50HPS	●			●		
70HPS	●	●	●	●	●	●
100HPS	●	●	●	●	●	●
150HPS	●	●	●	●	●	
50CMHE	●			●		
70CMHE	●			●		
100CMHE	●			●		
Fluorescent						
26QF[1]	●	●	●	●	●	
226QF[1]	●	●	●	●	●	
32TRF[1]	●	●	●	●	●	
42TRF[1]	●	●	●	●	●	
242TRF[1]	●	●	●	●		

CONFIGURATION CHART - 101EM

	Distribution			Voltage					
	FT	WT	MT	120	208	240	277	347	480
Fluorescent									
226QF			●	●			●		
42TRF			●	●			●		

CONFIGURATION CHART - 101EMR

	Distribution			Voltage					
	FT	WT	MT	120	208	240	277	347	480
Fluorescent									
226QF			●	●			●	●	
42TRF			●	●			●	●	
242TRF			●	●			●	●	

Combinations marked with a dot are available for ordering.
MH - Metal Halide CMHE - Ceramic Metal Halide with Electronic Ballast
HPS - High Pressure Sodium QF - Quad Fluorescent
TRF - Triple Tube Fluorescent

1. 26QF, 32TRF and 42TRF types feature an electronic fluorescent ballast that accepts 120V through 277V, 50hz or 60hz input.
2. Contact factory for Fluorescent Dimming

FINISH

BRP	Bronze Paint
BLP	Black Paint
WP	White Paint
NP	Natural Aluminum Paint
BGP	Beige Paint
OC	Optional Color Paint *Specify RAL designation ex: OC-RAL7024*
SC	Special Color Paint *Specify. Must supply color chip*

OPTIONS

F	Fusing *120V/277V only*
PCB	Button Type Photocontrol *n/a w/480V*
QS	Quartz Standby *HID only. N/A with CMHE Ballasts or with 175MH-480V*
Q924	Quartz Emergency *HID, WT Optics only. 150w max*
SL	Solite® Diffusing Lens
UT	5° Uptilt
WLU	Wet Location Door for Inverted Mount *Not available with WG option*
WS	Wall Mounted Box for Surface Conduit
WS/UT	WS Option w/5° Uptilt
WG	Wire Guard *Not available with WLU option*
B84C	Bodine Remote Emergency Pack *EMR luminaires only. Must be ordered here or supplied by others*
B84C-CAN	Bodine Remote Emergency Pack - Canada *EMR luminaires only. Must be ordered here or supplied by others*
POLY	Polycarbonate Sag Lens *100w HID maximum*

Gardco Lighting
2661 Alvarado Street
San Leandro, CA 94577

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510/357-6900 in California
Fax: 510/357-3088
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GARDCO LIGHTING

A Genlyte Company

100 LINE

101 PERFORMANCE SCONCE

SPECIFICATIONS

GENERAL: Each Gardco 101 Line luminaire is a wall mounted cutoff luminaire for high intensity discharge or compact fluorescent lamps. Internal components are totally enclosed in a rain-tight, dust-tight and corrosion resistant housing. The housing, back plate and door frame are diecast aluminum. A choice of three (3) optical systems is available. Luminaires are suitable for wet locations (damp locations if inverted).

HOUSING: Single-piece soft trapezoidal housings are diecast aluminum. A memory retentive gasket seals the housing with the doorframe to exclude moisture, dust, insects and pollutants from the optical system. A black, diecast ribbed backplate dissipates heat for longer lamp and ballast life.

DOOR FRAME: A single-piece diecast aluminum door frame integrates to the housing form. The door frame is hinged closed and secured to the housing with two (2) captive stainless steel fasteners. The heat and impact resistant 1/8" tempered glass lens and one-piece gasket are mechanically secured to the door frame with four (4) galvanized steel retainers.

OPTICAL SYSTEMS: Reflectors are composed of specular extruded and faceted Alzak® components, electropolished, anodized and sealed. Reflector segments are set in arc tube image duplicating patterns to achieve the wide throw, forward throw or medium throw downlight distributions.

ELECTRICAL: **Standard Luminaires:** Each high power factor ballast is the separate component type, capable of providing reliable lamp starting down to -20° F. Component-to-component wiring within the luminaire will carry no more than 80% of rated current and is listed by UL for use at 600 VAC at 150°C or higher. Plug disconnects are listed by UL for use at 600 VAC, 15A or higher.

Standard and dimming fluorescent units have a starting temperature of 0°F (-18°C). Dimming range is 15% to 100% Standard fluorescent ballasts are solid state.

EM Luminaires: Electronic fluorescent ballasts are high power factor. Sockets are high temperature polycarbonate with brass contacts. In the event of power interruption, integral battery pack will power (1) 42W or (2) 26W compact fluorescent lamps at reduced light levels. Maintenance free battery is rated for ambient temperatures down to 0ºC. Indicator light is visible through the lens. A test switch is accessible through the door assembly.

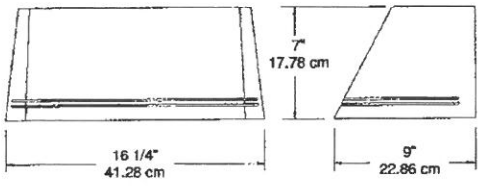
EMR Luminaires: Electronic fluorescent ballasts are high power factor. Sockets are high temperature PBT with brass contacts. A 7.5', 11 wire, quick disconnect assembly is provided for wiring through conduit (by others) to a Bodine B84C fluorescent emergency ballast. The B84C fluorescent emergency ballast is not provided by Gardco unless the B84C Option is specified on the order to the factory. In the event of power interruption, The remote battery pack (B84C) will power (1) 42W or (2) 26W compact fluorescent lamp at reduced light levels. Maintenance free battery is rated for ambient temperatures down to 0°C. Indicator light is visible through the lens. A test switch is accessible through the door assembly.

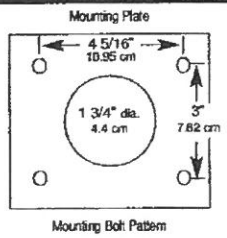
LAMPHOLDER: Pulse rated medium base sockets are glazed porcelain with nickel plated screw shell. Fluorescent sockets are high temperature plastic (PBT) with brass alloy contacts.

FINISH: Each standard color luminaire receives a fade and abrasion resistant, electrostatically applied, thermally cured, triglycidal isocyanurate (TGIC) textured polyester powdercoat finish. Standard colors include bronze (BRP), black (BLP), white (WP), natural aluminum (NP) and beige (BGP). Consult factory for specs on custom colors.

LABELS: All fixtures bear UL or CUL (where applicable) labels. Lens down application is Wet Location and lens up is Damp Location, except when using the optional inverted Wet Location components.

DIMENSIONS





Note: Mounting plate center is located in the center of the luminaire width and 3.5" above the luminaire bottom (lens down position). Splices must be made in the J-box (by others). Mounting plate must be secured by max. 5/16" diameter bolts (by others) structurally to the wall.

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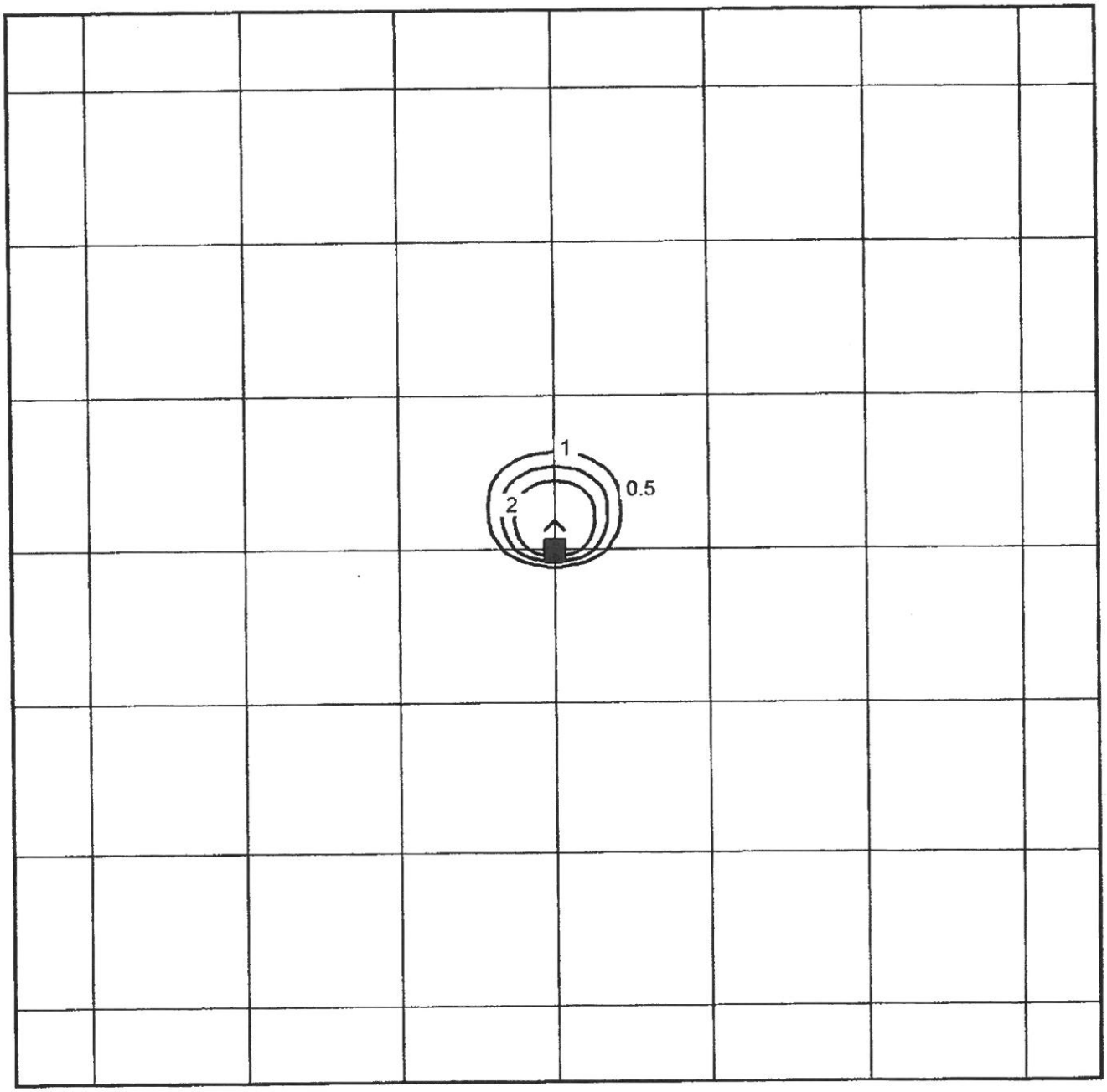
GARDCO LIGHTING

79115-124/0405

Scan C

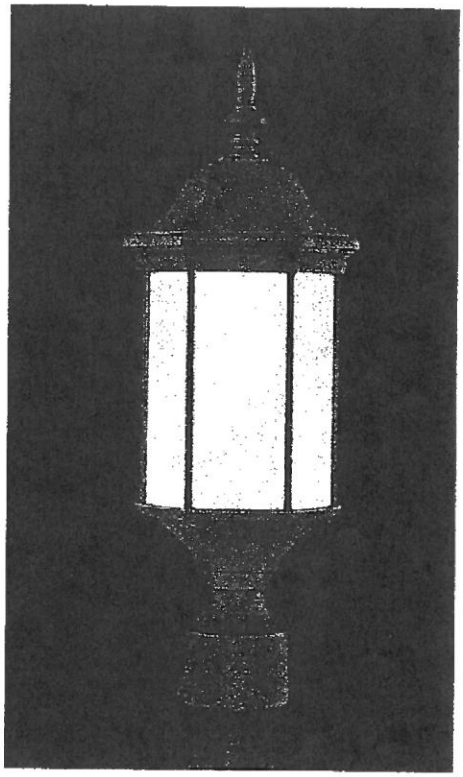
M1FS17M.ies
GARDCO LIGHTING
101-FT-175MH-SL
FLAT DIFFUSING SOLITE GLASS LENS
CLEAR 175MH/MED PRORATED TO 1000 LUMENS



LUMENS PER LAMP = 9000
LIGHT LOSS FACTOR = 0.72
OPTICAL HEIGHT = 14 FEET
ARM LENGTH = 0 FEET
TILT = 0 DEGREES FROM NADIR

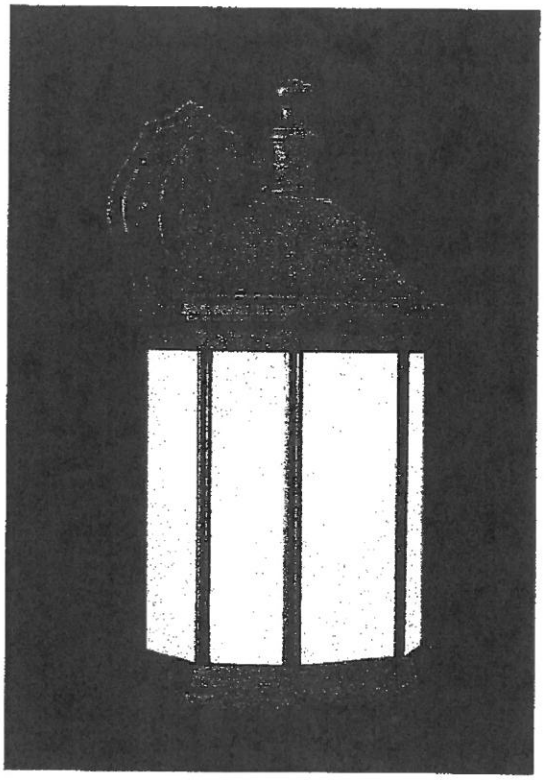
40 FEET BETWEEN GRIDLINES
MAXIMUM ILLUMINANCE = 7.9 FOOTCANDLES

Footprints™ by Gardco Lighting



Part Number:	PL9060-7
Manufacturer:	Thomas Lighting
Quantity:	1
Finish Options:	Black
Lamp Options:	(1)26w CFL G24 Quad
Total Wattage:	26 w Fourescent
Application:	Exterior Wet
Provided by:	LightingUniverse.com
Installed by:	builder

Product Description/Notes:
Family: Hawthorne One-light, compact fluorescent die-cast aluminum outdoor post lantern in Matte Black finish with white a panels. Electronic ballast for reliable starting in 0 degrees farenheit. Bulb is not included.



Part Number:	PL9460-7
Manufacturer:	Thomas Lighting
Quantity:	1
Finish Options:	Black
Lamp Options:	(1)26w CFL GX24 Quad
Total Wattage:	26W Fourescent
Application:	Exterior Damp
Provided by:	LightingUniverse.com
Installed by:	Builder

Product Description/Notes:
Family: Hawthorne One-light, compact fluorescent die-cast aluminum outdoor wall bracket in Matte Black finish with white a panels. Electronic ballast for reliable starting to 0° F. Bulb is not included.

COOPER Lighting

McGraw-Edison Decorative Metal Halide (MH)

Customers

Brands

- Halo
- Portfolio
- Metalux
- Neo-Ray
- Corelite
- Lumark
- McGraw-Edison
- Sure-Lites
- Fail-Safe
- Iris
- AtLite
- Lumière
- MWS
- Streetworks
- CooperLED
- International
- Regent
- Shaper
- Invue
- RSA

- New Search
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Product Information for:

GAR

Find this brand at a Sales Agents **near you:**

Enter Zip/Postal Code: Find

Product Data

Model Number	Description	Last Updated
GAR	The GAR series traditional character with updated styling and superior photometric performance offers roadway illumination and uniformity to set a new standard for decorative post top luminaires. It's traditional styling ties in well with historic districts, downtown streetscapes, walkways, and parking lots.	1/27/2005 V

Spec Sheets

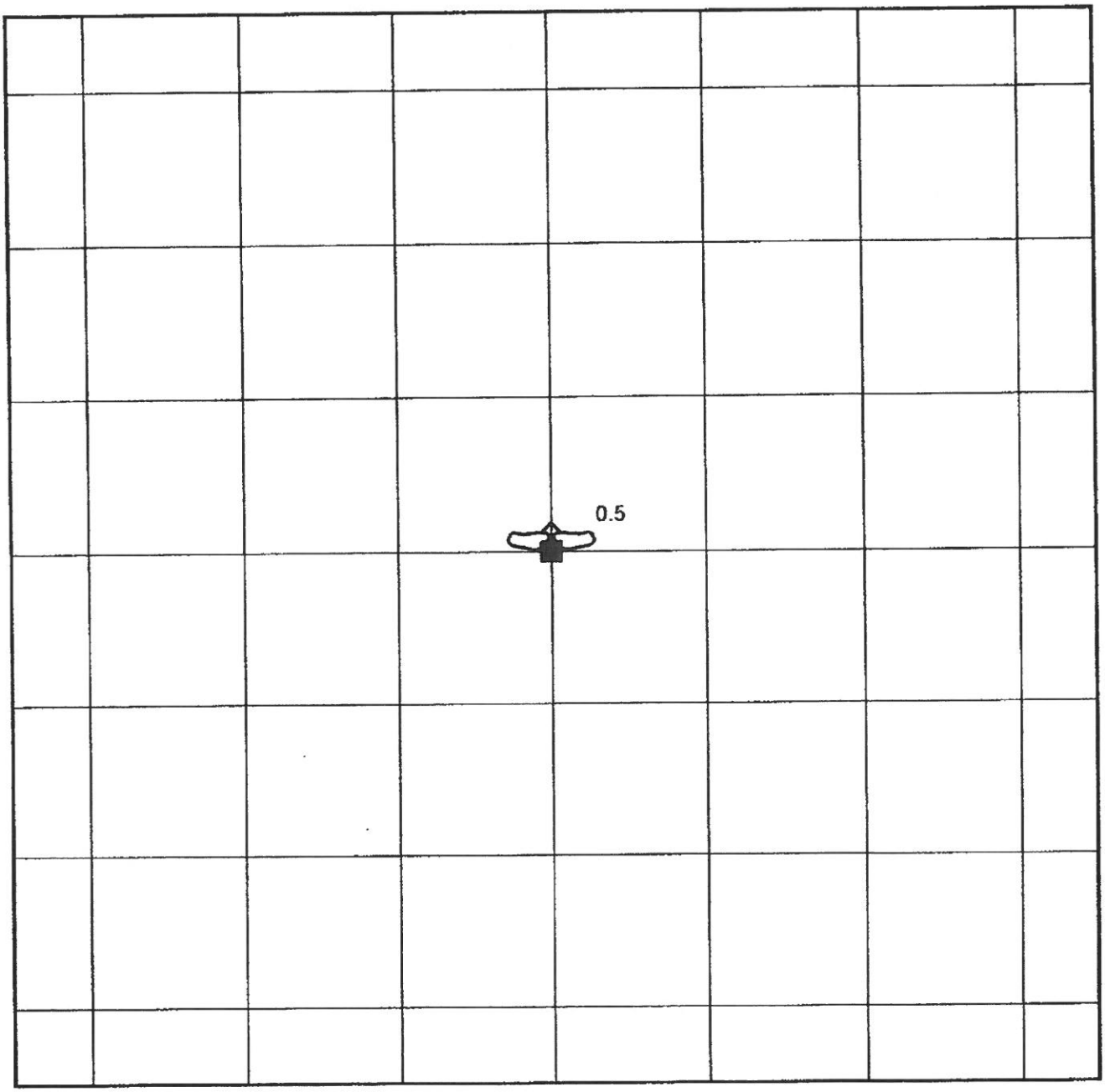
Catalog ID	Description	Last Updated	D In
GAR	Generation Series Post Top, Decorative	10/1/2004	
GAR-C	Generations CVL Acorn Series	9/24/2004	

IES Files

Catalog Number	Description	Last Updated	D In
GAR-150-HPS-X-3-AX	GAR 150W HPS TYPE III WITH GLOW TOP	4/11/2003	
GAR-150-HPS-X-3-AXR	GAR 150W HPS TYPE III WITH GLOW TOP & DOWNLIGHT REFLECTOR	4/11/2003	
GAR-85-QL-X-3-CX	GAR 85W INDUCTION LAMP TYPE III WITH MODERN OR CLASSICAL TOP	4/11/2003	
GAR-85-QL-X-3-CXR	GAR 85W INDUCTION LAMP TYPE III WITH MODERN OR CLASSICAL TOP & DOWNLIGHT REFLECTOR	4/11/2003	

GAR85QL3SPR.ies
8/27/02
COOPER LIGHTING
GAR-85-QL-X-3-CXR
Architectural Post Top Luminaire - TYPE III WITH
SPUN ALUMINUM TOP & INTERNAL DOWNLIGHT REFLECTOR
85 WATT PHILIPS QL INDUCTION LAMP

Use width in oval configuration for plans - Hawthorne Fixture



LUMENS PER LAMP = 1380
LIGHT LOSS FACTOR = 0.72
OPTICAL HEIGHT = 7 FEET
ARM LENGTH = 0 FEET
TILT = 0 DEGREES FROM NADIR

40 FEET BETWEEN GRIDLINES
MAXIMUM ILLUMINANCE = 0.9 FOOTCANDLES

Footprints™ by Gardco Lighting

DRAINAGE REPORT

FOR

Elizabeth Havens'
Town House Development

Georgetown Road
New London, CT

Prepared for:

New England Development Associates, LLC
March 2005

Prepared By:
Cherenzia & Associates, Ltd.
500 Bridge Street
Groton, CT 06320

EXECUTIVE SUMMARY

The site consists of approximately 6.36 acres of property in New London and 1.42 acres in Waterford, both properties with credited frontage on Georgetown Road in New London. The parcel will be developed in three phases, totaling 31 town homes in 6 buildings (Estates).

SITE CONDITIONS

Currently, the site is mostly wooded. In the 1950's the wetlands area of the site was disturbed in order to install a new collector gravity sanitary sewer line serving development on the West side of Ocean Avenue. In the 1960's when the Georgetown Apartments were initially developed, this site was then used to dispose of fill and rocks. Drainage from a private drain system, as well as the street storm drain system was dumped onto the property. In addition, when Gardener Avenue was extended, a natural watercourse formerly going to Niles Hill Road was diverted by a new catch basin that added an 18" RCP storm drain system to the new street and directed water that formerly flowed to Niles Hill Road to this site instead. The old channel of this water course can still be seen southwest of Gardener Drive in places, and it now carries much less runoff. In the 1990's a new sanitary sewer collector line was laid across the lower portion of the property to replace the old sewer built in the 1950s (farther west) that was not watertight. The old sewer has been sealed and abandoned.

The street level elevation ranges from 46 to 53, rising slightly to elevation 58 in places, then dropping to the wetlands at elevations 16 to 18. The lowest point on the site is approximately elevation 10.00. The wetlands feed Fenger Brook that leads to Alewife Cove then Long Island Sound. The project area is in the CAM review zone, and is classified at flood zone C on the New London side of the property. The Waterford side of the property contains Fenger Brook and is flood zone AE (elevation 10). No development is planned below elevation 14.

Through the use of best management practices including on-site runoff infiltration, there is no increase in the peak runoff rates over the predevelopment rates for 2, 5, 10, 25, and 100-year return storms. Previously untreated storm water entering this property from offsite will be subject to oil and sediment removal, before being discharged to level spreaders. Site runoff from drives and parking areas is subject to oil and sediment removal and prior to discharge into infiltration galley.

PROJECT DESCRIPTION AND PURPOSE

The project is to provide condominium town homes to meet a need for residential housing in New London in an existing multifamily zoned area.

DESCRIPTION OF EXISTING AND PROPOSED ON-SITE DRAINAGE

EXISTING SITE CONDITIONS

SOILS:

Currently, the upland portion of the site consists of fill and native soil. According to the Soil Survey of New London County, sheet 88, the native soils are Charleton-Hollis fine sandy soils, very rocky (CrC) (type B), Sutton (Sv), and Udorthents in the upland area. Wetlands soils were Scarborough and Ridgebury-Leicester-Whitman (Rn). These soils were confirmed by Soil & Environmental Services, Inc. and are documented in reports attached to the application submittal.

Test Pits:

Eight test pits, witnessed by the engineer or soil scientist, were done in November and December 2004. These test pits are shown on the plan (numbered 1, 2, 3, 4, 4A, 5, 6, and 6A). The test pits confirmed that the site is very bouldery, and that the soils are as documented. The most notable result was the absence of ledge in the area proposed for development.

Ledge:

One test hole (4A) showed refusal at 4 feet, but the adjacent test hole 23 feet away showed no refusal at 10 feet, suggesting that a large boulder may have been the reason for refusal in 4A. All other test holes showed no refusal at 9 or 10 feet depth. There is a known area of ledge (about 200 feet across the north finger of wetlands from Estate 3) along the route of the City's sanitary sewer line, where blasting was required. This is well away from any proposed area of development.

Groundwater:

Groundwater was encountered only in test hole # 6, where ground water was encountered at 96 inches after a wet month. A percolation test at test pit #6 was done, and the percolation rate was found to be 7.5 minutes per inch. The soil is classified as a hydric type B, and as silty sand, this percolation test and description of a moderately well drained soil are all consistent. All native soils found on the remainder of the site were of identical character, with no evidence of groundwater within those test pits. The percolation rate was assumed to be uniform through the native silt-sand soils.

RUNOFF PATTERNS:

The site drains to two separate wetlands that eventually drain to Fenger Brook. Drainage from a private storm drain system serving the Georgetown Apartments discharges to the north wetlands. Drainage from the City storm water system drains to the south wetlands area. The south wetland drains into the parking lot of the existing development to the southwest. Water flows across that parking lot in heavy storms, and then flows directly into Fenger Brook. West portions of this property drain directly to Fenger Brook, and a small area on the south side of the site drains to the neighboring yards.

PROPOSED SITE CONDITIONS:
DRAINAGE
Handling Existing Flows From Off-Site:
The drainage entering the parcel from off-site properties is to be:

- Consolidated into one pipe,
- Treated through a Stormceptor 6000 for reduction of oil and sediments,
- Discharged to an energy dissipater at the head of a small sediment pond,
- Finally, discharging through weirs, 80% to the existing northern wetlands, and 20% to the existing southern wetlands at a saddle between the north and south wetlands.

Handling of On-site Runoff:

In order to reduce the peak flows, and to provide cleansing of the storm water, infiltrator/ drywells are used thought the project. These drywells will handle all storm runoff from roofs and paved areas generated on site through a 25-year storm.

On North portion of site:

- Roof drains capture roof runoff and direct this cleaner water to infiltration beds behind Estate 3 and on the corner of Estates 1 and 2
- Runoff from the north driveway, and parking behind Estates 1 and 3 will be collected in catch basins (that remove oil and grit, and are fitted with snorkel inlets) before being discharged to infiltration beds under the pavement between Estate 1 and 3.
- Infiltration beds capture all water though a 25-year storm.
- In storms greater that 25-year return, infiltrators will overflow.
- Water from the infiltrators in back of Estates 1 and 3 will overflow to a curb cut and then flow down a mechanically stabilized slope until it reaches a swale located west of the sewer right-of way. The swale will overflow over a level spreader in the largest storms.
- Water from the roof of Estates 1 and 2 overflows the infiltrators in storms greater than 25-year return into the street on Georgetown Road. This flows to the City storm system.

On the central portion of the site:

- Behind Estates 2 and 4, surface runoff will sheet off the uncurbed driveway onto a grassed swale.
- Roof runoff for storms thorough 25-year return from #4 will be piped to an infiltration bed.
- The grassed swale is underlain by a line of 16 infiltration chambers that infiltrate a portion of the runoff generated by the developed area.
- Overflow from the swale enters catch basins leading to an infiltration bed located in the parking area of Building 6.
- In storms greater than a 25-year return, the infiltrators will be filled to capacity. Excess runoff will overflow to a curb cut at the south west corner of the parking area (in the grass) and go into a yard drain that will discharge at the base of the reinforced concrete retaining wall to a flatter area west of the Building 6 parking lot, where it will not cause erosion problems.

Handling of On-site Runoff, (continued):
On the south portion of the site:

- Roof runoff from Estate 5 will be piped to two separate infiltration beds.
- Runoff from the south driveway and parking areas in back of Estate 5 will be collected in catch basins, and discharged to an infiltration bed located in the parking area of #6.
- The roof drains and runoff from Estate 6 will be collected by an oil/grit removing catch basin and directed into an infiltration bed.
- In storms greater than 25-year return, the infiltrator capacity may be exceeded. Excess runoff will overflow to a curb cut at the southeast corner of the parking area (in the grass) and go into the same yard drain mentioned earlier.
- Runoff from grass and landscaped areas outside of paved areas will sheet flow to areas to the west.
- A small amount of landscaped area on the south edge of the site will continue to discharge onto the neighboring property, but at a lesser rate than occurs in the present condition.

A change in discharge points for the city Storm drain system is proposed. Presently, all water from the city system discharges uphill of the south wetlands and peak runoffs short circuit though the parking lot to the southwest. The proposed drainage system will minimize the short-circuiting by reducing the storm flows entering this wetland, but will continue to nourish the south wetlands with water absorbed in the infiltrator structures that serve Estate buildings 5 and 6. A discussion of the volume routing is included later in this report.

In order to avoid disturbance to as much wetland buffer area as possible, and still replace the sediment removal capacity normally given by the water quality volume, the Stormceptor 6000 unit will be provided to get a sediment removal efficiency of 81% before discharge to the sediment pond and level spreader. The Stormceptor will be used to treat all runoff entering the property from off-site.

Proposed Storm water Structures:

Stormceptor Unit:
The Stormceptor unit operates in a similar way to the more familiar Vortechnics brand unit. Storm water enters the unit and is swirled around inside. Edges are strategically arranged to retain oil and sediment and store it in a quiet part of the unit until the oil and sediment can be removed by a catch basin cleaner or vacuum truck. This particular unit, the Stormceptor 6000 was sized by a computer program that simulates the actual rainfall amounts and patterns occurring in a certain area by duplicating the historic rainfall record. Quite a lot of detail is required for this, and the nearest weather station that had sufficient information for this purpose in Newport Rhode Island. The daily rainfall quantities differ only a few hundreds of an inch, with those predicted for New London, but most important, the rainfall intensities are expected to be the same. The program analyzes the information for each storm, the intensity and quantity, and sums the percentage of sediment removed. For the larger storms, the unit has a by-pass that will allow some untreated runoff to escape during the peak of the storm, so the velocities inside the units do not get large enough to sweep away the sediment and oil already collected. At these times, the removal rate for the by-passed water will be 0. For the smallest storms, however, the unit will be very efficient, and removal rates of well over 85% are typical. Most storms are smaller. The engineer can pick the unit that provides removal rates required by the local regulators. In Connecticut, it

is considered a best management practice to have a sediment removal rate of 80% or greater. The Stormceptor 6000 unit will be provided to gain a sediment removal efficiency of 81%

Infiltrators:

All infiltrators proposed for this project are located on the property and will be maintained by the condominium association. The SC-750 and SC-310 infiltrators that were chosen do not require manifolds to each line of units. A 6" layer of stone is placed under all units. The layer acts to distribute and spread runoff to the other rows from the one row that is directly tied to the catch basin outlet. When installed with crushed stone in accordance with manufacturers guidelines, the SC 750 units provide 75 cubic feet of storage per unit, and the 310 units provide 31 cubic feet of storage per unit. The infiltration rate modeled for these units does not include credit for the one-foot width and 3.5 foot height of stone that forms the perimeter of each installation. Also for this project, whenever possible, roof runoff is separated from road surface runoff before it is directed to infiltrators.

Roof Runoff:

For our model, Infiltrators receiving roof runoff exclusively are labeled beginning with the letter E for "Estate". The gutters leading to these infiltrators are provided with leaf guards to prevent organic material from entering. There is a yard drain located between the roof drainpipe and the infiltrator bed in each of these systems that will permit the infiltrator to visibly overflow for storms of return periods greater than 25 years. The yard drain is set slightly above the surrounding surface so as not to intercept runoff from paved areas. The infiltrators for roof runoff do not require isolator rows because the only material expected is water and a small amount of grit from the shingles

Pavement runoff:

Each infiltrator bed receiving pavement runoff is preceded by a catch basin containing a "snorkel" hood to prevent oil and floatables from being transferred to the infiltrators. The final catch basin also serves as an overflow for the infiltrators for storms of 25 year return frequency or greater. For this project, the distributing line of infiltrators will be wrapped in filter fabric, and provided with an observation port to facilitate cleaning in case it becomes blinded with fines. In addition, catch basins served by infiltrators will have catch basin inserts designed to catch sediment, leaves, and trash, and to absorb some oil. The inserts would be inspected spring and fall, and replaced each spring by a maintenance contractor.

Soil Detention Time for Infiltrators:

The average detention time for all the infiltrators handling "clean" roof water is 8.8 hours, and the average detention time for all infiltrators handling pavement runoff is 14 hours. No infiltrator handling runoff from paving has a detention time of less than 9 hours. A detailed listing with calculations is given in the appendix.

Sediment Ponds:
Three sediment ponds are proposed for this project.
The small swale to the north is connected to a swale that captures runoff from the entire sewer access drive area, as well as overflow from the infiltrators serving Estate 3 and the rear of Estates 1 and 3. This sediment pond serves no paved areas for storms less than 25 year-return. As a result, there is no water quality volume associated with it. If dewatering is necessary during installation of the new sanitary sewer connection, dewatering water can be pumped to this swale. However, the sanitary sewer connection is designed to be above the seasonal high ground water level, so dewatering should not be required. This deep swale is a long narrow dug pond and will infiltrate much of the intercepted runoff, and discharges the remainder over a level low berm.

The centrally located sediment pond is also a dug pond and will serve the discharge for the Stormceptor as well as sheet flow from the surrounding grassed and gravel areas. During the early portion of the project, it will serve as a sediment pond for construction runoff. The inlet is rip rapped around an energy dissipater structure. The outlet is a series of low concrete weirs designed to slow the outlet flow and distribute it to the South and North wetlands that formerly received the untreated, unbuffered flow.

The third sediment pond is temporary and will be located between Estate building 2, and the future location for Estate Building 4. It will provide a temporary sedimentation pond for construction around estates one and two, and will be in place until the drainage work associated with the central pond, and it's upland drainage area are stabilized.

DESIGN PARAMETERS
SCS soil classification "B" was assumed for all TR-20, and 55 based calculations.

Condition	CN Value Assumed
Impervious	98
Woods (good)	55
Existing Grassed area (fair)	69
New grassed areas	61
Woods and grass	58
Gravel roads	82

The design storm is for New London County, with a type III rainfall distribution. Rainfall totals for 2, 5, 10, 25, and 100-year return storms are 3.4, 4.3, 5.0, 5.7, and 7.1 inches respectively.

HYDROLOGIC MODEL METHODOLOGY
Both existing and proposed conditions for the hydrologic study area were used to determine the areas of impervious surfaces, present soil types and land slopes. Weighted curve numbers, times of concentrations, and peak discharges were estimated using "Urban Hydrology for Small Watersheds" Soil Conservation Service Technical Release No. 20 (TR-20) and incorporated in "HydroCAD" version 7.0, from Applied Microcomputer Systems was used to evaluate the runoff and detention provided by the bio-filters.

MODEL SYMBOLS
- Hexagons represent areas where runoff is generated. A Cn number is calculated for each area by listing the square footage or acreage of each type of ground cover and soil. Also in the basin data

is the time of concentration calculated from distance, slope, and roughness of the land or pipe the runoff travels through. Each of the basin models produces a unique hydrograph, which is a chart of the amount of flow vs. time. The details are available in the 25-year summaries for each basin in the attached appendix.

- Triangles represent infiltration beds or sediment ponds. Infiltration beds are modeled as underground ponds where exfiltration accounts for most of the runoff handled, and the yard drains or overflows serve as both inlets and emergency overflows. In this model, all elevations are based on those of the plan.
- Zigzags are links that combine the hydrographs from all of the contributing basins to that link. In this model, the result is a single hydrograph made up of all the contributing hydrographs. This link gives results that show the maximum peak flow, when it occurs, and the total volumes of runoff passing. Since the times of concentration vary between basins, Q peaks are not always arithmetically cumulative, so the links allow us to look at what really happens vs. time.

HYDROLOGIC MODEL RESULTS

The reports for the model are presented in the appendix. The hydrologic model results for both the existing conditions and the proposed conditions are attached and are summarized below.

Graphical Method, Whole site, Qpeak, Predevelopment,
Cubic feet per second, "Total Leaving Site"

Storm Frequency	**2**	**5**	**10**	**25**	**100**
Total, predev	*13.81*	*23.48*	*32.01*	*41.09*	*60.39*

Post Development, with sediment ponds and infiltrators,

Storm Frequency	**2**	**5**	**10**	**25**	**100**
Total, Post	*13.81*	*23.40*	*31.69*	*40.44*	*58.85*

Comparing Pre and Post, with ponds,

Storm Frequency	**2**	**5**	**10**	**25**	**100**
Total, predev	13.81	23.48	32.01	41.09	60.39
Post Development	**13.81**	**23.40**	**31.69**	**40.44**	**58.85**
Increase (decrease)	0.00	(0.08)	(0.32)	(0.65)	(1.54)

VOLUME ROUTING

Peak flow is one part of consideration of impact to the wetland because it effects erosion, down stream flooding, and channel maintenance, but just as important is the volume of runoff that enters the wetlands. As a result of the storm water-handling measures proposed for this project, the *volume* of *surface* runoff occurring in 24 hours will decrease for all storms, and in both wetlands. All of the surface runoff generated by the new development is infiltrated. It does not leave the site as surface runoff. When infiltrated, the water travels much more slowly, but does eventually leave the site. In the meantime, the ground water levels rise, and the base groundwater flow to the wetlands in dry period is bolstered, in turn, increasing dry weather base flow to Fenger Brook. In all storms of 25-year return and less, the sum of the developed surface flow, and the amount of water newly infiltrated is greater than the surface runoff for the existing conditions. Therefore, the wetlands will continue to be nourished, flood volumes will be

reduced, and the ground water levels will be reinforced. Runoff volume summaries are documented in the appendix.

Runoff Volume Summaries, Acre-feet in 24 hours:

Comparing Pre and Post, Whole site

Storm Frequency	2	5	10	25	100
Total, predev	1.255	2.061	2.763	3.515	5.131
Post Development	0.956	1.695	2.330	3.009	4.561
Decrease in Surface flow	0.299	0.366	0.433	0.506	0.570

Note that this is a decrease in the amount of water entering the wetlands. If this were the only water entering the wetlands, we would run a risk of drying up the wetlands. However, remember that all the surface runoff from impervious surface on the development is to be infiltrated. When the infiltration volumes are added in to the surface runoff volumes:

Comparing Pre and Post, to South Wetlands, adding in infiltration volumes

Storm Frequency	2	5	10	25	100
Total, predev	0.373	0.594	0.784	0.986	1.419
Post Development	0.428	0.662	0.832	1.051	1.428
Increase	0.055	0.068	0.048	0.065	0.009

Comparing Pre and Post, to North Wetlands, adding in infiltration volumes

Storm Frequency	2	5	10	25	100
Total, predev	0.854	1.412	1.898	2.418	3.535
Post Development	1.109	1.778	2.471	2.892	4.179
Increase	0.255	0.366	0.573	0.474	0.644

The above figures assume the surface water volume from offsite will be split after treatment: 20% of the volume to the south basin, and 80% of volume to the north basin. If all the flow were directed to the North basin, the south basin would not receive as much total water volume as before. A flow splitting weir structure is used to distribute the flows.

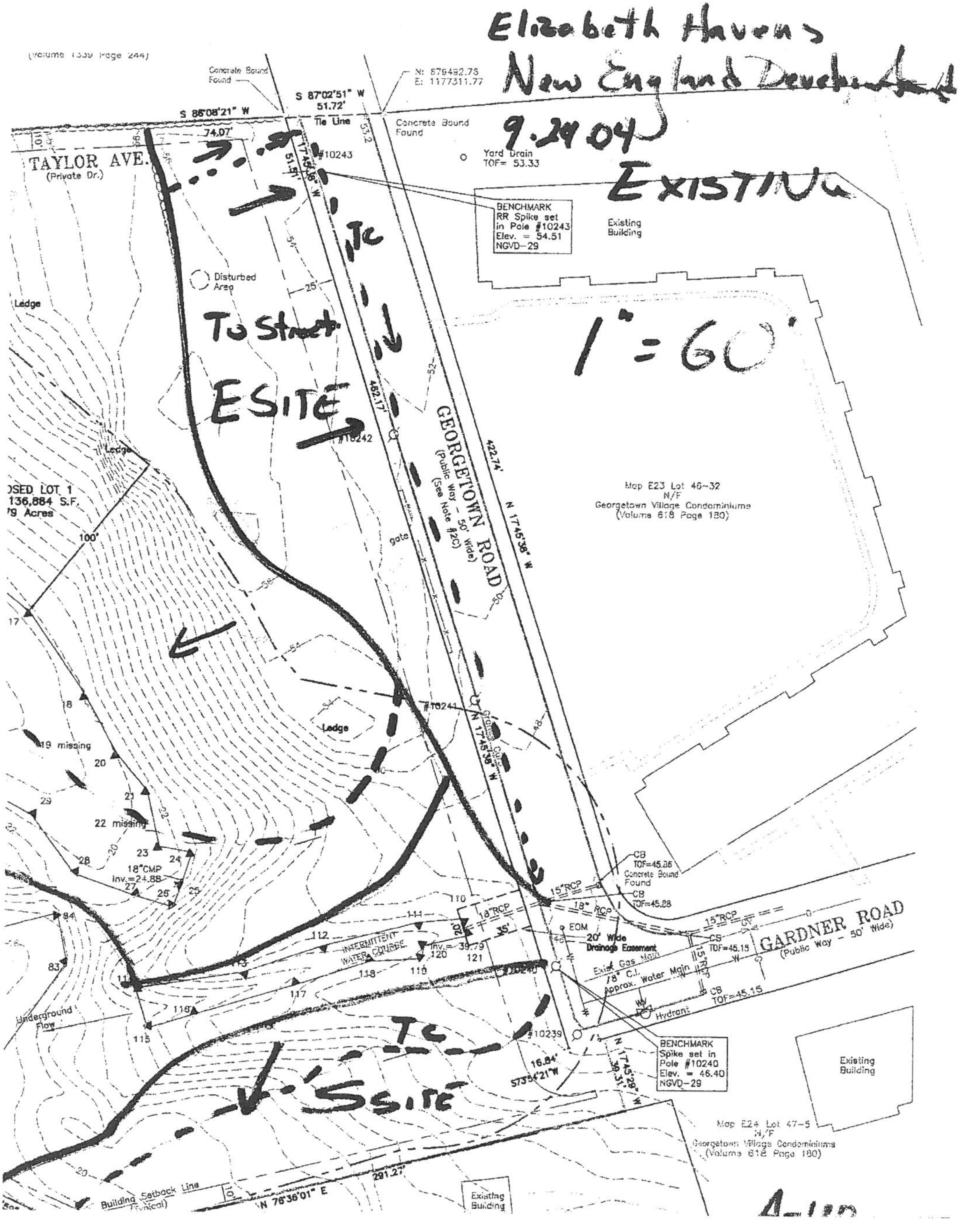
Calculations for Water Quality Volumes for Sediment Ponds

South Sediment Pond
No Impervious area

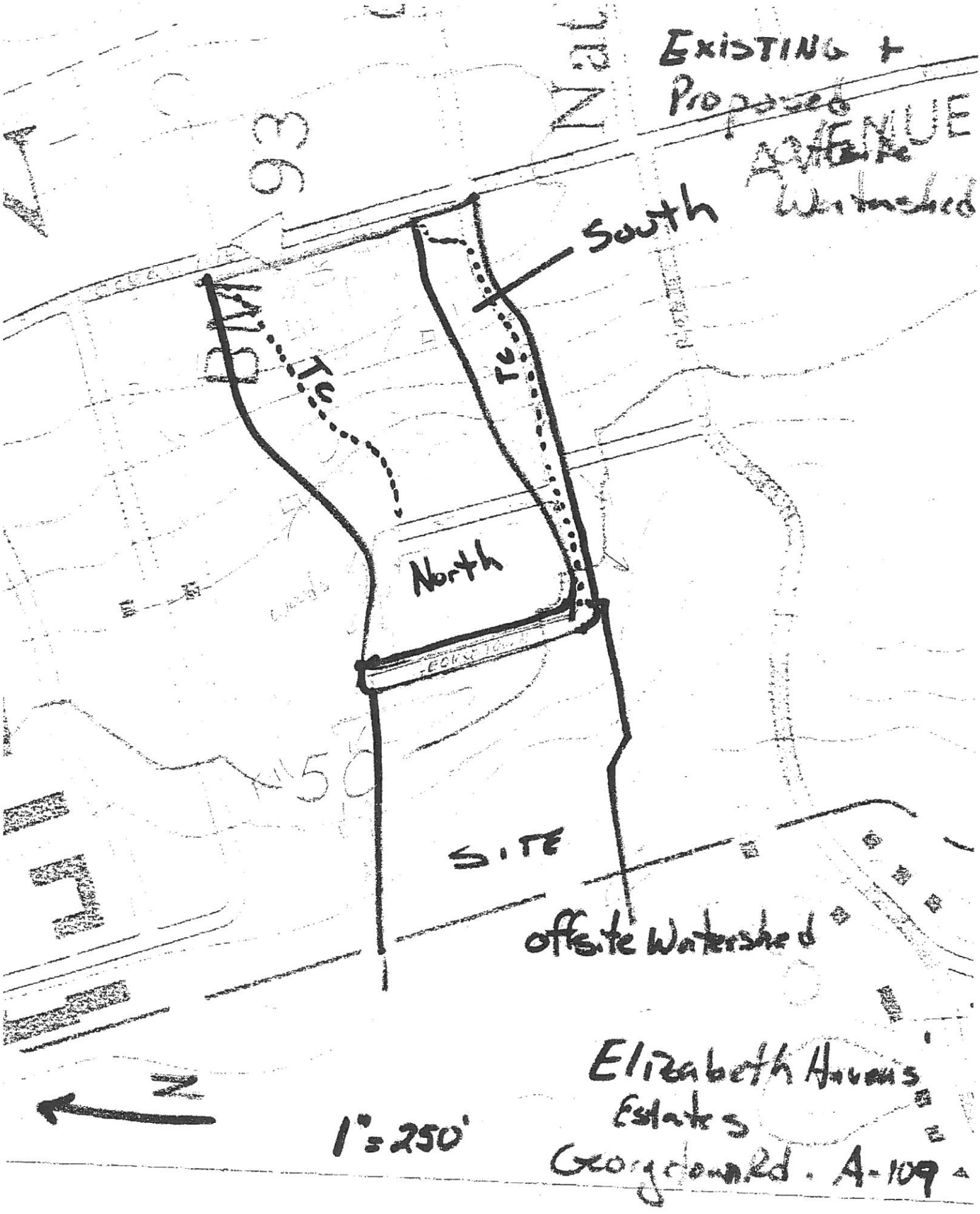
Central Sediment Pond
Impervious area off-site served by City and existing private storm drains totals 2.912 acres. Water quality volume for this area (1'' depth times area) is 10,571 cubic feet. Water quality volume impounded below the overflow elevation of 22 feet is 1,392 cubic feet, considered adequate, when combines with the use of a Stormceptor unit.

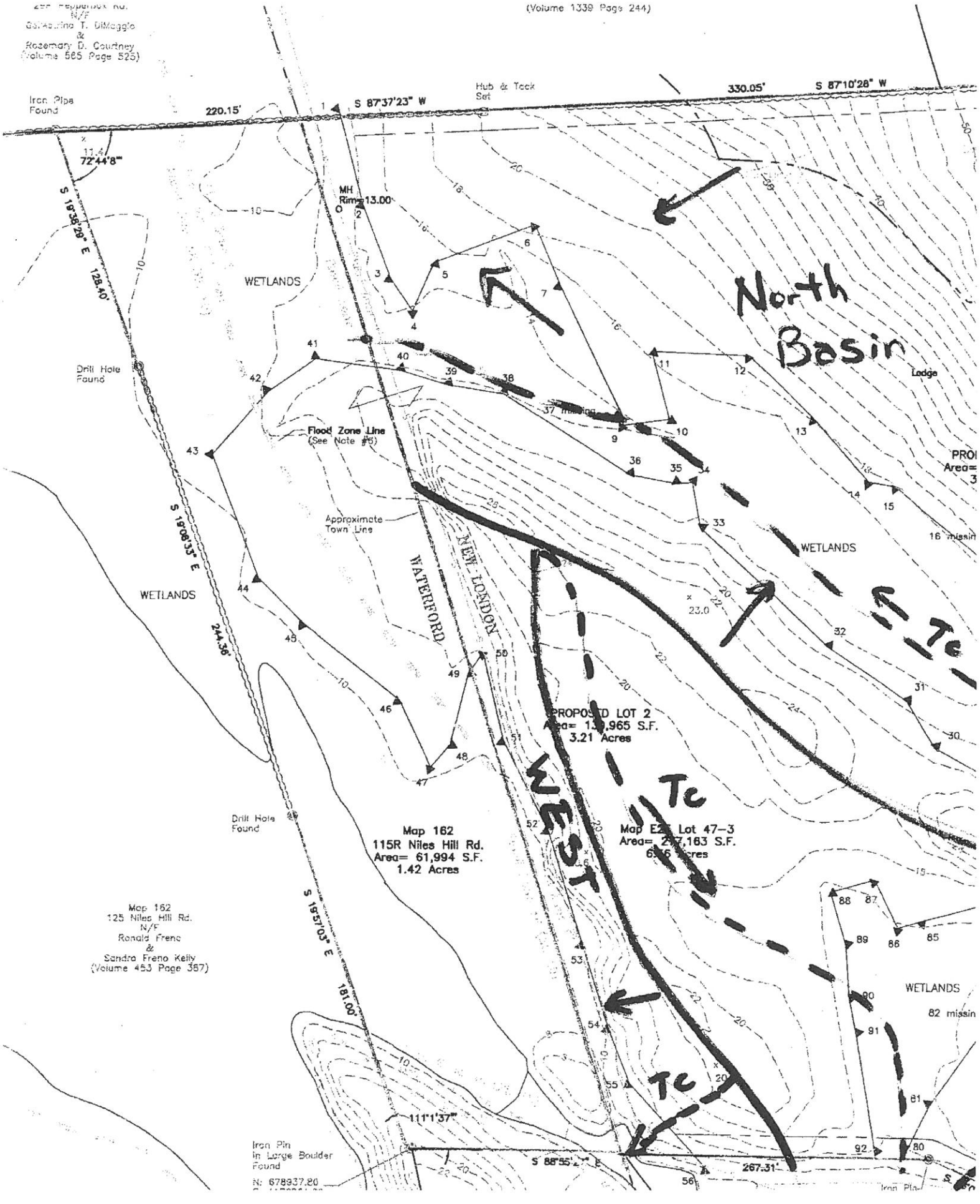
Impervious area on site served internally totals 1.249 acres, water quality volume for this area is 4,534 cubic feet. On-site infiltrators will take 100% of the required water quality volume required for this site.

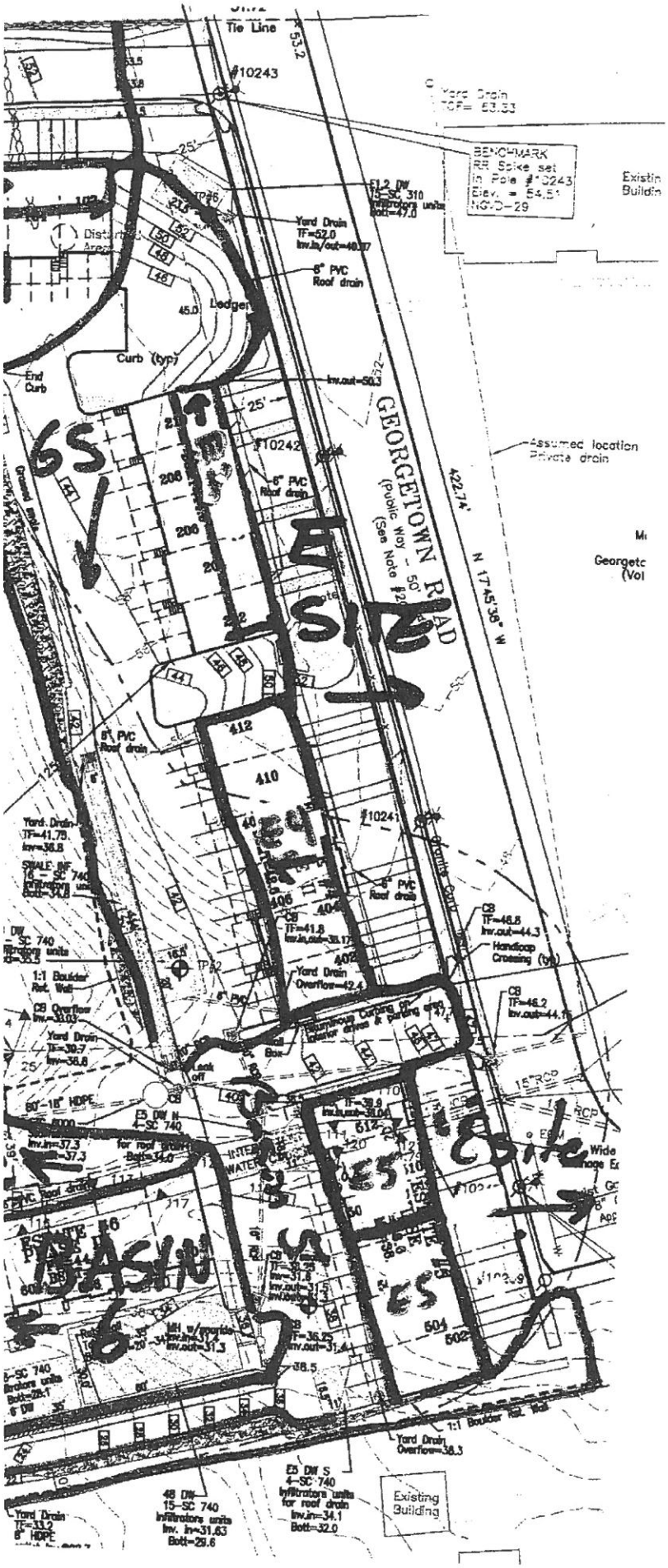
SUMMARY
In summary, the sediment ponds and infiltrators proposed for this project mitigate any increase in runoff or volume as a result of development for storms though the 100-year return. There is no increase in peak surface runoff flow or volume for these storms. Infiltration balances the reduced surface water flow so the wetlands continue to be nourished.



Elizabeth Havens
New England Development
9.24.04
EXISTING
1" = 60'
(Volume 1339 Page 244)
Concrete Bound Found
N: 879492.78
E: 1177311.77
S 87°02'51" W
51.72'
S 86°08'21" W
Tie Line
74.07'
Concrete Bound Found
TAYLOR AVE.
(Private Dr.)
#10243
51.51'
Yard Drain
TOF= 53.33
BENCHMARK
RR Spike set in Pole #10243
Elev. = 54.51
NGVD-29
Existing Building
Tc
Disturbed Area
Ledge
To Street
ESITE
462.17'
#10242
GEORGETOWN ROAD
(Public Way - 50' wide)
(See Note #2C)
422.74'
N 17°45'36" W
Map E23 Lot 46-32
N/F
Georgetown Village Condominiums
(Volume 618 Page 180)
OSED LOT 1
136,884 S.F.
79 Acres
100'
gate
#10241
Ledge
N 17°45'36" W
19 missing
22 missing
18"CMP
Inv.=24.88
CB
TOF=45.86
Concrete Bound Found
CB
TOF=45.88
15"RCP
18" RCP
EOM
20' Wide Drainage Easement
35'
GARDNER ROAD
(Public Way - 50' Wide)
CB
TOF=45.15
INTERMITTENT WATER COURSE
Inv.= 39.79
Exist. Gas Main
8" C.I. Approx. Water Main
#10240
CB
TOF=45.15
Hydrant
Underground Flow
#10239
BENCHMARK
Spike set in Pole #10240
Elev. = 46.40
NGVD-29
Tc
16.84'
S73°54'21"W
N 17°45'29" W
39.31'
Ssite
Existing Building
Map E24 Lot 47-5
N/F
Georgetown Village Condominiums
(Volume 618 Page 180)
291.27'
Building Setback Line (Typical)
N 76°36'01" E
Existing Building
A-120


EXISTING +
Proposed
AVENUE
Watershed
South
North
SITE
offsite Watershed
N
1"=250'
Elizabeth Havens
Estates
Georgetown Rd. A-109


(Volume 1339 Page 244)
N/F
Geraldine T. DiMaggio
&
Rosemary D. Courtney
(Volume 565 Page 525)
Iron Pipe Found
220.15'
S 87°37'23" W
Hub & Tack Set
330.05'
S 87°10'28" W
72°44'8"
S 19°38'28" E 128.40'
MH Rim=13.00
WETLANDS
Drill Hole Found
Flood Zone Line (See Note #5)
Approximate Town Line
WATERFORD
NEW LONDON
North Basin
Lodge
WETLANDS
WETLANDS
S 19°08'33" E 244.36'
PROPOSED LOT 2
Area= 139,965 S.F.
3.21 Acres
WEST
Tc
Tc
Tc
Map 162
115R Niles Hill Rd.
Area= 61,994 S.F.
1.42 Acres
Drill Hole Found
Map 162
125 Niles Hill Rd.
N/F
Ronald Freno
&
Sandra Freno Kelly
(Volume 453 Page 387)
S 19°57'03" E 181.00'
WETLANDS
111°1'37"
Iron Pin in Large Boulder Found
N: 678937.20
S 88°55'
267.31'

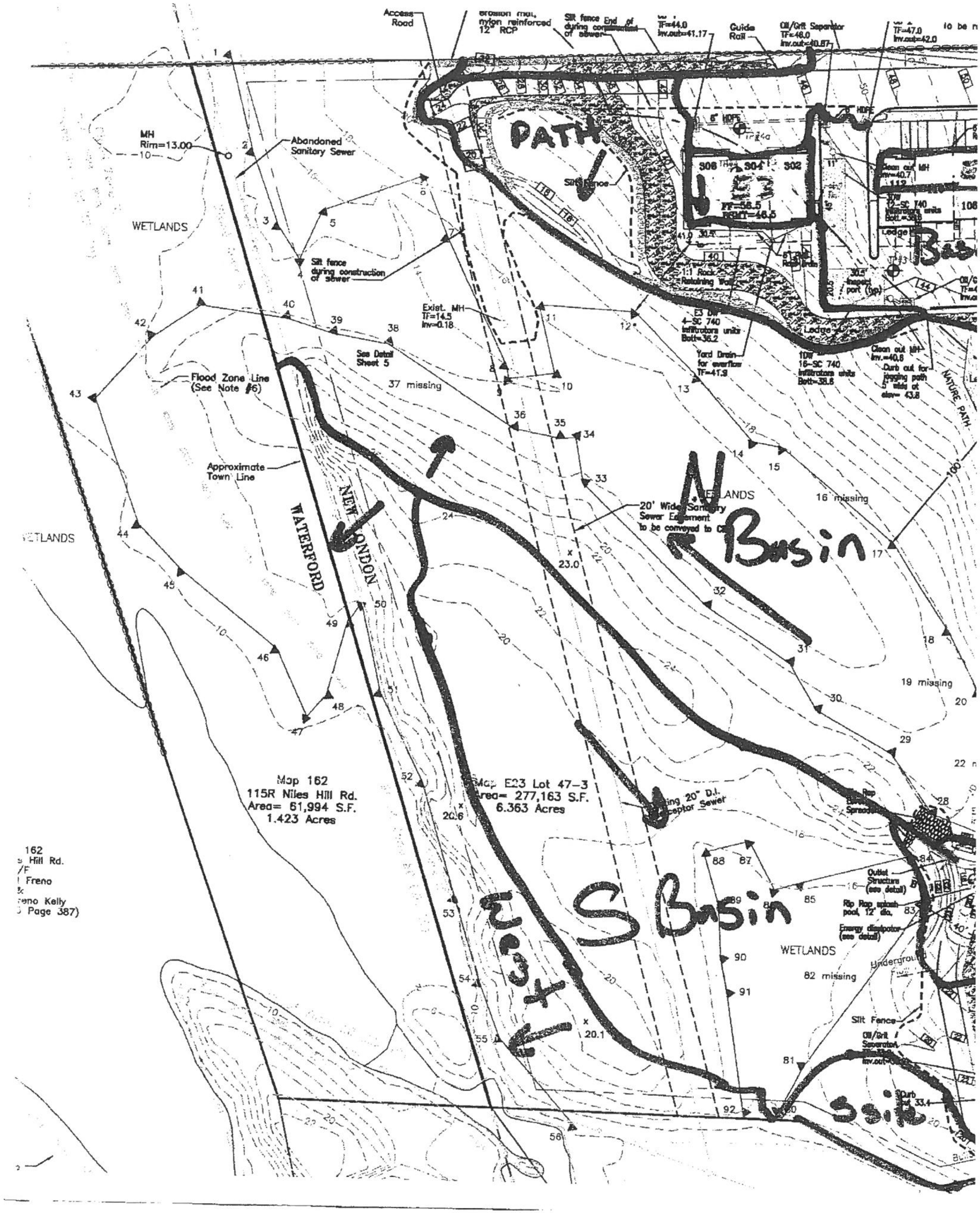


ELIZABETH HAVENS ESTATES

Proposed Drainage Basins

1" = 60'

3.7.05 A_ 111



Access Road
nylon reinforced 12" RCP
Silt fence during construction of sewer
End of
TF=44.0
Inv.out=41.17
Guide Rail
Oil/Grit Separator
TF=46.0
TF=47.0
Inv.out=42.0
6" HDPE
PATH
Silt fence
308
304
302
E3
FF=56.5
MH
Rim=13.00
Abandoned Sanitary Sewer
WETLANDS
Silt fence during construction of sewer
Exist. MH
TF=14.5
Inv=0.18
1:1 Rock Retaining Wall
E3 DW
4-SC 740
Infiltrators units
Bott=36.2
Yard Drain for overflow
TF=41.9
16-SC 740
Infiltrators units
Bott=38.8
Clean out MH
Inv.=40.8
Curb cut for jogging path
NATURE PATH
Ledge
See Detail Sheet 5
37 missing
Flood Zone Line
(See Note #6)
Approximate Town Line
WATERFORD
NEW LONDON
WETLANDS
20' Wide Sanitary Sewer Easement to be conveyed to C
N
Basin
16 missing
19 missing
23.0
Map 162
115R Niles Hill Rd.
Area= 61,994 S.F.
1.423 Acres
Map E23 Lot 47-3
Area= 277,163 S.F.
6.363 Acres
Existing 20" D.I. Interceptor Sewer
162
Hill Rd.
Freno
Freno Kelly
Page 387)
S Basin
E3
Outlet Structure (see detail)
Rip Rap splash pool, 12' dia.
Energy dissipator (see detail)
WETLANDS
82 missing
Silt Fence
Oil/Grit Separator
20.1
20.6

FISCAL IMPACT STUDY

&

POPULATION AND SCHOOL AGE CHILDREN PROJECTION

ELIZABETH HAVENS' ESTATES:
RESIDENTIAL CONDOMINIUM DEVELOPMENT

~~~~

CITY OF NEW LONDON, CT

PREPARED FOR:

NEW ENGLAND DEVELOPMENT ASSOCIATES, LLC

PREPARED BY: CHERENZIA & ASSOCIATES, LTD. -
JOSEPH D. LOMBARDO, AICP

APRIL 2005
~~~~

INTRODUCTION ~

This Fiscal Impact Study (FIS) has been prepared to supplement a Zoning Application by New England Development Associates, LLC. for a residential condominium project known as Elizabeth Havens' Estates. The property is located off Georgetown Road on Assessor's Map E23 – Lot # 7-3 and comprises 6.36 acres. The property is currently zoned R-3. The FIS will use the per capita multiplier method for estimating anticipated public revenues and expenses associated with a proposed Residential Condominium Project. The per capita multiplier is a generally accepted planning method to complete this study for review by the City of New London. The FIS will attempt to estimate both future revenues and expenses utilizing past and present statistics and financial data from a variety of sources, to be noted.

SUMMARY ~

In order to determine the school age children that may result from a development such as proposed, the Citywide average of .35 students per household will be utilized. If this ratio is applied to the proposed 31-unit condominium development, no more than Ten (10) school age children can be expected to be produced from the proposed development, as it can be expected to mirror the similar condominium complexes in Connecticut. The projected Ten (10) students from the project is consistent with the Citywide average or multiplier of **.35** pupils per housing unit. For the purposes of this FIS, **Ten (10) school age children** will be projected to be residents of this proposed development.

Therefore, the proposed 31-unit residential condominium project can be expected to produce a greater source of revenue over expenses. In fact, the City would likely realize net positive annual tax revenue of approximately **$30,000** from this proposed development, as this FIS will illustrate.

BASELINE INFORMATION ~

In order to begin the FIS, baseline information needs to be presented, including; population, housing units, City budget numbers, and school age children. The following table presents this information, and will establish per capita multipliers for New London, and this particular development proposal.

TABLE # 1:
PER CAPITA MULTIPLIERS - BASE YEAR OF 2005
CITY OF NEW LONDON

	PUBLIC SCHOOL PUPILS	MUNICIPAL BUDGET	SCHOOL BUDGET (FY 2004)	HOUSE-HOLDS (2000 Census)	POPULATION (2000 Census)
TOTAL	3,521	$35,636,050	$35,813,592	10,181	25,671
PER CAPITA	N/A	$1,395	N/A	2.52	N/A
PER PUPIL	N/A	N/A	$10,171	0.35	0.14

NOTES: Source: City of New London Finance Dept. and School Dept. – April 2005

Therefore, in summary, the Per Capita Multipliers for New London are:

- Municipal Budget per capita **$1,395**
- Revised Municipal Budget per capita (see below) **$976**
- School Budget per capita **$10,171**
- Population Multiplier per household **2.52**
- School age multiplier per household **0.35**

Considering that the City of New London conservatively received approximately 30% of its tax revenue from the Non-Residential sectors (industrial, commercial, etc.), the true burden on the residential sector is approximately 70% of the $1,395 per capita presented above, or $976 per capita. This is the multiplier that will be used in this report.

PROPOSED DEVELOPMENT ESTIMATES ~

Based on the per capita multipliers presented above, Table 2 presents the anticipated population projections for the residential condominium project:

TABLE # 2:
POPULATION PROJECTIONS -
PROPOSED DEVELOPMENT - BASE YEAR OF 2005
CITY OF NEW LONDON

	PER CAPITA	# OF UNITS	TOTALS
POPULATION (Citywide Average)	**2.52**	**31**	**78**

In order to determine the school age children that may result from a development such as proposed, the Citywide average of .35 students per household will be utilized. If this ratio is applied to the proposed 31-unit condominium development, no more than Ten (10) school age children can be expected to be produced from the proposed development, as it can be expected to mirror the similar condominium complexes in Connecticut. The projected Ten (10) students from the project is consistent with the Citywide average or multiplier of **.35** pupils per housing unit. For the purposes of this FIS, **Ten (10) school age children** will be projected to be residents of this proposed development.

PROJECT EXPENSES ESTIMATES ~

Based on the per capita multipliers and population and school age children projections presented above, Table 3 presents the projected total municipal expenses for the proposed 31 Residential Condominiums:

TABLE # 3:
TOTAL PROJECT EXPENSES PROJECTIONS - 2005
CITY OF NEW LONDON

	SCHOOL PUPILS	MUNICIPAL BUDGET	HOUSING UNITS	POPULATION
TOTAL	10	N/A	31	78
PER CAPITA	N/A	$976	N/A	N/A
PER PUPIL	$10,171	N/A	.35	N/A
TOTAL EXPENSES	$101,710	$76,128	N/A	N/A

Therefore, it is estimated that the proposed development will have a net annual cost to the City of New London of **$177,838** for both municipal and school expenses as calculated in Table 3 above. The school expense is the gross cost and does not include State of Connecticut Cost Sharing Grant for education, which totals **$19,891,599** for this current fiscal year. Education aid from the State represents **56%** of the total budgetary needs for the City of New London (Education only). Thus, the per pupil cost can be reduced 56% from **$10,171** to **$4,475** per pupil.

Using the actual cost per pupil of **$4,475**, the 10 additional students projected above would cost the community a total of **$44,750**, compared to the gross cost estimated at **$101,710**.

Therefore, the actual cost to the City for both municipal and school expenses for this project is **$120,878.**

PROJECT REVENUE ESTIMATES ~

Based on the projections presented above in Tables 1-3, Table 4 presents the projected total municipal revenue for the project:

TABLE # 4:
TOTAL PROJECT REVENUE PROJECTIONS -
PROPOSED DEVELOPMENT - BASE YEAR OF 2005
CITY OF NEW LONDON

	UNIT MARKET VALUE [+]	UNIT ASSESSED VALUE [*]	TAX RATE [*]	HOUSING UNITS	TOTAL REVENUE PER UNIT	TOTAL REVENUE
TOTAL UNITS	$275,000	$192,500	$25.34/ 1000	31	$4,878	$151,216

[+] Per New England Development Associates,LLC

[*] Per City of New London Tax Assessor's Office - @70% of value

The total estimated revenue from the Residential Condominium Project with 31 units is **$151,216**.

PROJECT ANTICIPATED REVENUE AND EXPENSE COMPARISON~

Based on information and statistics and the projections presented above in Tables 1-4, Table 5 presents a comparison of the projected total municipal revenue with total projected expenses for the Residential Condominium Project, as anticipated:

TABLE # 5:
PROJECT REVENUE AND EXPENSE COMPARISON -
BASE YEAR OF 2005
CITY OF NEW LONDON

	TOTAL MUNICIPAL COSTS	TOTAL SCHOOL COSTS	TOTAL COSTS	TOTAL ESTIMATED REVENUE	NET RESULTS
TOTAL PROJECT	**$76,128**	**$44,750*** (ten students)	**$120,878**	$151,216	**$30,338**

*Cost of education is net to the community after Cost Sharing Grant from the State

Therefore, the City of New London will actually realize a tax revenue gain of $30,000 on an annual basis with the buildout of 31 residential condominium units as proposed, as indicated in Table 5.

Index of Appendices

BYLAWS

OF

ELIZABETH HAVENS' ESTATES CONDOMINIUM ASSOCIATION, INC.

ARTICLE I
Introduction

These are the Bylaws of Elizabeth Havens' Estates Condominium Association, Inc.

ARTICLE II
Executive Board

Section 2.1 - Number and Qualification; Termination of Declarant Control.

(a) The affairs of the Common Interest Community and the Association shall be governed by an Executive Board consisting of a minimum of five (5) persons, the majority of whom, excepting the members of the Executive Board elected by the Declarant, shall be Unit Owners. If any Unit is owned by a partnership or corporation, any officer, partner or employee of that Unit Owner shall be eligible to serve as a board member. The members of the Executive Board shall be elected by the Unit Owners except for those appointed by the Declarant. At any meeting at which board members are to be elected, the Unit Owners may, by resolution, adopt specific procedures for conducting the elections, not inconsistent with these Bylaws or the Corporation Laws of the State of Connecticut. In the event the Executive Board determines that the condominium is to be a tax district, they may expand the Executive Board to seven members.

(b) The terms of at least one third (1/3) of the members of the Executive Board shall expire annually, as established in a resolution of the members setting terms.

(c) Section 8.9 of the Declaration shall govern appointment of members of the Executive Board during the period of Declarant control.

(d) The Executive Board shall elect the officers. The Directors and officers shall take office upon election.

(e) At any time after Unit Owners other than the Declarant are entitled to elect a Director, the Association shall call and give not less than ten (10), nor more than sixty (60) days notice of a meeting of the Unit Owners for this purpose. Such meeting may be called and the notice given by any Unit Owner if the Association fails to do so.

Condominium Management Plan
Appendix A

Section 2.2 - Powers and Duties. The Executive Board may act in all instances on behalf of the Association, except as provided in the Declaration, the Bylaws or the Act. The Executive Board shall have the powers and duties necessary for the administration of the affairs of the Association and of the Common Interest Community which shall include, but not be limited to, the following:

(a) Adopt and amend Bylaws and Rules;

(b) Adopt and amend budgets for revenues, expenditures and reserves;

(c) Collect assessments for Common Expenses from Unit Owners;

(d) Hire and discharge managing agents;

(e) Hire and discharge employees and agents other than managing agents and independent contractors;

(f) Institute, defend or intervene in litigation or administrative proceedings in its own name on behalf of itself or two or more Unit Owners on matters affecting the Common Interest Community;

(g) Make contracts and incur liabilities;

(h) Regulate the use, maintenance, repair, replacement and modification of the Common Elements;

(i) Cause additional improvements to be made as a part of the Common Elements;

(j) Acquire, hold, encumber and convey in its own name any right, title or interest to real property or personal property, but Common Elements may be conveyed or subjected to a security interest only pursuant to Section 55 of the Act;

(k) Grant leases, licenses and concessions for no more than one year, through or over the Common Elements;

(l) Grant easements for any period of time including permanent easements.

(m) Impose and receive payments, fees or charges for the use, rental or operation of the Common Elements, other than Limited Common Elements described in Subsections (2) and (4) of Section 22 of the Act, and for services provided to Unit Owners;

(n) Impose charges or interest or both for late payment of assessments and, after Notice and Hearing, levy reasonable fines for violations of the

Declaration, Bylaws and Rules of the Association;

(o) Impose reasonable charges for the preparation and recordation of amendments to the Declaration, resale certificates required by Section 71 of
the Act or statements of unpaid assessments;

(p) Provide for the indemnification of the Association's officers and Executive Board and maintain Directors' and Officers' liability insurance;

(q) Assign the Association's right to future income, including the right to receive Common Expense assessments;

(r) Exercise any other powers conferred by the Declaration or Bylaws;

(s) Exercise all other powers that may be exercised in Connecticut by legal entities of the same type as the Association;

(t) Exercise any other powers necessary and proper for the governance and operation of the Association; and

(u) By resolution, establish committees of Directors, permanent and standing, to perform any of the above functions under specifically delegated administrative standards, as designated in the resolution establishing the committee. All committees must maintain and publish notice of their actions to Unit Owners and the Executive Board. However, actions taken by a committee may be appealed to the Executive Board by any Unit Owner within forty-five (45) days of publication of such notice, and such committee action must be ratified, modified or rejected by the Executive Board at its next regular meeting.

Section 2.3 – Integrated Pest Management and Maintenance Plan. The Executive Board shall at all times, whether during the period of Declarant control or thereafter, be responsible for the maintenance of a Pest Management and Maintenance Plan, with the goal of the protection of the wetlands located on the property of the Condominium. At a minimum, the Executive Board shall insure that the following maintenance programs are fully performed:

Lawn Areas: Any reseeding or overseeding of any lawn areas shall be done with Lofts "Ecology Mix", or equivalent, at a rate of one (1) pound per one thousand (1,000) square feet. This mix does not need fertilizer and is extremely pest and disease resistant. In addition, the Executive Board shall insure that the following steps are taken:

(a) All grassy areas shall be mowed to a height of no less than two (2) inches.
(b) Grass clippings must be left on the lawn or mulched into the lawn with a mulcher/mower to recycle nutrients.

Appendix 4

(c) No fertilizer applications shall be used.
(d) An annual application of pelletized lime shall required, at the rate of forty (40) pounds per one thousand (1,000) square feet, in late winter, after the snow has melted.
(e) Pre-emergent crab grass preventive may be used only in the early spring after the third full season.

Rough Grass Areas: Any reseeding or overseeding of any rough grass areas shall be done with Lofts "Reclaim Native Grass Mix", or equivalent. In addition, the Executive Board shall insure that the following steps are taken:

(a) The grass in rough areas shall not be mown, fertilized or limed.
(b) Herbicides shall not be used at any time, except that a systemic herbicide may be used to control poison ivy and poison oak, but only by hand application with a brush.
(c) Shrubs may be clipped or pruned as needed.

Landscape Plantings: Now spraying or fertilizing shall be allowed. Trees and shrubs shall be shall be maintained as follows:

(a) Weed growth in mulch shall be removed by hand. No herbicides may be used.
(b) Mulch shall be replenished as needed with a natural, undyed, untreated product.
(c) Shrubs and trees shall be clipped and pruned as needed.

Woodland Areas: Woodland areas shall be left in their natural state except as needed to maintain jogging or nature paths. Any work within 100 feet of inland wetlands requires a permit from the New London Conservation Commission. The woodland areas shall be maintained as follows:

(a) Dangerously leaning or dead trees may be felled and cut into logs, which shall remain to provide natural habitat and cover for animals and birds.
(b) The woodland areas shall be inspected regularly for litter, which shall be disposed of.
(c) Open fires shall not be permitted in the woodland areas.

Wetland Areas: All wetland areas are to be left in a natural state. Any work within the wetlands areas requires a permit from the New London Conservation Commission. Maintenance is limited to litter removal by hand.

Section 2.4 - Stormwater Structure Maintenance Plan. The Executive Board shall at all times, whether during the period of Declarant control or thereafter, be responsible for the maintenance and protection of the wetlands into which the stormwater generated by the

Appendix A

Property and certain offsite sources ultimately flows. At a minimum, the Executive Board shall insure that the following maintenance programs are fully performed:

Parking and Driveways: All parking lots and driveways shall be swept clear of sand and sediment each spring and fall. Small oil spills (not entering a storm drain) shall be covered with oil absorbent material and the material swept up and disposed of in accordance with the regulations of the City of New London. The Executive Board shall adopt rules which require that each Unit Owner keep at least ten (10) pounds of such oil absorbent material on hand in case of a small oil leak or spill. Larger oil spills entering a storm drain shall be reported to the City wetlands agent and immediately cleaned and/or contained by a licensed waste disposal company. Gasoline spills entering a storm drain shall be immediately reported to the Fire Department of the City of New London.

Catch Basins: Each catch basin are equipped with an oil-sorbent, sediment capturing insert (Ultra DrainGuard Plus Model #9219). All catch basins shall be inspected in April, July, October and December of each year. At the time of each such inspection, all accumulated trash, leaves and other debris shall be removed, and each insert shall be inspected for oil and sediment. If any catch basin is flooding in minor storms, the insert shall be removed and replaced. If the quantity of sediment in any insert has triggered the red "pop-up" indicator, such insert shall be removed and replaced. Notwithstanding the foregoing, each insert and accompanying oil absorbent pillow shall be removed and replaced as a routine part of the April and October inspections. The level of sediment build up in each catch basin sump shall be monitored during the April and October inspections. If the sediment within any catch basin sump is determined to be within one foot of the outlet pipe, the sediment shall be removed.

Stormceptor: The Stormceptor shall be inspected for oil on a quarterly basis, and all trash, leaves and other debris shall be removed. The Stormceptor unit shall be inspected and maintained each spring and fall by a qualified maintenance company; and shall be cleaned in accordance with its maintenance manual and after any oil spill entering a storm drain.

Section 2.5 - Contracts: All management or contractor agreements providing for the services described in Section 2.3 or 2.4 of these Bylaws for maintenance and protection of the wetlands shall include, and each contracting party shall agree to, the provisions of said sections.

Section 2.6 - Standard of Care. In the performance of their duties, the officers and Directors of the Executive Board are required to exercise the care required of fiduciaries of the Unit Owners, if appointed by the Declarant, and ordinary and reasonable care if elected by the Unit Owners.

Appendix

Section 2.7 - Additional Limitations. The Executive Board shall be additionally limited pursuant to Article XXV of the Declaration.

Section 2.8 - Manager. The Executive Board may employ a Manager for the Common Interest Community at a compensation established by the Executive Board, to perform such duties and-services as the Executive Board shall authorize. The Executive Board may delegate to the Manager only the powers granted to the Executive Board by these Bylaws under Subdivisions 2.2(c), (e), (g), and (h). Licenses, concessions and contracts may be executed by the Manager pursuant to specific resolutions of the Executive Board, and to fulfill the requirements of the budget.

Appendix F

Integrated Pest Management
And Maintenance Plan
For
Elizabeth Havens' Estates
Georgetown Road
New London, Connecticut

Prepared for

New England Development Associates, LLC

By

Cherenzia & Associates, Ltd.
500 Bridge Street
Groton, CT 06340'

March 2005

Appendix A

Introduction:

Elizabeth Haven's Estates is a town house community of 31 homes in 6 buildings located on Georgetown Road on a parcel of woodland and wetlands. The site slopes back toward the wetlands, and careful environmental stewardship is required of the homeowners to protect the beautiful and sensitive ecosystem.

This plan outlines the minimum requirements the Condominium Association must follow to protect this natural resource once the builder has completed all the site work and landscaping. This plan must be made a part of any landscaping contract made by the condominium, and shall be signed off by the contractor.

Pest Management and Maintenance:

Lawn:

A special seed mix was used on all the lawn areas for this property. Any reseeding or over-seeding needed in the future should be done with Lofts "Ecology Mix" at a rate of 1 pound per 1000 square feet. This mix does not need fertilizer and is extremely pest and disease resistant. Providing the following steps are taken:

- The grass should be mowed to a height no less than 2 inches. This shades the roots reducing water demand and also shades out weeds.
- Grass clippings must be left on the lawn or mulched into the lawn with a mulcher/mower to recycle nutrients in a stable manner.
- No fertilizer applications are needed, and will not be permitted on this property.
- An annual application of pelletized lime is the only maintenance required. Apply 40 pounds of palletized lime per thousand square feet annually, preferably in late winter after the snow is gone.
- Pre-emergent crab grass preventive may be used only in the early spring after the third full season, after the bio-filters have become established.

Rough Grass Areas:

These areas were seeded with Lofts "Reclaim Native Grass Mix". Any reseeding or over-seeding in the future should be done with the same mix. Maintenance of these areas is limited, and must follow these guidelines.

- Do not mow grass in the rough areas. It needs to be long to reduce run-off, and protect against erosion.
- Do not fertilize or lime the rough area.
- Herbicide is not to be used anytime or for anything except: when hand applied to poison ivy or poison oak. A systemic herbicide may only be used to control Poison Ivy or Poison Oak, and only by hand application with a brush.
- All other species that may take over the rough areas are considered to be beneficial to the wildlife and will be allowed to remain. Shrubs may be clipped or pruned as needed.

Landscape Plantings:

The landscape plantings and trees chosen for this project are pest resistant, and hardy. No spraying or fertilizing is required for maintenance. Some leaf discoloration or fruit drop may be expected with the crab apple or cherry trees, but this does not affect the trees general hardiness or growth. Maintain shrubs and trees with the following guidelines:

- Do not fertilize trees or shrubs.
- Remove weed growth in the mulch by hand. All landscaping is installed with a landscape cloth barrier and care should be taken not to damage the barrier.
- Replenish shredded bark mulch, as needed with a natural, un-dyed, untreated product.
- Shrubs and trees may be pruned as needed to keep room around buildings and walks, and parking area. All plantings chosen have a pleasing natural shape, and do not need formal pruning for shape.

- Do not use herbicide to remove weeds. A systemic herbicide may only be used to control Poison Ivy or Poison Oak, and only by hand application with a brush.

Woodland Areas:

Woodland areas are to be left in the natural state except as needed to maintain jogging or nature paths. Any work within 100 feet of the wetlands requires a Permit from the New London Conservation Commission.

- Dangerously leaning or broken dead trees may be felled, but logs are to remain to provide natural habitat and cover for animals and birds.
- Maintenance will include litter removal.
- Open fires may not be permitted in the woodland.

Wetland Areas:

Wetlands Areas are to be left in a natural state. Any work within the wetlands requires a Permit from the New London Conservation Commission.

- Maintenance is to be limited to litter removal by hand.

I understand this plan and agree to comply with its maintenance requirements and prohibitions listed in this Integrated Pest Management and Maintenance Plan for Elizabeth Havens' Estates.

Signature of Landscape Contractor Date

A

Stormwater Structure Maintenance Plan For Elizabeth Havens' Estates Georgetown Road New London, Connecticut

Prepared for

New England Development Associates, LLC

By

Cherenzia & Associates, Ltd.
500 Bridge Street
Groton, CT 06340'

March, 2005

Appendix B

Stormwater Structure Maintenance Plan
For Elizabeth Havens' Estates

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Stormwater Maintenance:

Parking and Driveways:

- The parking lots and driveways shall be swept clear of sand and sediment each spring and fall.
- Small oil spills (not entering storm drain) shall be covered with oil absorbent material, and the material swept up and disposed of in accordance with city regulations. Each homeowner shall keep at least ten pounds of this material on hand on their premises in case of a small oil leak or spill.
- Larger oil spills entering storm drain shall be reported to the city wetlands agent and cleaned immediately by a licensed waste disposal company.
- Gasoline spills entering the storm drains shall be immediately reported to the City Fire Department.

Catch basins:

All catch basins shall be inspected in April, July, October, and December and the following maintenance shall be done:

- Trash and leaves shall be removed.
- If the catch basin is flooding in minor storms, the insert shall be replaced.
- If the quantity of sediment in the insert has triggered the red "pop-up" the insert should be replaced.

In April and October:

- The "Ultra DrainGuard Plus model #9219" insert and oil absorbent pillow shall be removed and replaced.
- If sediment within the catch basin sump is within one foot of the outlet pipe, the sediment shall be removed.

Stormwater Structure Maintenance Plan
For Elizabeth Havens' Estates

Stormceptor:

- The Stormceptor shall be checked and cleared of trash and inspected for oil on a quarterly basis.
- The Stormceptor shall be inspected and maintained in the spring and fall by a qualified maintenance company.
- Each spring and fall, the Stormceptor shall be cleaned in accordance with the maintenance manual and also after any oil spill.

FISCAL IMPACT STUDY

&

POPULATION AND SCHOOL AGE CHILDREN PROJECTION

ELIZABETH HAVENS' ESTATES:
RESIDENTIAL CONDOMINIUM DEVELOPMENT

~~~~

CITY OF NEW LONDON, CT

PREPARED FOR:

NEW ENGLAND DEVELOPMENT ASSOCIATES, LLC

PREPARED BY: CHERENZIA & ASSOCIATES, LTD. -
JOSEPH D. LOMBARDO, AICP

APRIL 2005
~~~~

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Therefore, the actual cost to the City for both municipal and school expenses for this project is **$120,878.**

PROJECT REVENUE ESTIMATES ~

Based on the projections presented above in Tables 1-3, Table 4 presents the projected total municipal revenue for the project:

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TOTAL PROJECT REVENUE PROJECTIONS - PROPOSED DEVELOPMENT - BASE YEAR OF 2005 CITY OF NEW LONDON

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TOTAL UNITS	$275,000	$192,500	$25.34/ 1000	31	$4,878	$151,216

[+] Per New England Development Associates,LLC

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The total estimated revenue from the Residential Condominium Project with 31 units is **$151,216**.

PROJECT ANTICIPATED REVENUE AND EXPENSE COMPARISON~

Based on information and statistics and the projections presented above in Tables 1-4, Table 5 presents a comparison of the projected total municipal revenue with total projected expenses for the Residential Condominium Project, as anticipated:

TABLE # 5:
PROJECT REVENUE AND EXPENSE COMPARISON -
BASE YEAR OF 2005
CITY OF NEW LONDON

	TOTAL MUNICIPAL COSTS	TOTAL SCHOOL COSTS	TOTAL COSTS	TOTAL ESTIMATED REVENUE	NET RESULTS
TOTAL PROJECT	**$76,128**	**$44,750*** (ten students)	**$120,878**	$151,216	**$30,338**

*Cost of education is net to the community after Cost Sharing Grant from the State

Therefore, the City of New London will actually realize a tax revenue gain of $30,000 on an annual basis with the buildout of 31 residential condominium units as proposed, as indicated in Table 5.

SITE
STORMWATER MANAGEMENT PLAN

For

Elizabeth Havens Estates

March 2005

Prepared for:
New England Development Associates, LLC

Prepared by:
Cherenzia & Associates, Ltd
500 Bridge Street
Groton, CT 06340

EXECUTIVE SUMMARY

The site consists of approximately 6.36 acres of property in New London and 1.42 acres in Waterford, both properties with credited frontage on Georgetown Road in New London. The parcel will be developed in three phases; totaling 31 upper end town homes in 6 buildings (Estates).

SITE CONDITIONS

Currently, the site is mostly wooded. In the 1950's the wetlands area of the site was disturbed in order to install a new collector gravity sanitary sewer line serving development on the West side of Ocean Avenue. In the 1960's when the Georgetown Apartments were initially developed, this site was then used to dispose of fill and rocks. Drainage from a private drain system, as well as the street storm drain system was dumped onto the property. In addition, when Gardener Avenue was extended, a natural watercourse formerly going to Niles Hill Road was diverted by a new catch basin that added an 18" RCP storm drain system to the new street and directed untreated runoff that formerly flowed to Niles Hill Road to this site instead. The old channel of this water course can still be seen southwest of Gardener Drive in places, and it now carries much less runoff. In the 1990's a new sanitary sewer collector line was laid across the lower portion of the property to replace the old sewer built in the 1950s (farther west) that was not watertight.

The street level elevation ranges from 46 to 53, rising slightly to elevation 58 in places, then dropping to the wetlands at elevations 16 to 18. The lowest point on the site is approximately elevation 10.00. The wetlands feed Fenger Brook that leads to Alewife Cove then Long Island Sound. The project area is in the CAM review zone, and is classified at flood zone C on the New London side of the property. The Waterford side of the property contains Fenger Brook and is flood zone AE (elevation 10). No development is planned below elevation 14.

PROJECT DESCRIPTION AND PURPOSE

The project is to provide condominium town homes to meet a need for upper end residential housing in New London in an existing multifamily zoned area.

DESCRIPTION OF EXISTING AND PROPOSED ON-SITE DRAINAGE

EXISTING SITE CONDITIONS

SOILS:
Currently, the upland portion of the site consists of fill and native soil. According to the Soil Survey of New London County, sheet 88, the native soils are Charleton-Hollis fine sandy soils, very rocky (CrC) (type B), Sutton (Sv), and Udorthents in the upland area. Wetlands soils were Scarborough and Ridgebury-Leicester-Whitman (Rn). These soils were confirmed by Soil & Environmental Services, Inc. and are documented in the reports included in the application package.

TEST PITS:
Eight test pits, witnessed by the engineer or soil scientist, were done in November and December 2004. The most notable result was the absence of ledge in the area proposed for development. These test pits are shown on the plan (numbered 1, 2, 3, 4, 4A, 5, 6, and 6A). The test pits confirmed that the site is very bouldery, and that the soils are as documented.

LEDGE:
One test hole (4A) showed refusal at 4 feet, but the adjacent test hole 23 feet away showed no refusal at 10 feet, suggesting that a large boulder may have been the reason for refusal in 4A. All other test holes showed no refusal at 9 or 10 feet depth. There is a known area of ledge (about 200 feet across the north finger of wetlands from Estate 3) along the route of the City's sanitary sewer line, where blasting was required. This is well away from any proposed area of development.

GROUNDWATER:
Groundwater was encountered only in test hole # 6, where ground water was encountered at 96 inches after a wet month. A percolation test at test pit #6 was done, and the percolation rate was found to be 7.5 minutes per inch. The soil is classified as a hydric type B, and as silty sand, this percolation test and description of a moderately well drained soil are all consistent. All native soils found on the remainder of the site were of identical character, with no evidence of groundwater within those test pits. The percolation rate was assumed to be uniform through the native silt-sand soils.

RUNOFF PATTERNS:
The site drains to two separate wetlands that eventually drain to Fenger Brook. Drainage from a private storm drain system serving the Georgetown Apartments discharges to the north wetlands. The untreated discharge from the City storm water system drains to the south wetlands area. The south wetland drains into the parking lot of the existing development to the southwest. Water flows across that parking lot in heavy storms, and then flows directly into Fenger Brook. West portions of this property drain directly to Fenger Brook, and a small area on the south east of the site drains to the neighboring yards.

EXISTING POLLUTANT REDUCTION ON-SITE:
The existing storm drain discharging into the north wetlands does so, directly at the wetlands edge. There is no reduction of pollutants before the runoff enters the wetland. However, on the south side, the pipe discharges near the street, the runoff enters an eroding ditch, and then toward the South wetland, the land becomes more gentle in slope and the runoff must travels over a vegetated area before reaching the wetlands. The P8 water quality program considers the pollutant removing ability for buffer areas. In this case, removal is assumed to be 35% (see spreadsheets in appendix).

Assumed P-8 Providence "average storm" pollutant loadings.

Pollutants in runoff	**tss**	**tp**	**tkn**	**copper**	**lead**	**zinc**	**bacteria**
In mg/l	**54.5**	**0.26**	**0.53**	**50.7**	**0.129**	**0.129**	**15000**

Calculated removal percentage for pollutants, existing site:

Pollutants in runoff	**tss**	**tp**	**tkn**	**copper**	**lead**	**zinc**
%	**9.92**	**4.89**	**4.21**	**4.21**	**4.21**	**7.05**

PROPOSED SITE CONDITIONS

DRAINAGE:
Handling Existing Flows From Off-Site:
The drainage entering the parcel from off-site properties is to be:

- Consolidated into one pipe,
- Treated through a Stormceptor 6000 for reduction of oil and sediments,
- Discharged to an energy dissipater at the head of a small sediment pond,
- Finally, discharging through weirs, 80% to the existing northern wetlands, and 20% to the existing southern wetlands at a saddle between the north and south wetlands.

Handling of On-site Runoff:
In order to reduce the peak flows, and to provide cleansing of the storm water, infiltrator/ drywells are used thought the project. These drywells will handle all storm runoff from roofs and paved areas generated on site through a 25-year storm.

On North portion of site:

- Roof drains capture roof runoff and direct this cleaner water to infiltration beds behind Estate 3 and on the corner of Estates 1 and 2
- Runoff from the north driveway, and parking behind Estates 1 and 3 will be collected in catch basins (that remove oil and grit, and are fitted with snorkel inlets) before being discharged to infiltration beds under the pavement between Estate 1 and 3.
- Infiltration beds capture all water though a 25-year storm.
- In storms greater that 25-year return, infiltrators will overflow.

- Water from the infiltrators in back of Estates 1 and 3 will overflow to a curb cut and then flow down a mechanically stabilized slope until it reaches a swale located west of the sewer right-of way. The swale will overflow over a level spreader in the largest storms.
- Water from the roof of Estates 1 and 2 overflows the infiltrators in storms greater than 25-year return into the street on Georgetown Road. This flows to the City storm system.

On the central portion of the site:

- Behind Estates 2 and 4, surface runoff will sheet off the uncurbed driveway onto a grassed swale.
- Roof runoff for storms thorough 25-year return from #4 will be piped to an infiltration bed.
- The grassed swale is underlain by a line of 16 infiltration chambers that infiltrate a portion of the runoff generated by the developed area.
- Overflow from the swale enters catch basins leading to an infiltration bed located in the parking area of Building 6.
- In storms greater than a 25-year return, the infiltrators will be filled to capacity. Excess runoff will overflow to a curb cut at the south west corner of the parking area (in the grass) and go into a yard drain that will discharge at the base of the reinforced concrete retaining wall to a flatter area west of the Building 6 parking lot, where it will not cause erosion problems.

On the south portion of the site:

- Roof runoff from Estate 5 will be piped to two separate infiltration beds.
- Runoff from the south driveway and parking areas in back of Estate 5 will be collected in catch basins, and discharged to an infiltration bed located in the parking area of #6.
- The roof drains and runoff from Estate 6 will be collected by an oil/grit removing catch basin and directed into an infiltration bed.
- In storms greater than 25-year return, the infiltrator capacity may be exceeded. Excess runoff will overflow to a curb cut at the southeast corner of the parking area (in the grass) and go into the same yard drain mentioned earlier.
- Runoff from grass and landscaped areas outside of paved areas will sheet flow to areas to the west.
- A small amount of landscaped area on the south edge of the site will continue to discharge onto the neighboring property, but at a lesser rate than occurs in the present condition.

A change in discharge points for the city Storm drain system is proposed. Presently, all water from the city system discharges uphill of the south wetlands and peak runoffs short circuit though the parking lot to the southwest. The proposed drainage system will minimize the short-circuiting by reducing the storm flows entering this wetland, but will continue to nourish the south wetlands with water absorbed in the infiltrator structures that serve Estate buildings 5 and 6. A discussion of the volume routing is included later in this report.

Stormwater Management Plan:

This plan is based upon the guidelines of the 2004 Stormwater Quality Manual. Supplementing this plan is the Drainage Report for this project, which provides detailed calculations and summarizes the hydrology, existing and proposed for the site. This portion of the stormwater management plan is designed to address water quality aspects of the existing and proposed runoff.

The 2004 Storm Water Quality Manual addresses the following subjects:

- **Hydrologic Sizing Criteria**
- **Site Planning and Design**
- **Source Control Practices and Pollution Prevention**
- **Selection Criteria**
- **Stormwater Retrofits**
-

Also included in this report are:

- **Pollutant Removal Rates**
- **Compliance with recommendations of the Fenger Brook Study**
- **Alternatives Considered**

Hydrologic Sizing Criteria:

Hydraulic sizing criteria are important elements of drainage design that address flooding and the potential for erosion. This subject is addressed separately in the Drainage Report and Stormceptor Sizing Report. The Drainage Report addresses both peak flows, and volumes of water, distributed to surface runoff and to the ground water.

Site Planning and Design:

Site planning addresses the following considerations:

- **Runoff Volume and Rate**
- **Groundwater Recharge**
- **Stream Base flow**
- **Runoff Water Quality**

Runoff rate:
On this site, several methods were used to reduce and slow runoff rate:

- Where possible, roof runoff was directed to drywells to reduce surface runoff on paved areas, providing groundwater recharge at the same time.
- Driveways were placed behind parking so as to use the paving for both through traffic and parking maneuvering.
- Where possible, curbs were omitted to permit runoff to flow into grassed swales.

- Infiltration with pretreatment was used to remove runoff from paved areas to minimize the volume of surface runoff discharged to the wetlands.
- Sediment ponds were modified to act as infiltration basins, for the average stormwater event.

Groundwater Recharge: Groundwater recharge was made a priority for this site because of the wetlands down hill of the site. By infiltrating as much runoff as possible, the wetlands continue to be nourished days after the rainfall event is over.

Stream Base flow: **Stream base flow** is protected or even enhanced. Flow and volume summations are provided in the drainage report.

Runoff Water Quality for this site was a challenge. Presently the site is host to two untreated point source discharges from existing off-property storm drain systems that discharge directly to the wetlands. These flows are many times the magnitude of any increase in flows due to development of this site. Handling and treating the increase in runoff from the site development alone is a relatively simple matter. The difficulty arises is treating and handling the existing flows. This is a retrofit problem, and where there is easily enough room to handle development increase, to do so while treating the existing untreated discharges presents the greatest challenge.

Source Control Practices and Pollution Prevention

The developer has no control over source control practices affecting the majority of stormwater entering the site, however, the development of the site itself offers the opportunity to incorporate the following practices:

- **Parking lot sweeping**: Required twice annually.
- **Drainage system maintenance**: Required quarterly.
- **Oil spill control**: Spill absorbent on site and provided to all owners.

And

- **Fertilizer and Pesticide Management**: Plan is part of any landscaping contract and prohibits use of fertilizers.

All of these preventive practices are incorporated into the Condominium documents as a legal obligation of the condominium board. Those papers and management plans are attached as Appendix A to this report.

Selection Criteria:

The main considerations for selection are:

- **Pollutant reduction,**
- **Groundwater recharge and runoff volume reduction, and**
- **Stream channel protection and peak flow control.**

Pollutant Reduction:
Although the Connecticut manual gives a specific chemical breakdown of typical pollutants by average quantities found in an average urban runoff profile, it generalizes pollutant removal into the following categories:

- Sediment
- Total P
- Total N
- Metals
- Hydrocarbons
- Bacteria
- Deicing chemicals

Pollutant Reduction For Untreated Off-site Sources:
The first priority is to reduce the pollutants from the off-site point untreated discharges. Sediment removal is the most important step because it offers the greatest chance for overall reduction of pollutants. A treatment train was designed, consisting of:

1. A vortex separator followed by,
2. A sediment pond modified to provide some infiltration basin capabilities.

Because of the designed treatment train (Stormcepter and pond) there was no need for a full size pond, which would have been sufficient for absorption without the use of the Stormcepter. By following a method weak in nutrient removal, with one stronger in nutrient removal, the two methods complement each other. The Stormceptor is sized to remove 81% of sediment though most storms, and 50% of hydrocarbons (see attached sizing report, Appendix B). The infiltration basins are effective in removal of nutrients, metals, bacteria and sediment (Table 8-1, Stormwater Management effectiveness criteria page 8.3, 2004 Stormwater Manual).

Pollutant Reduction For On-Site runoff:
On-site runoff was divided into roof and surface runoff whenever grades permitted.

Roof Runoff:
Almost all roof runoff is directed into drywells consisting of SC 310 and SC 740 infiltration units. All roof runoff has a minimum travel time through the soil column of at least 5 hours from basin bottom to ground water. Average travel time is more than 8 hours (see attached detention time table, Appendix C).

Surface Runoff:

The treatment train for surface runoff generated on site consists of:

1. A catch basin insert to remove hydrocarbons, trash and most sediment,
2. The catch-basin sump to remove additional sediment, and
3. An infiltration bed of SC 740 or SC 310 units.

The catch basin inserts, and the underground infiltrator systems are both considered innovative or emergent technologies. The catch basin insert is considered to provide a partial benefit for the removal of sediment, metals, flotables, and oil and grease (page 11-S9-1 Ct Manual)(see oil removal calculations, Appendix D). It is followed by a catch basin sump that with the low flows designed on this site (less than 1.5 cfs), provides additional sediment removal. The underground infiltration system is also considered to be partially effective on sediment, nutrients, metals and dissolved pollutants. Because we have restricted the use of fertilizers on-site, the nutrients loading should be low to start with. Finally, the entry row of each infiltrator bed is wrapped with filter fabric as a last line of defense against sediment blinding of the infiltrator bed.

Additional Treatment for On-site Runoff:

For the parking area in back of Buildings 2 and 4, the parking lot is curbless, permitting runoff to travel through a grass swale before entering the system detailed above. This adds a fourth step to the treatment train for this area. Grass swales (page 11-P5-1 Ct Manual) are effective at sediment removal, and partially effective at removing nutrients, metals, and dissolved pollutants.

Groundwater Recharge and Runoff Volume Reduction:

Infiltration was chosen whenever possible to reduce surface runoff, and to recharge the ground water. Detention times recommended by the Connecticut DEP were used, and the good distance to ground water or ledge, combined with the silty sand soil will provide retention time greater than 6 hours for adequate removal of pollutants prior to entering the groundwater table. The minimum calculated retention time is 9 hours, and the average is 14. Calculations on volumes are found in the drainage report. In the summer, water released into a wetlands system from the groundwater is usually cooler than stormwater runoff, helping reduce the overall temperature, to reduce BOD and bacteria growth, and stress on fauna.

Stormwater Retrofits

The Stormceptor, and the central sediment pond are essentially a retrofit on the existing storm drain system. Untreated discharge from two separate existing off-site systems is to be treated and discharges through level spreaders instead of being discharged directly to the wetlands.

Anticipated Pollutant Removals:

All that is required in the most recent publication of the Connecticut manual—governing the Best Management Practices – is a demonstration of effectiveness. Selectively, the Connecticut Manual does not evaluate the effectiveness by percentage (except for sediment removal); quantities of pollutants removed are not calculated or quantified in this report. Since all surface runoff is subjected to at least two methods of treatment, the chosen treatment trains (themselves) will be evaluated for their effectiveness as set forth within the Connecticut manual.

Anticipated Pollutant Constituents:

Pollutant	
Total Suspended Solids	54.5 mg/l
Total Phosphorus	0.26 mg/l
Soluble Phosphorus	0.1 mg/l
Nitrate Nitrogen	2 mg/l
Total Nitrogen	1.47 mg/l
Total K N	0.53 mg/l
Nitrate and Nitrite	11.1 mg/l
Copper	50.7 u/g
Lead	129 u/g
Zinc	129 u/g
BOD	11.5 mg/l
COD	44.7 mg/l
Organic Carbon	11.9 mg/l
PAH	3.5 mg/l
Oil and Grease	3 mg/l
Fecal Coliform	15000 Col/100 ml
Fecal Strep	35400 Col/100 ml
Chloride (snow melt)	116 mg/l

From Table 2.4
2004 Connecticut Stormwater Quality Manual

The above table represents average urban runoff in the northeast. The runoff for this project might be considered somewhat better in quality than what is listed above because the drainage area is only 20 to 30% impervious, low for an "urban" area. However, there is no discussion or provision for assuming lower pollutant loading in a residential area. Therefore, these figures will be used as a basis for the initial quality of the runoff from paved areas, and from off-site.

Removal Rates:
Although the Connecticut Manual does not require a detailed evaluation of proposed stormwater quality, removal rates found in the P-8 Stormwater quality program was applied to this project (documentation in Appendix E).

The sediment found in the runoff of a two year storm can be calculated by assuming a sediment loading (54.5 mg/l from table 2-4), and calculating the volume of runoff. For runoff originating offsite, the volume in a 2-year storm is 1.083 acre-feet. The pounds of sediment entering the wetlands presently total 168 pounds. Approximately 17 pounds are removed in the buffer area before entering the south wetlands leaving 151 pounds entering the wetlands.

After development, the offsite runoff plus the onsite runoff is 1.372 acre-feet. The loading would be 203 pounds of sediment. An estimated 82% of this is removed after development, through treatment in the Stormceptor and the infiltration area, to 37 pounds. This is a 75% reduction in sediment loading to the wetlands.

Removal of other pollutants:
Pollutant removals were discussed earlier the Selection Criteria under Pollutant Reduction and three sources noted. Where there is not room for more traditional ponds, treatments in series may be used instead, providing they complement each other on pollutant removal. The following chart shows pollutants vs. the anticipated removals as outlined in the 2004 Connecticut Stormwater Quality Manual.

For runoff from offsite:

Pollutant	Stormceptor	Infiltration
Sediment	effective	effective
Total P	low	effective
Total N	low	effective
Metals	Partially	effective
Hydrocarbons	effective	low
Dissolved Pollutants	low	partially
Bacteria	low	effective

For on-site generated runoff (excluding roof runoff in dry-wells)

Pollutant	CB insert	CB	infiltrator
Sediment	partially	partially	partially
Total P**	low	low	partially
Total N**	low	low	partially
Metals	partially	low	partially
Hydrocarbons	Effective *	low	partially
Dissolved Pollutants	low	low	partially
Bacteria	low	low	effective

* see attached oil analysis

** Due to land management practices, initial nutrient runoff from this site should be extremely low. Overflow from this system is routed to one of the detention basins.

Water quality analysis results using P8 model parameters:

Assumed P-8 Providence "average storm" pollutant loadings.

Pollutants in runoff	tss	tp	tkn	copper	lead	zinc	bacteria
In mg/l	54.5	0.26	0.53	50.7	0.129	0.129	15000

Calculated removal percentage for pollutants, proposed site:

Pollutants in runoff	tss	tp	tkn	copper	lead	zinc
%	81.8	46.0	41.0	41.0	62.3	39.1

Calculated removal percentage for pollutants, existing site:

Pollutants in runoff	tss	tp	tkn	copper	lead	zinc
%	9.92	4.89	4.21	4.21	4.21	7.05

As can be seen, there would be a 5 to 10-fold increase in pollutant removal over the existing conditions.

In conclusion, all listed pollutants are effectively reduced-- meeting the aforesaid criteria as set forth within the Connecticut manual-- with the implementation of this methodology (treatment train).

COMPLIANCE WITH RECCOMMENDATIONS OF THE FENGER BROOK STUDY:

The Connecticut DEP Impaired Waters list includes Fenger Brook and Alewife Cove as Water Bodies not meeting water quality standards or designated uses per Section 303(d) of the Federal Clean Water Act.

Fenger Brook is assigned a tier 3 priority for the impaired designated use of Aquatic Life Support. A tier 2 priority has been assigned for the designated use of Primary Contact Recreation. Potential causes of impaired water quality are listed as unknown, organic enrichment, and low dissolved oxygen. Potential sources of impaired water quality are identified as unknown source, urban run-off/storm sewers.

Alewife Cove is assigned a tier 2 priority for the impaired designated uses of Aquatic Life Support and Shellfishing. Potential causes of impaired water quality are listed as nutrients, organic enrichment and low dissolve oxygen. Potential sources are listed as urban run-off/storm sewers and waterfowl.

The Fenger Brook Watershed Study was done in 1996 covering watersheds in both New London and Waterford. It was done to identify non-point sources in the watershed and to develop a strategy to mitigate such impacts. The specific problems identified included elevated fecal coliform bacteria concentrations, algae blooms, high sedimentation rates, and freshwater flushing associated with stormwater impacts. The study made several recommendations to the Town and City.
The most cost effective measures were improved street sweeping practices, annual catch basin maintenance, conveyance of stormwater to level spreaders, discharging to forested areas, sand filters, and a fertilizer management program. All of these measures except for sand filters are incorporated into the Stormwater Management plan for this project.

Other recommendations not specifically aimed at Town and City regulation changes or work in the wetlands themselves included reduction of impervious areas, minimizing concentrated runoff flow, and increase infiltration, and garbage collection for private property owners. All of these measures are also incorporated into the plan for this project.

Some measures we have proposed were not specifically addressed in the 1996 plan because they were not proven technology at the time. For example, vortex sediment removal devices were only being introduced at that time. Since then, the City has installed one on Woodlawn Road, and this project also proposes the installation of a Stormceptor model to remove oil and sediment from the currently untreated discharge from the City Storm System. Underground infiltrators were not specifically addressed at that time either, but are addressed now in the State Stormwater manual. Also not commonly used at the time are catch basin inserts. The catch basin inserts are not usually appropriate for public streets due to the higher flows, but they are easily used in a small private parking lot being maintained by contract.

This project conforms to the recommendations of the Fenger Brook Study in as many ways as possible. The quality of stormwater discharged from this site after development will be greatly improved over existing conditions.

ALTERNATIVES CONSIDERED:

This project has been through several iterations of design, and several alternatives were considered, and rejected as a result of input from the State, the Town of Waterford, the City, and from neighbors. Alternates considered included:

- Different placement of buildings closer to wetlands than in the current configuration,
- The used of a large central dry pond located adjacent to the wetlands to treat, infiltrate and control the flooding of stormwater.
- Placement of a playfield adjacent to the wetlands.
- Placement of fill on the north side of the property to balance cut and fill on the site (would have conflicted with the natural vegetation in the upland buffer).

- Placement of a dry pond on the west side of the sewer right-of-way (close to the brook itself).
- A wider driveway on the north side of the project.
- Potential future development on the portion of the upland property near the sewer right of way.
- Porous pavement (requires special vacuum equipment to maintain pervious characteristics).
- Concrete pavers (costly and tend to seal up after a few years).

PROPOSED STORMWATER MONITORING PROCEDURES:

Parameters to be monitored:

1. Total Oil and grease (mg/l)
2. pH
3. Biological Oxygen demand (mg/l)
4. Chemical Oxygen demand (mg/l)
5. Total suspended solids (mg/l)
6. Total Kjeldahl Nitrogen (mg/l)
7. Nitrate as Nitrogen (mg/l)
8. Fecal coliforms (mpn/100 ml)
9. Total coliforms (mpn/100 ml)
10. Total Copper (mg/l)
11. Total Zinc (mg/l)
12. Total Lead (mg/l)
13. Chloride (mg/l)
14. Sodium (mg/l)
15. True color (co-Pt units)
16. Turbidity (NTU)
17. Odor (Threshold units)
18. Total petroleum Hydrocarbons (mg/l)

Annual samples shall be collected from the discharge of the central sediment pond resulting from a storm event that is greater than 0.1 inch in magnitude and that occurs at least 72 hours after any previous storm event of 0.1 inch or greater. Where feasible, the rainfall during the first thirty minutes of the storm event monitored shall be between 0.1 and .74 inches. Runoff events resulting form snow or ice melt cannot be used to meet the minimum annual monitoring requirements. Grab samples shall be used for all monitoring. Grab samples shall be collected during the first 30 minutes of a storm event **discharge.** The uncontaminated rainfall pH measurement shall be taken at this time.

The following information shall be taken for the storm events monitored:

1. The date, temperature, time of the start of the discharge, time of the sampling, and magnitude (in inches) of the storm event sampled.

2. The duration between the storm event sampled and the end of the previous measurable (greater than 0.1 inch rainfall) storm event.

Test procedures: All pollutant parameters shall be tested according to methods prescribed in title 40, CFR, Part 136 (2001)

Reporting and Record Keeping Requirements:
For each measurement or sample taken pursuant to the requirements of this permit, the discharger shall record the following information:

1. The place, date, and time of sampling
2. The person collecting the samples
3. The dates and times the analyses were initiated
4. The person(s) or laboratory who performed the analyses
5. The analytical techniques or methods used
6. The results of all required analyses

SUMMARY:

As a result of this project, stormwater quality will be improved over existing conditions. Presently untreated stormwater from the off-site stormwater systems will be treated for the first time, and overall pollutant loads on Fenger brook will be decreased.

Stormceptor Sizing and Maintenance

Information Package

For:

Elizabeth Havens' Estates
Georgetown Road
New London, CT

Appendix C

Stormceptor CD Sizing Program
United States
Version 4.0.0

Project Details			
Project	New England Development	Project #	204108
Location	New London, CT	Company	Cherenzi & Associates, Ltd
Date	Sept 2004	Contact	D. Marshall-Baker

Selected Rainfall Station	
State	Connecticut
Name	NEW HAVEN WB AIRPORT
ID #	5273
Elev. (ft)	6
Latitude	N 41 deg 16 min
Longitude	W 72 deg 53 min

Site Parameters	
Total Area (ac)	13.252
Imperviousness (%)	25
Impervious Area (ac)	3.31

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

Stormceptor Sizing Table		
Stormceptor Model	% Runoff Treated	% TSS Removal
STC 450	38	57
STC 900	55	70
STC 1200	55	71
STC 1800	55	70
STC 2400	67	75
STC 3600	67	75
STC 4800	79	80
STC 6000	79	81
STC 7200	85	83
STC 11000	90	87
STC 13000	90	87
STC 16000	94	90

Comments :

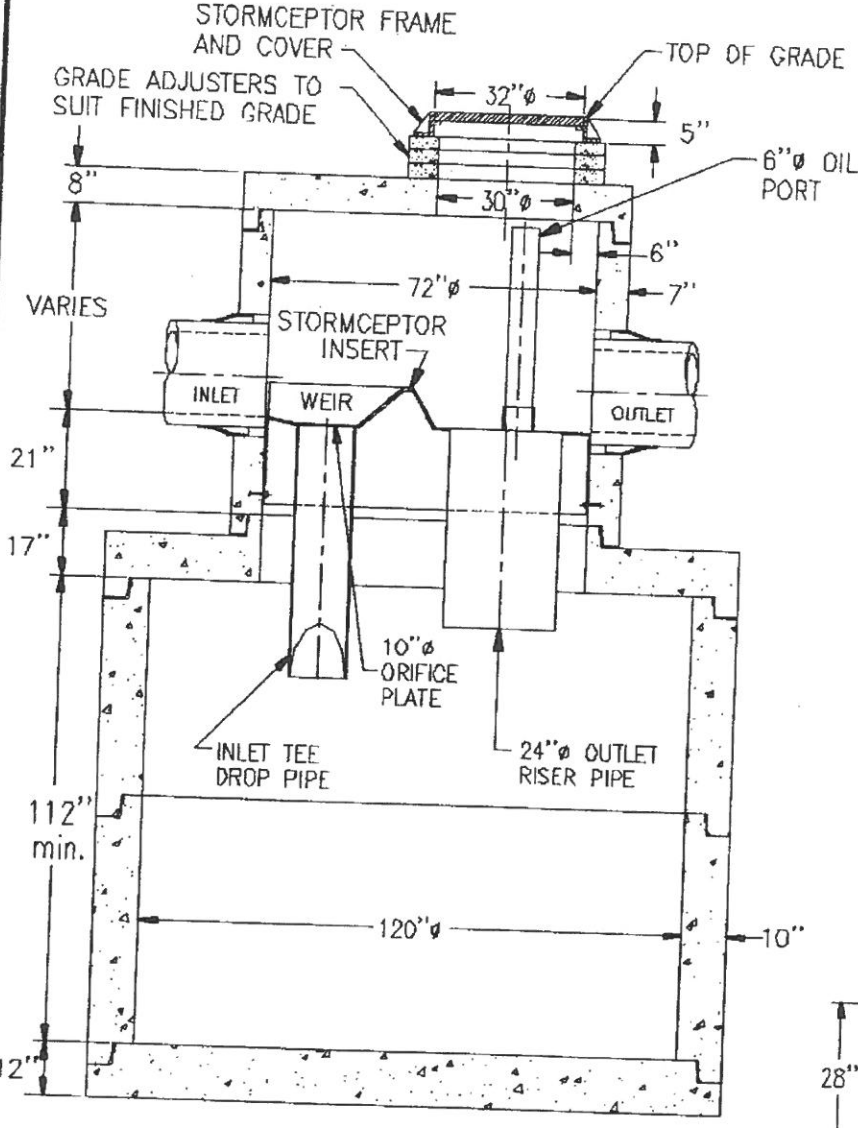
Stormceptor®

Hydro Conduit

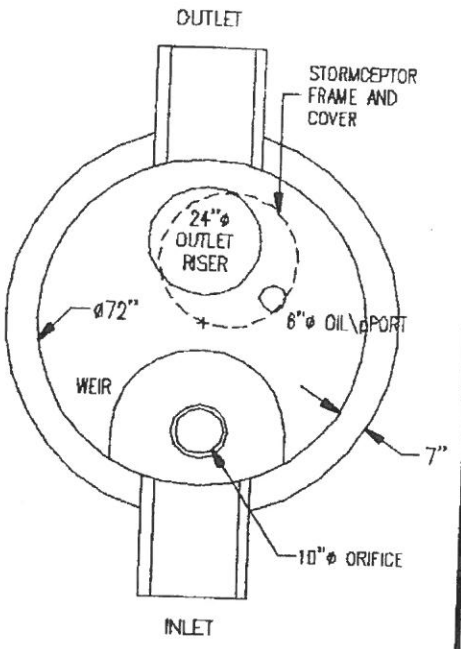
STC 6000 Precast Concrete Stormceptor
(6000 US Gallon Capacity)

PROJECT:
LOCATION:

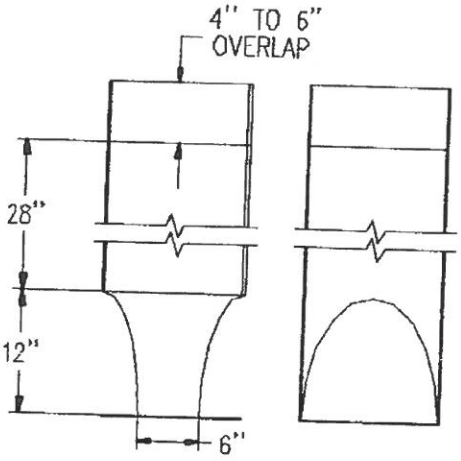
DR. BY: N. BALDWIN
CK. BY:
DATE: FEB. 13, 2001
SCALE: N.T.S.
DWG.#



SECTION THRU CHAMBER



PLAN VIEW OF INSERT



ENLARGED INLET TEE DROP PIPE

NOTE :

1. THE USE OF FLEXIBLE CONNECTIONS IS RECOMMENDED AT THE INLET AND OUTLET WHERE APPLICABLE.
2. THE COVER SHOULD BE POSITIONED OVER THE 24"ø OUTLER RISER PIPE AND THE 6"ø OIL PORT.
3. THE STORMCEPTOR SYSTEM IS PROTECTED BY ONE OR MORE OF THE FOLLOWING U.S. PATENTS: #4985148, #5498331, #5725760, #5753115, #5849181.

REV.	DESCRIPTION	BY:	DATE

B

Application/Limitations of the Program

This program was designed to accommodate the needs of most of the common urban applications where the Stormceptor will be used. There are certain applications where the program should not be used in the design of a Stormceptor which include the following:

1. Sites that exhibit unstable wash-off characteristics such as construction sites and sites with material storage.
2. Sites with a-typical suspended solids characteristics such as coal manufacturing facilities, cement manufacturers (sites with a particle size finer or coarser than that given by the USEPA NURP)
3. Sites with altered post development annual hydrology. Alterations to the annual hydrology result from the implementation of stormwater controls upstream of the proposed Stormceptor. Infiltration or detention control of small storms (< 1 year) result in alterations to the annual hydrology. Sites with flood control (2 to 100 year detention facilities) will not significantly alter the annual hydrology since detention occurs infrequently. Upstream flood control facilities do not preclude the use of this program for water quality design.
4. Predictions of annual runoff treatment and TSS removal were calculated for up to 20 impervious acres. The program will indicate a "drainage area too large" error for impervious areas that exceed this value.

The program calculates continuous runoff from rainfall and simulates TSS build-up and wash-off from the design area. TSS removal rates are estimated from the particle size distribution and settling rates. Assumptions for slope, depression storage, evaporation rates, build-up and wash-off parameters as well as the particle size distribution and settling rates are given in the description of the model calculations. Users of the program should become familiar with these calculations and parameter values to ensure that they understand the applicability and limitations of this program.

The Stormceptor Group of Companies and their affiliates have the ability to model the Stormceptor System to accommodate specific design scenarios. Please call 1-800-565-4801 or e-mail us to receive a copy of the detailed sizing program. The detailed program provides inputs for particle size distribution, winter sanding, slopes, depression storages, upstream detention storage and different loading functions.

Users should be familiar with the disclaimer regarding the use of this program.

Stormceptor®

Maintenance Frequency

Frequency

Stormceptor® should be maintained annually, when sized correctly, after a spill event or if, Oil and Sediment levels exceed maintenance volumes, as below. Maintenance should be part of Standard Operating Procedure.

Sediment Volumes

* Maintenance depths for concrete are based on volumes as specified in the table. Consult your local manufacturing representative for the actual dimensions of the units your area of interest.

Concrete*

Unit	Total Volume IMPG	Total Volume USG	Total Sediment Volume IMPG (L)	Total Sediment Depth IN (mm)	Maintenance Volume IMPG (L)	Maintenance Depth IN (mm)
STC	300	450	280 (1275	43 (1092)	51	8 (200)
STC	750	900	541 (2460)	37 (936)	116	8 (200)
STC	1000	1200	717 (3260)	49 (1241)	144	10 (250)
STC	1600	1800	1245 (5660)	85 (2154)	217	14 (375)
STC	2000	2400	1353 (6150)	52 (1317)	308	11 (300)
STC	3000	3600	2291 (10415)	88 (2231)	436	16 (425)
STC	4000	4800	3093 (14060)	76 (1927)	602	14 (375)
STC	5000	6000	3993 (18510)	100 (2537)	722	17 (450)
STC	6000	7200	5157 (23445)	88(2231)	867	14 (375)
STC	9000	11000	6186 (28120)	76 (1927)**	602	14(375)**
STC	10000	13000	7986 (37020)	100 (2537)**	722	17(450)**
STC	14000	16000	10314 (23445)	44 (1115)**	867	14(375)**

Fiberglass

Unit	Total Volume IMPG	Total Volume USG	Max Sediment Volume IMPG	Max Sediment Depth IN (mm)	Sediment Maintenance Depth IN (mm)	Sediment Maintenance Volume IMPG (L)
STA	300	450	277	45 (1143)	8 (200)	38 (172)
STA	750	900	529	36 (914)	14 (356)	75 (340)
STA	1000	1200	779	36 (1346)	17 (432)	100 (454)
STA	1600	1800	1279	87 (2210)	21 (533)	150 (681)
STA	2 000	2 400	1088	47 (1194)	13 (330)	200 (908)
STA	3000	3600	2088	85 (2159)	17 (432)	300 (1 362)

STA	4000	4800	2632	71 (1803)	16 (400)	
STA	5000	6000	3660	96 (2438)	22 (559)	
STA	6000	7200	4600	86 (2184)	18 (457)	600 (2 725)
STA	9000	11000	5264	16 (400)		
STA	10000	14000	7320	192 (4368)**	22 (559)	
STA	13000	16000	9200	172 (22096)**	18 (457)	

**Depth for each tank.

Oil Volumes

* Maintenance depths for concrete are based on volumes as specified in the table. Consult your local manufacturing representative for the actual dimensions of the units your area of interest.

Concrete*

Unit	Total Volume IMPG	Total Volume USG	Max Oil Volume IMPG (L)	Max Depth of Oil IN (mm)	Maintenance Depth Oil IN (mm)
STC	300	450	325 (4159)	11 (273)	8 (200)
STC	750	900	915 (4159)	9 (234)	8 (200)
STC	1000	1200	915 (4159)	12 (310)	10 (250)
STC	1600	1800	915 (4159)	21 (539)	14 (375)
STC	2000	2400	2945 (13 388)	13 (329)	11 (300)
STC	3000	3600	2945 (13 388)	22 (558)	16 (425)
STC	4000	4800	3490 (15 866)	16 (413)	14 (375)
STC	5000	6000	3490 (15 866)	25 (634)	17 (450)
STC	6000	7200	4150 (18 866)	22 (558)	14 (375)
STC	9000	11000	6980 (31 731)	16 (413)**	14 (375)**
STC	10000	13000	6980 (31 731)	25 (634)**	17 (450)**
STC	14000	16000	8300 (37 732)	22 (558)**	14 (375) **

** Depth for each tank

Fiberglass

Unit	Total Volume IMPG	Total Volume USG	Max Oil Volume USG	Oil Maintenance Depth IN (mm)	Oil Maintenance Depth IN (mm)
STA	300	450	71	86 (2184)	273 (11)
STA	750	900	201	242 (6147)	234 (9)
STA	1000	1200	201	242 (6147)	310 (12)
STA	1600	1800	201	242 (6147)	539 (21)
STA	2000	2400	648	778 (19761)	329 (13)
STA	3000	3600	648	778 (19761)	558 (22)
STA	4000	4800	768	922 (23419)	413 (16)
STA	5000	6000	768	922 (23419)	634 (25)
STA	6000	7200	913	1096 (27838)	558 (22)
STA	9000	11000	1535	1844 (46838)	413 (16)**
STA	10000	13000	1535	1844 (46838)	634 (25)**
STA	14000	16000	1826	2193 (55702)	558 (22)**

Requires Profile Information (contact Stormceptor® for information)

Inspection procedure

General

Stormceptor® should be inspected regularly. Inspections should be part of Standard Operating Procedures.

Safety

Do not enter the Stormceptor® treatment chamber unless properly trained, equipped and qualified to enter a confined space as identified by local Occupational Safety and Health Regulations (e.g. Canada Occupational Safety and Health Regulations - SOR/86-304). Watch for and avoid contact with overhead power lines when inspecting the unit with long sampling devices (e.g. Sludge Judge®) Stormceptor® is designed so inspection of the unit can be preformed from grade (i.e. inspect for obstructions, etc.). Qualified personal may enter the upper by-pass chamber and use the insert as a platform to remove obstructions, sewer flushes, or camera surveys. Be aware that the insert may be slippery. Be aware that some units do not have a safety grate over the outlet riser pipe.

Sampling Equipment

- Sludge Judge® or equivalent Oil level alarm system.

Contact your local manufacturing representative for details.

Inspection Procedure

Determine the length of sampler required; consult the owner's manual or contact the local manufacturing representative for this information.

Assemble the sampler sections (top, middles, and bottom) to the correct length.

Locate the 6" (150mm) oil port visible from surface, usually located near the outlet riser pipe.

Lower the Sludge Judge® to the bottom of the tank. The float valve opens allowing materials to flow in. When the bottom has been reached and the pipe has been filled to the surface level, tug slightly on the rope as the Sludge Judge® is raised.

This sets the check valve trapping the mixture inside.

When the sampler has been raised the amount of oil and sediment can be read using the 1-ft. increments marked on the pipe sections.

To release the material in the Sludge Judge® touch the pin extending from the bottom section against a hard surface such as a pail. This will open the check valve to drain the sample.

Maintenance should be performed once the oil and sediment reach the recommended depths. Maintenance should be performed once the sediment depth exceeds the values as below.

Concrete

Unit	Canada	USA	Total Volume IMPG (L)	Max Sediment Volume IMPG (L)	Maintenance Depth Sediment Inches (mm)
STC	300	450	280 (1 275)	273 (11)	8" (200)
STC	750	900	541 (2 460)	234 (9)	8" (200)
STC	1000	1200	717 (3 260)	310 (12)	10" (250)
STC	1600	1800	1 245 (5 660)	539 (21)	14" (375)
STC	2000	2400	1 353 (6 150)	329 (13)	11" (300)
STC	3000	3600	2 291 (10 415)	558 (22)	16" (425)
STC	4000	4800	3 093 (14 060)	413 (16)	14" (375)
STC	5000	6000	3 993 (18 510)	634 (25)	17" (450)
STC	6000	7200	5 157 (23 445)	558 (22)	14" (375)
STC	9000	10000	6 186 (28 120)	413 (16) **	14"
STC	10000	13000	7 986 (37 020)	634 (25) **	17"
STC	14000	16000	10 314 (23 445)	558 (22) **	14"
*These maintenance depths are only an estimate. Consult you local manufacturing representatives for accurate volumes.					
** Depth for each tank					

Stormceptor®

Owner's Manual

April 2000

The Stormceptor® System is protected by one or more of the following patents:

Canadian Patent No. 2,009,208
Canadian Patent No. 2,137,942
Canadian Patent No. 2,175,277
Canadian Patent No. 2,180,305
Canadian Patent No. 2,206,338
U.S. Patent No. 4,985,148
U.S. Patent No. 5,498,331
U.S. Patent No. 5,725,760
U.S. Patent No. 5,753,115
U.S. Patent No. 5,849,181
U.S. Patent No. 6,068,765
Australia 693.164
Australia 707,133
New Zealand 314,646
European Paten Treaty 95 307 996.9

The Stormceptor System for

Stormwater Quality Improvement

Congratulations!

Your selection of a Stormceptor® System means that you have chosen the most recognized and efficient stormwater oil/sediment separator available. Stormceptor is a pollution control device that protects our lakes, rivers and streams from the harmful effects of non-point source pollution. Please address any questions or concerns regarding the Stormceptor Systems to Stormceptor Canada Inc at 1-800-565-4801 or visit our website at *www.stormceptor.com.*

What is a Stormceptor?

Stormceptor is a patented water quality structure that takes the place of a conventional manhole with in a storm drain system. Stormceptor removes free oil (TPH) and suspended solids (TSS) from stormwater preventing spills and non-point source pollution from entering downstream lakes and rivers. Key benefits of a Stormceptor include:

- Capable of removing 50% to 80% of the total sediment load when properly applied as a source control for small areas
- Removes free oil from stormwater during low flow conditions
- Will not scour or re-suspend trapped pollutants
- Excellent spill control device for commercial and industrial developments
- Easy to maintain (vacuum truck)
- STORMCEPTOR *clearly* marked on the cover (excluding inlet designs)
- Engineered and continually tested
- Vertical orientation therefore resulting in a smaller footprint

Please Maintain Your Stormceptor

To ensure long-term environmental protection through continual performance, **Stormceptor must be maintained**. The need for maintenance is determined through inspection of the Stormceptor. Procedures for inspection are provided in this document. Maintenance of the Stormceptor is performed from the surface via vacuum truck. . If you require a list of contacts for cleaning your Stormceptor please call one of our Stormceptor offices or your nearest Stormceptor affiliate (affiliates listed in Appendix 1).

How does Stormceptor® Work?

Stormceptor can be divided into two components:

- Lower treatment chamber
- Upper by-pass chamber

Stormwater flows into the by-pass chamber via the storm drain pipe. Low flows are diverted into the treatment chamber by a weir and drop pipe arrangement. The treatment chamber is always full of water. Water flows up through the outlet pipe based on the head at the inlet weir, and is discharged back into the by-pass chamber downstream of the weir. The downstream section of the by-pass chamber is connected to the outlet storm drainpipe.

Free oils and other liquids lighter than water will rise in the treatment chamber and become entrapped beneath the fiberglass insert since the outlet pipe is submerged. Sediment will settle to the bottom of the chamber by gravity. The circular design of the treatment chamber is critical to prevent turbulent eddy currents and to promote settling.

During high flow conditions, stormwater in the by-pass chamber will flow overtop of the weir and be conveyed to the outlet storm drain directly. Water that overflows the weir creates a backwater effect on the outlet pipe (head stabilization between the inlet drop pipe and outlet riser pipe) ensuring that excessive flow will not be forced into the treatment chamber, which could scour or re-suspend the settled material. The by-pass is an integral part of Stormceptor since other oil/grit separators have been noted to scour during high flow conditions (Schueler and Shepp, 1993).

Stormceptor Models and Identification

Stormceptor is available in both concrete and fiberglass. There are currently nine different sizes available. A concrete Stormceptor is denoted by STC (e.g. STC6000) preceding the model number. A fiberglass Stormceptor is denoted by STA (e.g. STA6000) preceding the model number.

In the concrete Stormceptor, a fiberglass insert separates the treatment chamber from the by-pass chamber. There is three insert designs: the "spool", the "disc" and the "inlet". The different insert designs are illustrated in Figures 1, 2 and 3. These designs are easily distinguishable from the surface once the cover has been removed. In the "spool" design you will see one large 914 mm (36") opening in the center of the insert with two 200 mm (8") inspection ports located either vertically on the sides of the 914 mm (36") opening or horizontally on either side of the opening. There are three versions of the in-line disc insert: "single inlet/outlet", "multiple inlet" and "submerged". In the "disc" design you will be able to see the inlet pipe, the drop pipe opening to the lower chamber, the weir, a 150 mm (6") oil inspection/cleanout pipe, a large 610 mm (24") riser pipe-opening offset on the outlet side of the structure, and the outlet pipe from the unit. The weir will be around the 610 mm (24") outlet pipe on the "multiple inlet" disc insert. The "submerged" disc insert has a higher weir and a second inlet drop pipe. In the "inlet" design you will be

able to see the 305 mm (12") inlet drop pipe and 100 mm (4") outlet riser pipe as well as a central 100mm [4"] oil inspection/cleanout port.

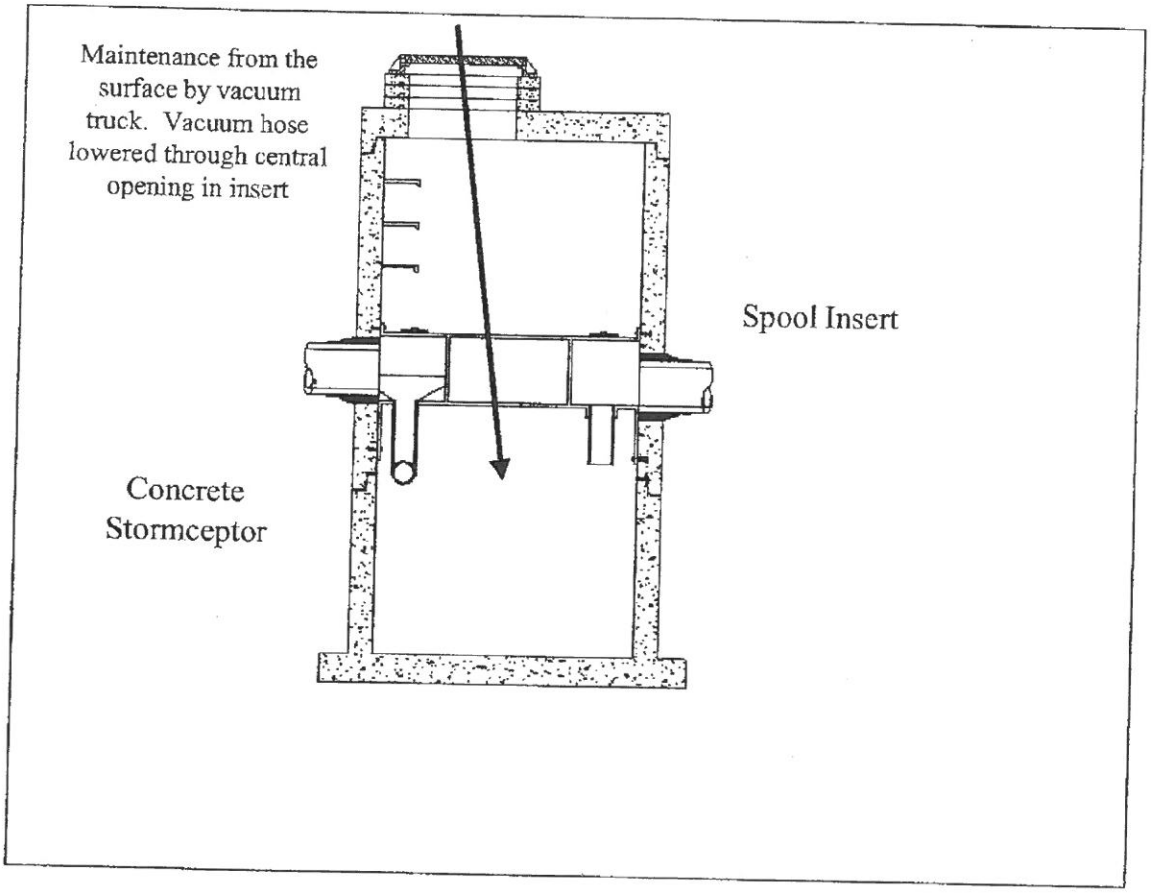


Figure 1 "Spool" Insert Concrete Stormceptor®

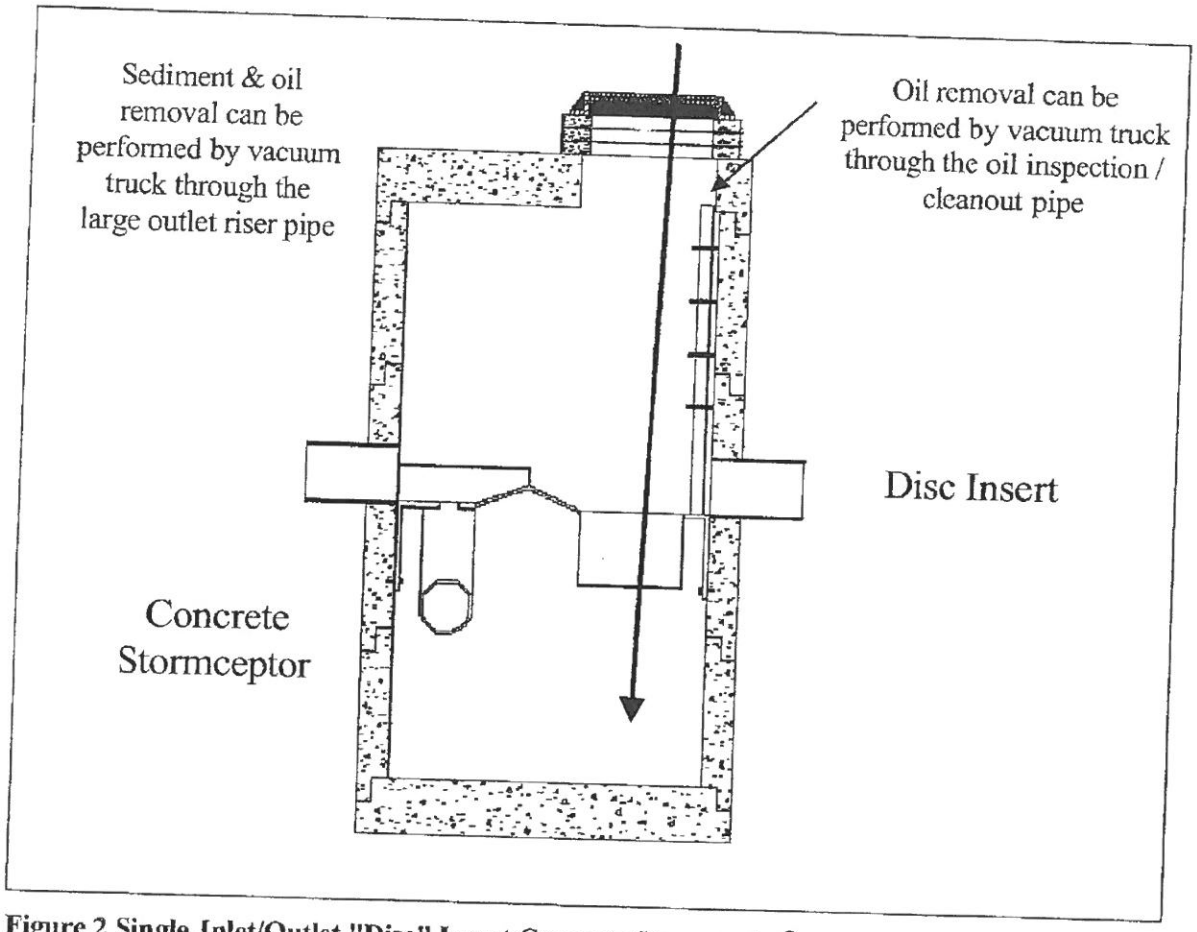
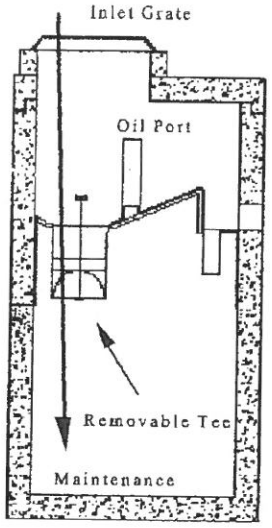


Figure 2 Single Inlet/Outlet "Disc" Insert Concrete Stormceptor®



Inlet Insert

Figure 3 STC 300/450 Inlet Insert

Sizes/Models

Dimensions of the fiberglass and concrete Stormceptor® units are provided in Table 1. Values of invert to grade are provided later in this document for your site. The total depth for cleaning will be the sum of the depth from invert to grade and invert to the bottom of the unit.

Table 1. Stormceptor Dimensions *

Model (Metric)	Model (US)	Pipe Invert to Bottom of STA Stormceptor m (in.)	Pipe Invert to Bottom of STC Stormceptor m (in.)
300	450	1.6 (64)	1.7 (68)
750	900	1.6 (64)	1.9 (74)
1000	1200	2.1 (81)	2.2 (86)
1500	1800	2.9 (115)	3.1 (122)
2000	2400	2.3 (89)	3.1 (122)
3000	3600	3.2 (127)	4.0 (158)
4000	4800	2.9 (113)	3.7 (146)
5000	6000	3.5 (138)	4.3 (170)
6000	7200	3.3 (128)	4.0 (158)

*** Depths are approximate**

The capacities of the different Stormceptor units are provided in Table 2.

Table 2. Stormceptor® Capacities				
Model (Metric)	Model (US)	Sediment Capacity L (US gal)	Oil Capacity L (US gal)	Total Holding Capacity L (US gal)
300	450	1275 (335)	325 (85)	1775 (470)
750	900	2460 (565)	915 (280)	4325 (950)
1000	1200	3260 (845)	915 (280)	5125 (1230)
1500	1800	5660 (1445)	915 (280)	7525 (1830)
2000	2400	6150 (1345)	2945 (880)	10925 (2495)
3000	3600	10415 (2600)	2945 (880)	15195 (3750)
4000	4800	14060 (3475)	3490 (1025)	20180 (5020)
5000	6000	18510 (4550)	3490 (1025)	24635 (6095)
6000	7200	23445 (5425)	4150 (1100)	31210 (7415)

Identification

Even if you do not have plans of your storm drain system you will be able to easily identify where the inline Stormceptor unit(s) (spool or disc insert) are since the name STORMCEPTOR is clearly embossed on the cover. You will be able to determine the location of "inlet" Stormceptor units with horizontal catch basin inlets by looking down the grate since the insert will be visible. The name Stormceptor is not embossed on the inlet models due to the variability of inlet grates used/approved across North America. Once you have found the unit, you may still be uncertain which model number it is. Comparing the measured depth from the water level (bottom of insert) to the bottom of the tank with Table 1 should help determine the size of the unit.

Starting in 1996, a metal serial number tag has been affixed to the inside of the unit. The serial number has the model number written on it. If the unit does not have a serial number, or if there is any uncertainty regarding the size of the interceptor using depth measurements, please contact Stormceptor at 1 800 565-4801 and we will help you determine the size of a particular unit.

What is the Maintenance Procedure?

Maintenance of Stormceptor is performed using vacuum trucks. No entry into the unit is required for maintenance of the spool insert, inlet insert or the smaller disc inserts. Entry to the level of the disc insert may be required for servicing the larger disc insert models. **DO NOT ENTER THE STORMCEPTOR CHAMBER** unless you have the proper equipment, have been trained and are qualified to enter a confined space, as identified by local Occupational Safety and Health Regulations (*e.g.* Canada Occupational Safety and Health Regulations – SOR/86-304). Without the proper equipment and training, entry into confined spaces can result in serious bodily harm and potentially death. Consult local, provincial, and/or state regulations to determine the requirements for confined space entry. Be aware that the insert may be slippery. In addition, be aware that some units do not have a safety grate to cover the outlet riser pipe that leads to the submerged, lower treatment chamber.

The Vacuum Service Industry is a well-established sector of the service industry that cleans underground tanks, sewers and catch basins. Costs to clean a Stormceptor® will vary based on the size of unit and transportation distances.

The depth of oil in the interceptor can be determined by inserting a dipstick tube in the 150 mm (6") oil inspection/cleanout pipe ("disc" design), or in the 914 mm (36") central access way ("spool" design), or in the 100 mm (4") cleanout pipe
("inlet" design).

Similarly, the depth of sediment can be measured from the surface without entry into the Stormceptor via a dipstick tube equipped with a ball valve (Sludge Judge). This tube would be inserted in the central opening ("spool" design) or in the 610 mm (24") opening ("disc" design), or in the 100 mm (4") cleanout pipe ("inlet" design). Maintenance should be performed once the sediment depth exceeds the guideline values provided in Table 3.

For the "spool" design Stormceptor maintenance is performed through the large central 914 mm (36") diameter opening for both the oil and the sediment. In the "disc" design, oil is removed through the 150 mm (6") oil inspection/cleanout pipe and sediment is removed through the 610 mm (24") diameter outlet riser pipe. Alternatively, oil could be removed from the 610 mm (24") opening if water is removed from the lower chamber to lower the oil level to the level of the drop pipes. For the "inlet" design, maintenance is performed through the 305mm (12") inlet drop pipe for the sediment, and oil can be removed from the 100 mm (4") oil/inspection cleanout pipe.

We recommend the following procedure to clean out the Stormceptor:

1. Check for oil (using a dipstick tube)
2. Remove any oil separately using a small portable pump
3. Decant the water from the unit to the sanitary sewer using a portable pump **(prior approval is required from the sewer authority/municipality)**
4. Remove the sludge from the bottom of the unit using a vacuum truck
5. Re-fill the Stormceptor with water where required by the local jurisdiction

How Often Is Maintenance Required?

Generally, annual maintenance is recommended but the required maintenance frequency will vary with the amount of pollution on your site (number of hydrocarbon spills, amount of sediment, etc.). It is recommended that the frequency of maintenance be increased or reduced based on local conditions. If the sediment load is high, maintenance may be required semi-annually. Conversely once the site has stabilized, maintenance may be required less frequently. Maintenance should be performed immediately after an oil spill or once the sediment depth in Stormceptor reaches the value specified in Table 3 based on the unit size.

In the "disc" design and "inlet" design, any potential obstructions at the inlet can be observed from the surface. The "disc" insert has been designed as a platform to facilitate maintenance of the Stormceptor and the storm drain system.

Table 3. Sediment Depths Indicating Required Maintenance		
Model (Metric)	Model (US)	Sediment Depth mm (in.)
300	450	200 (8)
750	900	200 (8)
1000	1200	250 (10)
1500	1800	375 (15)
2000	2400	300 (12)
3000	3600	425 (17)
4000	4800	375 (15)
5000	6000	450 (18)
6000	7200	375 (15)

What Should I do in the Event of an Oil Spill?

Stormceptor® is often implemented in areas where the potential for spills is great. Stormceptor should be cleaned immediately after a spill occurs by a licensed liquid waste hauler. You should also notify the appropriate regulatory agencies as required in the event of a spill.

Disposal of the Trapped Material Removed from Stormceptor

The requirements for the disposal of material from Stormceptor are similar to that of any other Best Management Practices (BMP). Local guidelines should be consulted prior to disposal of the separator contents.

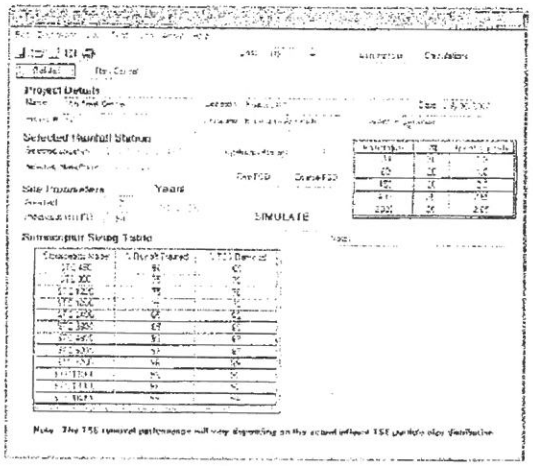
In most areas the sediment, once dewatered, can be disposed of in a sanitary landfill. It is not anticipated that the sediment would be classified as hazardous waste. In some areas, mixing the water with the sediment will create a slurry that can be discharged into a trunk sanitary sewer. In all disposal options, approval from the dsposal facility operator/agency is required. Petroleum waste products collected in Stormceptor (oil/chemical/fuel spills) should be removed by a licensed waste management company.

What if I see an oil rainbow or sheen at the Stormceptor outlet?

With a steady influx of water with high concentrations of oil, a sheen may be noticeable at the Stormceptor outlet. This may occur because a rainbow or sheen can be seen at very small oil concentrations (< 10 ppm). Stormceptor will remove over 95% of all free oil and the appearance of a sheen at the outlet with high influent oil concentrations does not mean that the unit is not working to this level of removal. In addition, if the influent oil is emulsified, the Stormceptor will not be able to remove it. The Stormceptor is designed for free oil removal and not emulsified or dissolved oil conditions.

RELEASED: STORMCEPTOR® CD SIZING PROGRAM

The Stormceptor Group of Companies is pleased to announce the release of the Stormceptor® CD Sizing Program Version 4.0.0 as of October, 2003. The sizing program is an update of the Expert System Version 2.0 (Canada) and the Expert System Version 3.0 (United States).



The Stormceptor CD Sizing Program Version 4.0.0 is proprietary software which applies mathematical models to simulate sediment accumulation, hydrology and long term total suspended solids removal. The sizing program has been calibrated to field monitoring results from actual Stormceptor units that have been monitored in North America with a resulting correlation coefficient (R^2) of 0.94 as presented in Figure 1.

Continued on page 2

DESIGN ONLINE!

Visit our website
www.stormceptor.com
to design online with our interactive
Sizing Program

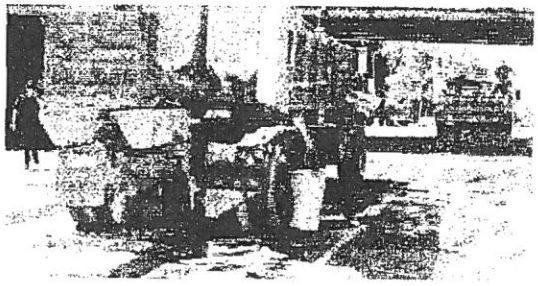
STORMCEPTOR® SYSTEMS

- Inlet
- Inline
- Submerged
- Series

THE NUMBER OF STORMCEPTOR SYSTEMS CURRENTLY PROTECTING OUR ENVIRONMENT

MTO TRUCK IMPOUNDMENT YARD GUARDED BY THE STORMCEPTOR® SYSTEM

Over the past five years, truck safety has improved significantly in Ontario as the volume of truck traffic continues to grow. Instrumental in the province's safety program is the Commercial Vehicle Impoundment Program initiated in early 1998. Ontario is the first jurisdiction in North America to introduce impound-



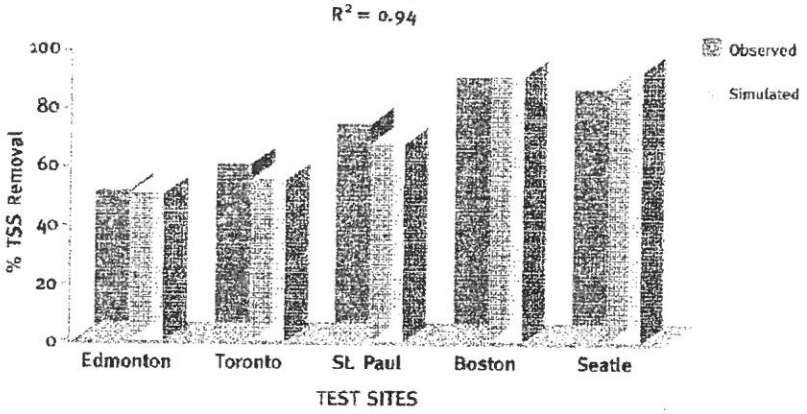
ment for seriously unsafe trucks, buses and trailers. The challenge to the Ministry of Transportation Ontario (MTO) is to locate impoundment yards in close proximity to major highways, within a reasonable towing distance of the inspection location they serve. The yards must be sites that can be easily accessed and upgraded to accommodate large vehicles and cargos that may cause environmental damage, if not contained. Not only are unsafe vehicles impounded, but any leaks from such transports must be contained on site as well. This is where the Stormceptor oil/sediment removal system plays a vital role in preventing pollutants from entering storm sewers and, ultimately, rivers and lakes.

The new impoundment yard at the northwest corner of Kennedy Road and Highway 401 in Toronto is located on the same site as an existing MTO inspection station and works yard. The MTO has an agreement with the Ministry of the Environment (MOE) through a "certificate of approval" noting that it can use the Stormceptor System in its patrol yards. MTO environmental planners and design engineers make every

Continued on page 4

CONTINUED FROM PAGE 1
RELEASED STORMCEPTOR® CD SIZING PROGRAM

Calibration Between Simulated and Field Monitoring Results

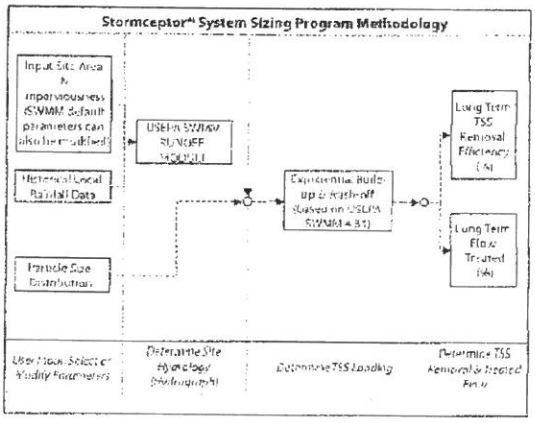


The sizing for the Stormceptor® is based on continuous simulation of hydrology units and total suspended solids (TSS) settling. The sizing process has three components:

- Determination of real time flows;
- Buildup and Washoff of TSS from impervious land areas; and
- TSS transport through the Stormceptor (settling, discharge, by-pass).

The sizing program model consists of two modules. One module is based on the United States Environmental Protection Agency (USEPA) Stormwater Management Model (SWMM) Version 4.3 which models and interprets the hydrology specific to the site. The second module consists of analysis of TSS loading and removal/treatment efficiencies. Figure 2 presents a flowchart of the sizing methodology for the Expert Sizing Program.

Flowchart of Sizing Program Methodology



Key Features - Flowchart of Sizing Program Methodology

The use of a calibrated model is the preferred method for sizing stormwater quality structures for the following reasons:

- The hydrology of the local area is properly incorporated in the design (distribution of flows, back to back storms, inter-event times, rainfall intensity, frequency of large storms);
- The distribution of TSS with the hydrology is properly considered in the design;
- Particle size distribution is properly considered in the design;
- The design can be optimized for TSS removal; and
- The cost benefit of alternate TSS removal criteria can be easily assessed.

The Stormceptor CD Sizing Program Version 4.0.0 is packaged on a CD-ROM and includes a printed instruction manual. Please contact your local Stormceptor representative for a CD-ROM and for any inquiries. Alternatively, the sizing program results (look up table) may be accessed at www.stormceptor.com.

Key Features

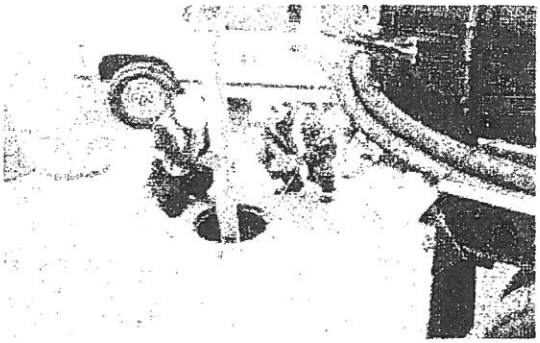
- User friendly interface
- Compatibility with Windows 95, 98, ME, NT, 2000 and XP
- Updated CAD drawings
- Additional rainfall records including locations in Australia, and Japan
- Updated detailed output
- Direct access to the Stormceptor web page through a built in web browser
- Look-up table output
- Comprehensive help function

[illegible]

STORMCEPTOR® SERVICING FACT SHEET

Identification The Stormceptor® System is installed with an embossed frame and cover clearly labeled "Stormceptor".

Access The Stormceptor System may be accessed for inspection and servicing through the maintenance hole (MH) cover. Once the MH cover is removed, the oil inspection port and riser pipe opening may be accessed for inspection or servicing.



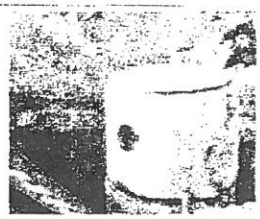
Inspection Using a dipstick or a similar device, the Stormceptor unit is inspected, through the oil cleanout port, at least once every six months. The sediment depth and oil level is measured and once the sediment depth reaches the recommended levels as indicated in the table below, the units should be serviced. If any large presence of oil is measured, the oil should be removed and disposed of.

Sediment Depths Indicating Required Servicing

Model CAN/US	Sediment Depth	Model CAN/US	Sediment Depth
STC 300/450	200 mm (8")	STC 4000/4800	375 mm (15")
STC 750/900	200 mm (8")	STC 5000/6000	450 mm (18")
STC 1000/1200	250 mm (10")	STC 6000/7200	375 mm (15")
STC 1500/1800	375 mm (15")	STC 9000/11000	375 mm (15")
STC 2000/2400	300 mm (12")	STC 10000/13000	450 mm (18")
STC 3000/3600	425 mm (17")	STC 14000/16000	375 mm (15")

Servicing Once the sediment depth has reached the recommended depth for maintenance, the Stormceptor unit should be serviced. A vacuum truck company for liquid/solid waste disposal should be contracted to clean out the unit. Without any inspection, the Stormceptor unit should be serviced a minimum of once per year.

Minotaur (USA) Limited Minotaur is a recommended service contractor for the Stormceptor System. They have three years of direct experience in maintaining Stormceptor units across North America and are the most knowledgeable service contractor in the field. For further information on their services please call 1-519-759-7001.



SERVICE & INSPECTION QUESTIONS ANSWERED

How frequently does a Stormceptor unit have to be inspected?

A Stormceptor unit should be inspected once every six months. Regular inspection is important to quantify the rate of sediment build up and to check for the occurrence of a spill.

How frequently does a Stormceptor unit have to be serviced?

A Stormceptor unit should be serviced once the sediment depth reaches 15% of the total storage volume of the model. The site should be regularly inspected to determine the rate of sediment accumulation. The cleanout frequency averages once per year, depending on site conditions.

How is oil checked for and cleaned out?

The density of oil is lighter than water and can be checked through the oil inspection port. The oil port (150 mm (6 inches) in diameter) may be accessed to measure the depth of oil and to access the oil directly for removal.

How is a Stormceptor unit serviced?

The Stormceptor System is serviced using a vacuum truck. Servicing companies may be found in the local yellow pages under liquid waste disposal. The vacuum truck should be of an adequate size to clean the respective unit.

Must all the water be removed and disposed of from the unit?

No. Only the sediment and oil need to be removed from the lower chamber. The water may be temporarily pumped out of the unit and returned once the sediment has been removed.

What is the definition of clean?

A Stormceptor unit is considered clean when at least 85% of the sediment is removed from the unit. Like any BMP it is physically possible to clean out a system to 100% clean, however, it will not be cost effective.

Is an oil sheen a problem?

With a steady influx of water with high concentrations of oil, a sheen may be noticeable at the Stormceptor outlet. This may occur because a rainbow or sheen can be seen at very small oil concentrations (<10 ppm). Stormceptor will remove over 95% of all free oil and the appearance of a sheen at the outlet with high influent oil concentrations does not mean that the unit is not working to this level of removal. In addition, if the influent oil is emulsified the Stormceptor will not be able to remove it. The Stormceptor is designed for free oil removal, not emulsified conditions.

SERVICE AND INSPECTIONS Q&A

How long does it take to clean out a Stormceptor unit?

It takes less than two hours to service a Stormceptor unit.

Is it difficult to service a Stormceptor unit?

No. Cost effective and efficient methods of servicing have been developed.

Can a Stormceptor unit installed deeper than 10 m (33 ft.) be serviced?

Yes! At 10 m (33 ft.) absolute zero is reached. Today, vacuum technology and equipment is commonly available to service units at far greater depths.

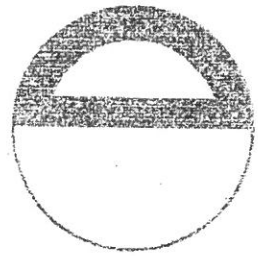
CONTINUED FROM PAGE 1

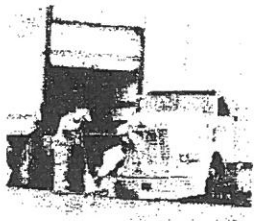
MTO TRUCK IMPOUNDMENT YARD GUARDED BY THE STORMCEPTOR® SYSTEM

effort to ensure that oil and other contaminants in urban runoff are significantly reduced.

Vehicles detained at the Kennedy Road yard would be parked on a concrete pad within a fenced facility. Runoff from the pad and service roads is conveyed to a single Stormceptor unit designed to accommodate a 0.535 ha drainage area characterized by 88.8% imperviousness for a total contributing impervious area of 0.475 ha. Consulting engineers at Philips Engineering Ltd. (Philips) in Burlington sized the required Stormceptor unit based on the current MOE Sizing Guideline of 15 m³/impervious ha (for Level 1 treatment, or approximately 80% total suspended solids removal). They calculated that the unit would require a holding capacity of 7.3 m³. The Stormceptor model STC 1500 or equivalent was recommended. It has a 7,525 litre total holding capacity and a bypass flow rate of 18 L/s. Philips engineers are experienced in designing stormwater quality facilities with many oil/sediment removal systems. Philips has used the Stormceptor System on complex sites with very little room for installing oil/sediment removal structures. The company includes Stormceptor or equivalent notations on their specifications and drawings because of wide consumer recognition and acceptance of the product. The Stormceptor System easily meets MOE guidelines for sizing. Hanson Pipe & Products Canada, Inc., using the Expert Sizing Program, simulated an 80% annual total suspended solids removal efficiency for the specified impervious drainage area.

Dufferin Construction Company was awarded the contract to upgrade the site to accommodate the vehicle impoundment yard, which included installation of the Stormceptor unit and construction of the associated 300 mm diameter storm sewer. On November 7 2002, the contractor took delivery of the Stormceptor unit from the Cambridge plant of Hanson Pipe & Products Canada, Inc. The shipment consisted of six standard 1800 mm (72 inch) diameter precast concrete products including a 0.305 m high base slab, a 0.610 m (2 ft.) riser, 1.219 m (4 ft.) high riser, 1.524 m (5 ft.) high riser section mounted with a fibreglass insert, 0.914 m (3 ft.) high riser, and a 0.305 m flat cap. When placed in position, the unit stood 4.87 m high. Once excavation had been completed on November 9, 2002, the unit was completely assembled, and ready for backfilling and connection to the storm sewer within 60 minutes.





THE STORMCEPTOR® SYSTEM

The Stormceptor® System is a vertically-oriented stormwater separator that removes oil, sediment and other pollutants from urban runoff. Its built-in bypass feature prevents trapped contents from flushing out during intense rainstorms.

Performance Claim Verified by the ETV Program

Lawrence Rigatti, project engineer with Dufferin Construction Company, noted that the installation was straightforward and made easy with detailed instructions for assembly included with the packing slip. He also commented on the good design of the Swift Lift lifting device for moving and placing the precast concrete components.

Lorne Gibson of Highway Construction Inspection Ontario Inc. (HCIO) of Barrie, retained to perform construction administration services, noted that he was comfortable working with a Stormceptor installation because the information supplied with the product is comprehensive. The system was provided to the client with an inspection and maintenance package.

The Stormceptor model STC 1500 at the MTO vehicle impoundment yard at Kennedy Road was installed easily and quickly. Specifiers and designers of the stormwater quality management system for the MTO site selected the Stormceptor unit based on its appropriateness for this application, using existing MOE sizing guidelines which ultimately facilitated securing the required approvals for its use. Features such as standard precast concrete components, well documented product drawings, supplier specifications, installation instructions, maintenance package, and Swift Lift lifting devices made the installation process easier and faster. With the Stormceptor unit in place, the City of Toronto's surface water quality is now offered further protection from potential spills or leaks from a facility designed to make our highways safer.

Stormceptor Sales & Marketing
Hanson Pipe & Products Canada, Inc.

Appendix: Stormceptor Data

Stormceptor

From a study of Village Marine Drainage, Lake George, NY, final report

http://www.vortechnics.com/techbulletins/FINAL_LakeGeorge_6_01PDF.pdf

A Vortechnics unit for a 95% impervious site:

TSS 88% (study period, designed for 80%)

Total phosphorus 3%

Total nitrogen none

BOD 33%

Testing Summary, Madison, Wisconsin

1.74 HA (4.3 acres) STC 6000

96% impervious sand yard (unstable)

http://www.stormceptor.com/downloads/pdf/wisc.pdf

Total phosphorus 18%
TSS 37%
PAH 32%

Stormceptor, Westwood Massachusetts (stable)
TSS 93%
TPH 82%
http://www.stormceptor.com/downloads/pdf/west.pdf

STC 1200, .65 acres
We have specified a STC 6000 to treat runoff from 3.003 acres of impervious surface from off site. The ratio of unit size to acreage for the Westwood site is 1846 storage per acre. The ratio of our site is 1998 units of storage per acre. We should expect similar performance for the post construction period of this development.

Appendix B

B

New England Development
Detention Time Tables for
Infiltrators

	Infiltration bed description	bottom of bed	existing ground surface	nearest Test Pit number	existing TP elevation	Depth to GW, Bottom or refusal	elev of GW or Refusal	elevation dif. Between bottom and GW	7.5"/hr Detention time to GW	Detention Average Hours
Roof Runoff	E 1,2 DW	49.00	54.00	6	54.00	8.10	45.90	3.10	4.96	
infiltrators	E3 DW	36.20	30.00	4	36.00	9.00	27.00	9.20	14.72	
	E4 DW	35.50	39.00	2	39.00	10.00	29.00	6.50	10.40	
(no surface runoff)	E5 DW N	34.00	40.00	1	36.00	10.00	26.00	8.00	8.00	
	E5 DW S	32.00	34.00	1	36.00	10.00	26.00	6.00	6.00	
										8.82
Parking area	1DW'	38.60	32 to 42	3	36.00	10.00	26.00	12.60	20.16	
infiltrators	3 DW	38.60	22to38	3	36.00	10.00	26.00	12.60	20.16	
	Swale inf	34.80	38 to 48	2	39.00	10.00	29.00	5.80	9.28	
	5 DW	29.60	30.00	5	25.00	10.00	15.00	14.60	14.60	
	6 DW	28.10	22-24	5	25.00	9.00	16.00	12.10	12.10	14.04

** boulder fill
Infilt. Est. at 5 MPI

Minimum detention for surface runoff is 6 hours
Detention time is permitted to be less for roof runoff because of increased water quality.

dsm 1/10/05

Appendix C

New England Development
Configuration tables for Infiltrators
1/11/2006 DSM

	Infiltration bed description	bottom of bed	Type of unit	# of Rows	# Units in each row	total # of units	Isolator row Location	Comments
Roof Runoff infiltrators	E 1,2 DW	49.00	SC-310	5	3	15	none required	
	E3 DW	36.20	SC-740	1	4	4	none required	
	E4 DW	35.50	SC-740	4	2	8	none required	
(no surface runoff)	E5 DW N	34.00	SC-740	2	2	4	none required	
	E5 DW S	32.00	SC-740	2	2	4	none required	
Parking area infiltrators	1DW	38.60	SC-740	4	4	16	2nd row from south	
	3 DW	38.60	SC-740	2	6	12	east row	
	Swale Inf	34.80	SC-740	1	16	16	entire row	
	5 DW	29.60	SC-740	3	5	15	south row	
	6 DW	28.10	SC-740	4	4	18	2nd row from north	plus two sideways at end

Annual rainfall is about 45 inches/year
largest paved area served by one catch basin is 9955 sf in swale basin
Analysis of oil loading on catch basin inserts Sheet 1

From Table 5*, runoff for a hypothetical 40 acre shopping center parking lot

in one year	pounds		
Grease	82.47		
oil	46.27		
total	128.74	for	40 acres times 43, 560 sf/acre is 1,742,400 sf

our paved area is 9955 sf

9,955/1,742,400 is 0.0057

0.0057 times 128.74 pounds is 0.73 lbs of oil and grease in one year.
The specific gravity of oil is 0.88.

one gallon of water weighs 8 lbs.
one gallon of oil weighs 8 times 0.88 or 7.04 lbs
0.73 lbs divided by 7.04lbs/gal is 0.11 gallons of oil in one year.

The oil insert alone, not counting the surface of the insert (which will be trimmed) can absorb 1.38 less 0.87 gallons, or 0.51 gallons of oil.

We are changing the inserts twice per year, giving us a minimum capacity of 1.02 gallons of oil per catch basin, for a maximum calculated loading of 0.11 annually, yielding a safety factor of 10.

* table 5. We believe these pollutant levels are overstated for our residential area but are using these figures in order to show a worst-case scenario.

Elizabeth Havens
dsm 1/2005

Shop Shop
Product List

Absorbent Pads/Rolls
-- Select --

Absorbent Mats
-- Select --

Absorbent Socks
-- Select --

Spill Kits
-- Select --

Specialty
-- Select --

Accessories
-- Select --

Marine
-- Select --

Granulars
-- Select --

Spill Containment
-- Select --

Stormwater Products
-- Select --

Shipping Info

Catch Basin Drain Inserts

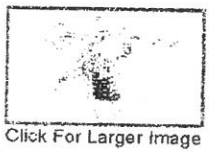
Keep Sediment And Other Pollutants From Entering The Water System With DrainGuard Catch Basin Inserts

Storm water pollution has become a major concern both locally and a national level. The DrainGuard removes waste from storm water before it can become a problem in the water system.

The Drain Guard is a simple device designed to fit most drain catch basins. Held in place by the metal grate, it effectively removes coarse sediments, oil, grease, litter and debris from storm water. Parking lot tend to be sources of water pollution; cars and trucks drip oil and grease on to the surface which is carried into the catch basins by rain water. Most of these catch basins ultimately drain into streams, lakes or ground water aquifers. Great for parking lots, vehicle storage/service areas, construction sites and industrial plants. Three catch basin drain inserts to meet your needs.

Available in Three Models:

- **Oil & Sediment Model** - Part # 9217 (1Unit)
- **Oil & Sediment Plus Model** - Part # 9219 (1 Unit)
- **Trash and Debris Model** - Part #9227 (1Unit)

Oil and Sediment Model	Oil and Sediment PLUS Model	Trash and Debris Mod
Same as plus model except no X-Tex Absorbent Filter Strip.	 Click For Larger Image	 Click For Larger Image
The Oil and Sediment Model has a geotextile outer material that removes oil and grease from water flow as it passes through the DrainGuard.	The Oil and Sediment Model contains more X -Tex absorbent filter strips that removes oil and grease from water flow as it passes through the DrainGuard.	The Trash and Debris Model designed specifically to catch la items such as cigarette butts, ca wrappers and paper goods.

Learn more about X-Tex

	Oil & Sediment Model	Oil & Sediment Plus Model	Trash & Debris Model
Part #:	9217 (1-Pack)	9219 (1-Pack)	9227 (1-Pack)
Weight:	1 lb.	2 lbs.	1 lb.
Dimensions:	48" L x 36" W x 18"H	48" L x 36" W x 18" H	48" L x 36" W x 1 H
Weight:	1 lbs.	2 lbs.	1 lbs.
Performance:	Oil: Up to .87 gallons Sediment: Up to 40 lbs.	Oil: Up to 1.38 gallons Sediment: Up to 40 lbs.	1 cu. ft. (before reaching bypass ports)
	* The total water flow rate through the insert in new condition is in excess of 500 gpm. The bypass rate is approximately 700 gpm.		
		Effectiveness Study on DrainGuards	

On Sale! Limited time!

Installation Instructions

9217	**Oil & Sediment Insert** Absorbs up to .87 gallons of oil, 48"X36"X18", 1 UNIT, 1 LBS. MINIMUM ORDER 5 INSERTS	~~59.99~~ 54.99	0
9219	**Oil & Sediment PLUS Insert** Absorbs up to 1.38 gallons of oil, 48"X36"X18", 1 UNIT, 2 LBS.	~~86.99~~ 83.99	0
9227	**Trash and Debris Insert** For large items such as cigarette butts and candy wrappers. 48"X36"X18", 1 UNIT, 1 LBS. MINIMUM ORDER 5 INSERTS	~~59.99~~ 54.99	0

Usual lead time 2 to 5 working days.

1982), (4) urban runoff for 1,029 acres in Durham, North Carolina (EPA 1977) and, (5) a composite average based on nationwide samples from interstate highway runoff (Clark et al. 1981).

Table 2
Selected Average Stormwater Pollutant Concentrations

Pollutant	Concentration	Citation
Biochemical Oxygen Demand	20.0 mg/L	EPA 1980a pg. 203
Chemical Oxygen Demand	138.7 mg/L	EPA 1982 pg. B-15
Chromium	0.23 mg/L	EPA 1977 pg. 99
Copper	0.107 mg/L	EPA 1982 pg. B-15
Lead	0.315 mg/L	EPA 1982 pg. B-15
Nickel	0.15 mg/L	EPA 1977 pg.99
Nitrate/Nitrite	1.14 mg/L	Clark et al. 1981
Nitrogen, Total Organic	1.7 mg/L	EPA 1980a
Oil and Grease[1]	33.0 mg/L	EPA 1980a pg.12
Phosphorous Total	0.186 mg/L	EPA 1982 pg. B-15
Total Kjeldahl Nitrogen	2.99 mg/L	Clark et al. 1981 pg. 1068
Total Organic Carbon	41.0 mg/L	Clark et al. 1981 pg. 1068
Total Suspended Solids	320.0 mg/L	EPA 1980a pg. 203
Zinc	0.36 mg/L	EPA 1977 pg. 99

Investigation of environmental impacts associated with ground and surface water follow three logical arguments.

1. Chronic pollutants generated on a study area by attracted traffic will enter the soil, surface water and groundwater and will degrade those environments in relation to the mass and toxicity of the pollutants so generated.
2. Drainage and management plans must be designed to mitigate at least the 18 pollutant classes identified herein.
3. Sediment traps alone can not manage these pollutants and can not neutralize or destroy elemental or chemically stable pollutants such as:

   Asbestos[2], Chloride, Chromium,Copper, Nickel, Rubber, Zinc, Lead

[1] Oil and Grease relevant to assessment of watershed protection, this finding is important because while oil is always detected in roadway and parking lot runoff, it contains polynuclear aromatic hydrocarbons (PAHs), a known carcinogen that is associated with such oil. Although not quantified, PAH concentrations in used engine oil are known to approximate 0.11 mg/g (Perry and McIntyre 1987). Therefore, water quality impacts associated with PAH deposited on the pavement of a study area will be directly proportional to the oil fraction of the petroleum that contaminate the site each year by the traffic volume expected. Recognizing that parking spaces will generate oil deposited from parked vehicles, PAH concentrations will be chronically present.

[2] Asbestos contamination is generated by traffic at the rate of 108,000 fibers per axle per kilometer (Shaheen 1975), when asbestos brake liners are present. When other liner material is used, including those asbestos substitutes that contain copper, the residue generated is derived from that material. Its mass and biological activity is under investigation relative to its contribution of particulates to the waste stream. Therefore, this aspect of traffic generated pollution remains under study. In the present assessment, asbestos will be lower than expected and copper, much higher than expected.

These chemical species can be partially filtered out of the waste stream. However, that filtration is relatively low, and requires high maintenance costs of waste storage or disposal as part of an overall clean site maintenance plan.

II

Calculation of Water Pollutant Masses Generated Annually By On-Site Traffic

Studies in the scientific literature of seasonal runoff from paved areas found significant differences between summer and winter for some pollutants and not for others (Solbe 1986). Total solids, total volatile solids, chloride, and bromide were in higher concentration in winter runoff as compared to summer events. Chlorides and bromides originate largely from deicing salts as do total solids. About 6% by weight of deicing salt consists of insoluble particulate material, and consequently, deicing mixtures contribute up to 25% of the total suspended solids recorded during winter studies in England (Solbe 1986).

Estimation of potential contamination of a project is based on calculations of pollutant loading on the pavement of proposed traffic bearing surfaces from vehicular use (Shaheen 1975). The empirical model reports rates of pollutant deposition in kilograms of pollutant per axle-kilometer. That is, the deposition at a proposed site is directly proportional to the number of axles that pass over a length of its roadways and parking areas as measured in kilometers. The mass of contaminants thus deposited can then be converted to kilograms deposited per day and then in to kilograms deposited per year. The algorithm used here is from Wanielista et al. 1978 after McElroy et al. 1976 from Shaheen 1975:

$$Y_i = y_i \cdot LH \cdot \Sigma_j (TD_j \cdot AX_j)$$

Where

Y_i = loading of pollutant "i" in Kilograms per day
y_i = deposition rate of pollutant "i" in Kilograms per axle-kilometers
LH = length of surface over which the axle travels in kilometers
TD_j = traffic density of vehicles with "j" axles in vehicles per day
AX_j = number of axles per "j" vehicle

With respect to the road and parking surfaces over which each vehicle passes entering and leaving the site, assumptions are made based on a proposed site.

As stated above, the deposition rate of each class of pollutant is dependent on each vehicle passing over the road and parking surface. Deposition is also directly dependent on the number of axles on each vehicle because each axle deposits contaminants on the paved surface over which it rolls. Table 3 reports the vehicle mix that reasonably represents those expected to enter and leave a commercial "Big Box Retail" site. This assumption is equivalent to an average of 2.15 axles on each hypothetical vehicle (AX_j) that enters and leaves the site. That is one variable in the algorithm calculated in Table 5.

Table 3

Vehicle Mix Average Number of Axles

Based on observations De Santo made in Waterford, CT on 1/18/03 1/19/03, and 11/20/03, and in Glastonbury, CT on 1/21/03

Vehicle	Axles/Vehicle	% of Traffic	Axles/100 Vehicles
Passenger Cars	2	50	100
Sport Utility Vehicles, Vans, Pick-ups	2	40	80
Buses	2	5	10
Trailers	5	5	25
Number of Axles/100 vehicles entering and leaving the site (AX_i):			215

Table 4 reports the estimated deposition rate expected on the site for each of eighteen (18) contaminant variables (y_i) that are used in the algorithm calculated in Table 5

Table 4

Deposition Rates of Traffic-Related Pollutants (y_i)

(Wanielista et al. 1978 after McElroy et al. 1976 from Shaheen 1975)

	Pollutant	Deposition Rate (kg/axle-km or as noted)
1	Asbestos	1.08×10^{5} fibers/axle-km[3]
2	BOD	1.52×10^{-6}
3	Chloride	6.16×10^{-7}
4	Chromium	5.18×10^{-8}
5	COD	3.58×10^{-5}
6	Copper	7.95×10^{-8}
7	Grease	4.26×10^{-6}
8	Kjeldahl – N	1.04×10^{-7}
9	Magnetic Fraction	3.53×10^{-5}
10	Nickel	1.23×15^{-7}
11	Nitrate – N	5.29×10^{-8}
12	Nitrite – N	6.33×10^{-9}
13	n-Paraffins	1.68×10^{-6}
14	Petroleum	2.39×10^{-6}
15	Rubber	3.47×10^{-6}
16	Total Phosphate - P	4.03×10^{-7}
17	Volatile solids	6.67×10^{-4}
18	Zinc	9.8×10^{-7}

The total pollutant loading generated (Y_i) by traffic attracted to a site is calculated below in Table 5 based on the above deposition rates (y_i), in combination with the calculated number of axles that enter and leave the site (AX_j) in relation to the distances they roll and park (LH)[4]. That is, the total mass of a particular pollutant deposited each day on the site is equal to the rate of daily deposition (y_i) multiplied by the average distance over which the pollutant is deposited (LH), multiplied by the Average Daily Traffic (TD), multiplied by the average number of axles on each vehicle (AX_j). These identified masses do not include the contribution that traffic makes to air pollution. This analysis is comprised of only those pollutants that contaminate the ground, surface water, and groundwater of the site and consequently of those down gradient habitats in to which a site will direct its effluents.

[3] One fiber of asbestos weighs 0.00000000040 mg, based on data in Casarett and Doull. Toxicology. Second Edition, 1980. The pollution of asbestos fibers generated at a hyoithetical Big Box Retail site is reported in kilograms in Table 5.

[4] For purposes of this hypothetical case, it is assumed each vehicle enters and leaves the site travels a total distance on site of 0.85 Kilometers.

Table 5

Deposition of Traffic Generated Pollution
Not Including Air Pollution or Increased Residue Deposition Resulting from Vehicular Queuing for a hypothetical 40 acres site.

	Pollutant i	y_i (kg/axle-km)	x LH (km)	x TD_j (vehicles/day)	x Ax_j (axles/vehicle)	= Y_i (kg/day)	= Yearly Load (kg/year)	= Yearly Load (lb/year)
1	Asbestos	4.32E-11	0.85	13,124	2.15	1.0393E-06	*See Note below	
2	BOD	1.52E-06	0.85	13,124	2.15	0.03656736	13.35	29.43
3	Chloride	6.16E-07	0.85	13,124	2.15	0.0148194	5.41	11.92
4	Chromium	5.18E-08	0.85	13,124	2.15	0.00124618	0.45	1.00
5	COD	3.58E-05	0.85	13,124	2.15	0.86125754	314.36	693.04
6	Copper	7.95E-08	0.85	13,124	2.15	0.00191257	0.70	1.54
7	Grease	4.26E-06	0.85	13,124	2.15	0.10248484	37.41	82.47
8	Kjeldahl - N	1.04E-07	0.85	13,124	2.15	0.00250198	0.91	2.01
9	Magnetic Fraction	3.53E-05	0.85	13,124	2.15	0.8492288	309.97	683.36
10	Nickel	1.23E-07	0.85	13,124	2.15	0.00295907	1.08	2.38
11	Nitrate - N	5.29E-08	0.85	13,124	2.15	0.00127264	0.46	1.02
12	Nitrite – N	6.33E-09	0.85	13,124	2.15	0.00015228	0.06	0.12
13	n-Paraffins	1.68E-06	0.85	13,124	2.15	0.04041655	14.75	32.52
14	Petroleum	2.39E-06	0.85	13,124	2.15	0.05749736	20.99	46.27
15	Rubber	3.47E-06	0.85	13,124	2.15	0.08347943	30.47	67.17
16	Total Phosphate - P	4.03E-07	0.85	13,124	2.15	0.00969516	3.54	7.80
17	Volatile solids	3.39E-05	0.85	13,124	2.15	0.81554834	297.68	656.26
18	Zinc	9.80E-07	0.85	13,124	2.15	0.02357632	8.61	18.97

* The scientific notation 1.0393E-06 kg/day reports the mass of asbestos fibers generated and deposited on the site by attracted traffic equipt with asbestos brake pads. That mass is equivalent to 108,000 fibers per axle per kilometer, or 2,598,207,101 fibers/day, which is equivalent to 948,345,591,967 fibers/year.

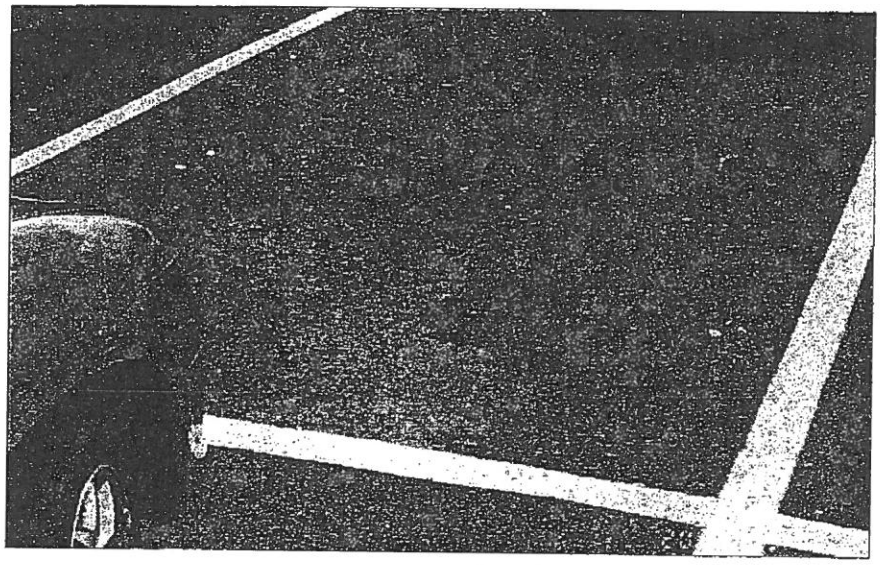
The calculations that report the mass of asbestos and copper in Table 5 require annotation because they have an inverse relationship relative to this analysis of stormwater pollution. When asbestos fibers were recognized in the 1970s as being carcinogenic, the use of that material in brake pads has declined but has not disappeared. It is generally being replaced in some products by copper and other materials. As brake pads wear, their constituents are abraded and settle in the form of fine dust on the vehicle chassis and road surfaces. These residues are

ultimately washed off these impervious surfaces and find their way in to storm drainage (see Appendix).

Since asbestos is being replaced in brake pads, its contaminating mass in the environment will decline from the mass calculated in Table 5. The reverse is true of copper, which will increase over the values calculated in Table 5.

A seminal study by Armstrong (1994) found that disc brake pads contain copper from less than 0.00625% to as much as 20.5%. He found lead in concentrations of less than 0.01% to as much as 11.9%, while zinc was found to range between 0.01% to 18.8%. His work also discovered that concentrations for all three heavy metals (i.e. Cu, Pb, and Zn) were variable between sampled brake pads although those with the lowest concentration of any constituent in one sample remained lowest when re-sampled. The significance of these early findings are further documented in Tiefenthaler et. al. (2001) who showed that impervious (paved) surfaces directly affect the water quality of a watershed. In that study, samples of surface runoff from parking lots were analyzed for suspended solids, trace metals including cadmium (Cd), chromium (Cr), copper (Cu), iron (Fe), nickel (Ni), lead (Pb), and zinc (Zn), in both dissolved and particulate-bound phases, and 25 polycyclic (i.e. polynuclear) aromatic hydrocarbons (PAHs). The highest mean concentrations of metals in surface runoff samples were for iron (810 µg/L), zinc (620 µg/L), copper (40 µg/L), and lead (40 µg/L).

Figure **1**



Shown here at a Wal-Mart site in Waterford, CT, at approximately 12 noon on November 20, 2003, is a sheen of petroleum residue on the parking surface. Nearly an inch of rain had fallen during the prior 24 hours. Since rain had stopped falling earlier that day, this residue was left within a few hours of the photograph. Subsequent rain will carry much of this petroleum slick and its contained pollutions (e.g. PAHs, etc.) into the drainage system.

Dissolved zinc, lead, and copper accounted for between 65 and 81% of concentrations in surface runoff samples and the mean total PAH concentrations in surface runoff samples ranged from 0.08 to 180 µg/L. Parking lot usage and maintenance did not affect the accumulation of runoff constituents in the Armstrong (1994) study and similar concentrations of total suspended solids

(TSS), trace metals, and total PAHs were found among high-use and low-use parking lots. Most interestingly, street sweeping as a maintenance activity did not reduce or improve runoff concentrations. Only the use of pressure washing did appear to reduce, but did not completely remove, suspended solid and trace metal concentrations (Armstrong 1994).

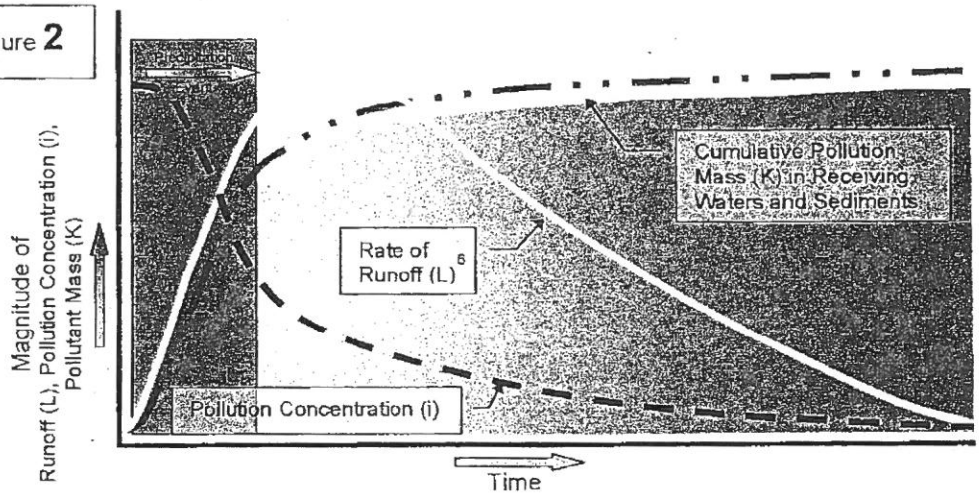
III
Calculation of Water Pollutant Average Concentrations in Runoff

The identified mass of contaminants generated by traffic at a hypothetical site will generate certain impacts on the environment that require calculating and reporting at least annual average effluent concentrations. In order to do so, the average mass of each contaminant generated on site (Table 5) must be divided by the annual average volume of runoff, understanding that the first flush of 0.5 inches of runoff during a storm transports 90% of the particulate and adsorbed and dissolved deposits from contaminated paved surfaces along the drainage system (McElroy et al. 1976, Amy et al. 1974), while the remaining contaminants are subsequently transported in lower concentration by the runoff[5]. That is, a storm event that produces a large volume of runoff will contribute a greater pollution load to the receiving waters than a storm event that produces a smaller volume of runoff. However, runoff from the latter will contain a greater average pollutant concentration (Amy et al. 1974).

In order to simplify this mass balance model of how much contaminant gets generated and how much leaves the site and enters the surface and ground waters, it is assumed that all contaminants are ultimately removed by the precipitation that strikes the parking and road surfaces and that they enter the proposed drainage system. There, they are diluted with runoff entering that system from other on site catchment areas, such as from roofs. This relationship of the rate of runoff (L), the concentration of pollutant (i), and the cumulative mass (K) of pollutant leaving the site, is shown in Figure 2.

The first step required to quantify the components of this relationship is to calculate the volume of precipitation that will transport and dilute site generated contaminants since it is this precipitation that mobilizes the contaminants and carries them off the traffic surfaces.

Figure **2**



As an example, Brumbach (1965) reports that between 1931 and 1960, annual precipitation was 44.17 inches at Brainard Field, East Hartford. This average is adjusted downward to

[5] Removal of 90% was apparently first reported by Amy et al. (1974), who also found that rainfalls of 0.27, 0.15, 0.08, and 0.02 inches remove 70%, 50%, 30%, and 10%, respectively, of road surface contaminants including particulates along with adsorbed and dissolved factions.

[6] This graph of runoff is generally labeled a hydrograph,

44.14 inches based on the average reported to have fallen annually between 1961 and 1990, according to the Connecticut State Climate Center at Storrs (http://www.nrcc.cornell.edu/ccd/nrmpcp.html). Therefore, it is assumed here that 44.14 inches (i.e. 3.678333333 feet) of precipitation falls on the hypothetical study area in the Hartford, Connecticut region each year. Calculations based on this average of the annual site runoff, is given in Table 6.

Table 6
Average Volume of Precipitation Runoff from a hypothetical site in the Hartford, Connecticut Region

Surface Type[7]	Surface Area in Acres	Precipitation Run-off Coefficient (%)[8]	Annual Volume of Run-off in Liters/Year (L/yr)[9]
Industrial (Impervious)	1.21	0.95	5,215,462.225
Impervious Roads, Parking, Walkways	31.91	0.95	137,541,652.564
Lawn (Pervious)	6.46	0.15[10]	4,396,505.347
Undetermined (Assumed Impervious)	0.27	0.95	1,163,780.827
Total	39.85		148,317,401

Calculations for Table 6

Annual Precipitation Runoff in Liters

Catchment Area in Acres		44.14 in. Annual Precip. In Feet		Runoff Coefficient		Cu. M Per Acre-Foot		Liters per Cu. Meter		Annual Runoff in Liters
Column	1	x 2		x 3		x 4		x 5	=	6
	1.21	3.678333		0.95		1233.481		1000		5,215,462.225
	31.91	3.678333		0.95		1233.481		1000		137,541,652.564
	6.46	3.678333		0.15		1233.481		1000		4,396,505.347
	0.27[11]	3.678333		0.95		1233.481		1000		1,163,780.827
Total	39.85							Total		148,317,400.962

[7] Areas of Industrial, Impervious, lawns, and total area are assumptions that reflect proposed development of a Big Box retail center on approximately 40 acres.

[8] Runoff Coefficient (commonly identified as "C") is that fraction of precipitation falling on a catchment area that actually reaches the receiving body as surface flow. If C = 1, then 100% of the precipitation reaches the receiving body as surface flow. See the Internet Link http://www.geocities.com/Eureka/Concourse/3075/coef.html).

[9] Annual Runoff in Liters Per Year = (Catchment Area in Acres) x (Annual Precipitation in Feet) x (Runoff Coefficient) x (1233.4818 Cubic Meters per Acre-Foot) x (1,000 Liters per- Cubic Meter).

[10] Assuming the lawns are on sandy soil with average slopes of 2 to 7%, estimated runoff will be 10 to 15% of total rainfall (Chow 1964).

[11] This adjustment of 0.27 acres is assumed to be impervious and is used here to make the surface types add up to the total of 39.85 acres (i.e. approximately 40 acres), which is the area of the hypothetical site modeled herein.

Based on Table 6, approximately 93% of annual precipitation (i.e. 137,541,653/148,317,401) drains from impervious roads, parking lots and walkways. Since all runoff from this hypothetical site ultimately leaves the site, the contaminants generated on site and deposited on its impervious surfaces will be transported and diluted as they move down gradient. This is calculated in Table 7. Therefore, the most highly contaminated runoff is 93% of total runoff, which is diluted by 7% of potentially less contaminated runoff if herbicides, pesticides, and fertilizers are not used on the lawns and planted areas of the site.

Table 7
Pollutant Loading and Resultant Concentrations in Site Runoff

	Pollutant i	Yearly Load (kg/year)	Fibers/ Year	Yearly Precipitation (l/yr)	Concentration		
1	Asbestos*	*See Note	9.48E+11	148,317,400.962	6394.03	Fibers/L	1
2	BOD	13.35		148,317,400.962	0.08999002	mg/L	2
3	Chloride	5.41		148,317,400.962	0.03646964	mg/L	3
4	Chromium	0.45		148,317,400.962	0.00306677	mg/L	4
5	COD	314.36		148,317,400.962	2.11950182	mg/L	5
6	Copper	0.70		148,317,400.962	0.00470671	mg/L	6
7	Grease	37.41		148,317,400.962	0.25220888	mg/L	7
8	Kjeldahl - N	0.91		148,317,400.962	0.00615721	mg/L	8
9	Magnetic Fraction	309.97		148,317,400.962	2.08989984	mg/L	9
10	Nickel	1.08		148,317,400.962	0.00728209	mg/L	10
11	Nitrate - N	0.46		148,317,400.962	0.00313189	mg/L	11
12	Nitrite – N	0.06		148,317,400.962	0.00037476	mg/L	12
13	n-Paraffins	14.75		148,317,400.962	0.09946266	mg/L	13
14	Petroleum	20.99		148,317,400.962	0.14149747	mg/L	14
15	Rubber	30.47		148,317,400.962	0.20543775	mg/L	15
16	Total Phosphate - P	3.54		148,317,400.962	0.02385920	mg/L	16
17	Volatile solids	297.68		148,317,400.962	2.00701430	mg/L	17
18	Zinc	8.61		148,317,400.962	0.05801988	mg/L	18

*Note: 108,000 fibers/day/axle/km is reported as a concentration of fibers/Liter.

The structure and function of the drainage system, its associated routing of runoff, and the consequent transport of contaminants is presumably defined in the Stormwater Management Report prepared by the design engineer of the hypothetical site.

That report should be reviewed with the above considerations in mind. The report should address alternatives for use of Best Management Practices (BMPs) that mitigate stormwater runoff pollution that will otherwise degrade the watershed to which the site contributes its polluted runoff as an inevitable consequence of development (See Appendix).

IV
Reference Bibliography

Amy, G., R. Pitt, R. Singh, W.L. Bradford, and M.B. LaGraff. 1974. Water Quality Management Planning for Urban Runoff. U.S. Environmental Protection Agency. Washington, D.C. December. (NTIS PB 241 689/AS). 246 pp.

Armstrong, L.J., 1994. Contribution of Heavy Metals to Storm Water From Automotive Disc Brake Pad Wear. Technical Report. Santa Clara Valley Nonpoint Source Pollution Control Program. Woodward-Clyde Consultants. Oakland, CA. 28 pp.

Athayde, D.N., P.E. Shelley, E.D. Driscoll, D. Gaboury, and G. Boyd. 1983. Results of the Nationwide Urban Runoff Program. Volume I – Final Report. Environmental Protection Agency. Report #PB84-185552. 200 pp.

Brumbach, J.J. 1965. The Climate of Connecticut. State Geological and Natural History Survey of Connecticut. Bulletin # 99. Hartford. 215 p.

Chow, V.YT. 1964. Handbook of Applied Hydrology. McGraw-Hill Book Co. New York. Sectional Pagination.

Clark, D.L., R. Asplund, J. Ferguson, B.W. Mar. 1981. Composite Sampling of Highway Runoff. ASCE Environmental Engineering Division. 107 (5):1067-1081.

Environmental Protection Agency. 1977. Urban Stormwater Management and Technology. Update and Users' Guide. NTIS Report # PB 275 654. 312 p.

———. 1980. Urban Stormwater Management and Technology: Case Histories. NTIS Report # PB 81-107153. 357 p.

———. 1982. Preliminary Results of the Nationwide Urban Runoff Program. Vol. 2. NTIS Report # PB 82-208-000.

-GeoSyntec Consultants, Urban Drainage and Flood Control District, URS, and Urban Water Resources Research Council (UWRRC) of ASCE. 2000. Determining Urban Stormwater Best Management Practice (BMP) Removal Efficiencies Task 3.4 – Final Data Exploration and Evaluation Report. USEPA Office of Water. Washington, DC. 19 pp.

Grizzard, T, C. Randall, B. Weand, and K. Ellis. 1986. Effectiveness of Extended Detention Ponds, in Urban Runoff Quality-Impact and Quality Enhancement Technology. B. Urbonas and L. Roesner (editor). American Society of Civil Engineers. New York, NY. pp. 323-338.

Kadlec, R. and R. Knight. 1995. Treatment Wetlands. CRC Press and Lewis Publishers, Boca Raton, FL. 894pp.

Kobriger, N.P., T.V. Dupuis, W.A. Kreutzberger, F. Steam, G. Guntensperge, and J.R. Keough. 1983. Guidelines for the Management of Highway Runoff on Wetlands. Transportation Research Board. Washington, D.C. 166 p.

McElroy, A.D.; S.Y. Chiu; J.W. Nebgen; A. Aleti and F.W. Bennett. 1976. Loading Functions for Assessment of Water Pollution from Nonpoint Sources. U.S. Environmental Protection Agency Report #600/2-76 151. 428 p.

Perry, R., and McIntyre, A. 1987. Oil and Polynuclear Aromatic Hydrocarbon Contamination of Road Runoff, A Comparison of Treatment Procedures. *In* Oil in Freshwater: Chemistry, Biology, Countermeasure Technology, Proceedings of the Symposium of Oil Pollution in Freshwater, Edmonton, AB. Permagon Press, N.Y.

Quigley, M., E. Stecher, and B. Urbonas. 2003. Urban stormwater BMP performance: Application of recent findings from the National Stormwater Best Management Practices database project. In press.

Reed, S. 1995. Surface Flow Wetlands: A Technology Assessment. USEPA. Office of Wastewater. Washington, DC. (Unpublished internal report)

Schueler, T. 2000. Irreducible Pollutant Concentrations Discharged From Stormwater Practices. Watershed Protection Techniques. 2(2):369-372.

Shaheen, Donald G. 1975. Contribution of Urban Roadway Usage to Water Pollution. EPA-600/2-75-004 NTIS PB-245-854

Solbé, J F de L G (Ed). 1986. Effects of Land Use on Fresh Waters: Agriculture, Forestry, Mineral Exploitation, Urbanization. Ellis Horwood Ltd., Chichester, 568 pp.

Strecker, E.W, M.M. Quigley, B.R. Urbonas, J.E. Jones, and J.K. Clary. 2001. Determining Urban Strom Water BMP Effectiveness. Journal of Water Resources Planning and Management. 127(3), 144-149.

Strecker, E.W. 1994. Constituents and Methods for Assessing BMPs. In *Proceedings of the Engineering Foundation Conference on Storm Water Monitoring*. August 7-12, Crested Butte, CO.

Tiefenthaler, L.L., K.C. Schiff, and S.M. Bay. 2001. Characteristics of Parking Lot Runoff Produced by Simulated Rainfall. Southern California Coastal Water Research Project. Technical Report #343. Westminster. Appendix F. 56 pp.

Tscharntke, T., I. Steffan-Dewenter, A. Kruess, and C. Thies. 2002. Contribution of small habitat fragments to conservation of inset communities of grassland-cropland landscapes. Ecological Applications 12(2):354-363.

The Environmental Law Institute. 2003. Conservation Thresholds for Land Use Planners. Environmental Law Institute. Washington. 55 p.

Urbonas, B.R. 1994. Parameters to Report with BMP Monitoring Data. In *Proceedings of the Engineering Foundation Conference on Storm Water Monitoring*. August 7-12, Crested Butte, CO.

Wanielista, M.P., R.N. Gennaro, J.H. Bell, and J.W. Johnson. 1978 Shallow-Water Roadside Ditches for Stormwater Purification. Florida Technological University. Orlando.75 pp.

APPENDIX

The evaluation and design guidelines that are cited below are available from the Institute of Environmental Stewardship, LLC.

The single most current and useful source of information on Best Management Practices that would minimize the undesirable impacts associated with the construction and operation of Charter Oak Market Place is the:

International Stormwater Best Management Practices (BMP) Database

http://www.bmpdatabase.org/

A new tool for evaluating stormwater BMP effectiveness, this database provides access to BMP performance data in a standardized format for roughly 200 BMP studies conducted over the past fifteen years. The database may be searched and/or downloaded on this Web site, and is also available on CD-ROM. Additional BMP studies are currently being prepared for the database. The database was developed by the Urban Water Resources Research Council (UWRRC) of the American Society of Civil Engineers (ASCE) under a cooperative agreement with the U.S. Environmental Protection Agency.

Urban Stormwater BMP Performance Monitoring, Guidance Manual for Meeting the National Stormwater BMP Database Requirements. April 2002. 248 pp. is available at:

http://www.bmpdatabase.org/docs/Urban%20Stormwater%20BMP%20Performance%20Monitoring.pdf

Another source of useful information and design alternatives that relate to watershed protection and land development is available from the:

The Center for Watershed Protection
8390 Main Street, 2nd Floor
Ellicott City, MD 21043
Phone: 410-461-8323
Fax: 410-461-8324
email: center@cwp.org

The following articles are available from the Center for Watershed Protection's *The Practice of Watershed Protection (2000)*, a comprehensive compilation of all past issues of the Center's technical journal, *Watershed Protection Techniques (http://www.cwp.org/)*. Those HiLited in yellow have particular relevance to Stormwater management and urban development.

Section 1: Stormwater Pollution

1. The Importance of Imperviousness
2. Hydrocarbon Hotspots in the Urban Landscape: Can They Be Controlled?
3. Influence of Snowmelt Dynamics on Stormwater Runoff Quality
4. Nutrient Movement from the Lawn to the Stream?
5. Urban Pesticides: From the Lawn to the Stream
6. Cars are Leading Source of Metal Loads in California
7. Sources of Urban Stormwater Pollutants Defined in Wisconsin
8. Is Rooftop Runoff Really Clean?
9. First Flush of Stormwater Pollutants Investigated in Texas

10. Dry Weather Flow in Urban Streams
11. Multiple Indicators Used to Evaluate Stream Conditions in Milwaukee
12. Characterization of Heavy Metals in Santa Clara Valley
13. Simple and Complex Stormwater Pollutant Load Models Compared
14. Impact of Suspended and Deposited Sediments
15. Stormwater Pollution Source Areas Isolated in Michigan
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17. Microbes in Urban Watersheds: Concentrations, Sources and Pathways

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21. Habitat and Biological Impairment in Delaware Headwater Streams
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23. Historical Change in a Warmwater Fish Community in an Urbanizing Watershed
24. Fish Dynamics in Urban Streams Near Atlanta, Georgia
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31. Microbes and Urban Watersheds: Implications for Watershed Managers
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Section 4: Watershed Protection Tool #2 - Land Conservation

33. Impact of Stormwater on Puget Sound Wetlands
34. Loss of White Cedar in New Jersey Linked to Stormwater Runoff
35. Wetter Is Not Always Better: Flood Tolerance of Woody Species
36. The Compaction of Urban Soils
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38. Choosing Appropriate Vegetation for Salt-Impacted Roadways

Section 5: Watershed Protection Tool #3 - Aquatic Buffers

39. The Architecture of Urban Stream Buffers
40. Urbanization, Stream Buffers and Stewardship in Maryland
41. Invisibility of Stream and Wetland Buffers in the Field
42. Techniques for Improving the Survivorship of Riparian Plantings
43. Impact of Riparian Forest Cover on Mid-Atlantic Stream Ecosystems
44. The Return of the Beaver

Section 6: Watershed Protection Tool #4 - Better Site Design

45. An Introduction to Better Site Design
46. The Benefits of Better Site Design in Residential Subdivisions
47. The Benefits of Better Site Design in Commercial Development
48. Changing Development Rules in Your Community
49. The Economics of Urban Sprawl
50. Skinny Streets and One-Sided Sidewalks: A Strategy for Not Paving Paradise
51. Use of Open Space Design to Protect Watersheds

Section 7: Watershed Protection Tool #5 - Erosion and Sediment Control

52. Muddy Water In; Muddy Water Out?
53. Clearing and Grading Regulations Exposed
54. Practical Tips for Construction Site Phasing
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57. The Limits of Settling
58. Improving the Trapping Efficiency of Sediment Basins
59. Performance of Sediment Controls at Maryland Construction Sites
60. Construction Practices: The Good, the Bad and the Ugly
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Section 8: Watershed Protection Tool #6 - Stormwater Management Practices

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63. Why Stormwater Matters
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67. Microbes and Urban Watersheds: Ways to Kill `Em
68. The Economics of Stormwater Treatment: An Update
69. Trends in Managing Stormwater Utilities*Ponds*
70. Pond/Wetland System Proves Effective in New Zealand
71. Performance of Stormwater Ponds and Wetlands in Winter
72. Performance of a Stormwater Pond/Wetland System in Colorado
73. Performance of Two Wet Ponds in the Piedmont of North Carolina
74. Performance of Stormwater Ponds in Central Texas
75. Pollutant Removal Dynamics of Three Canadian Wet Ponds
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77. Performance of a Dry Extended Pond in North Carolina
78. Influence of Groundwater on Performance of Stormwater Ponds in Florida
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95. Performance of Gravel-based Wetland in a Cold, High Altitude Climate
96. The StormTreat System: A New Technology for Treating Stormwater Runoff
97. Vegetated Rock Filters Used to Treat Stormwater Pollutants in Florida
98. Practical Tips for Establishing Freshwater Wetlands
99. Broad-leaf Arrowhead: A Workhorse of the Wetlands
100. Mosquitos in Constructed Wetlands: A Management Bugaboo?

Infiltration
101. Failure Rates of Infiltration Practices Assessed in Maryland
102. Longevity of Infiltration Basins Assessed in Puget Sound
103. A Second Look at Porous Pavement/Underground Recharge
104. The Risk of Groundwater Contamination from Infiltration of Stormwater

Filters
105. Developments in Sand Filter Technology to Treat Stormwater Runoff
106. Further Developments in Sand Filter Technology
107. Performance of Delaware Sand Filter Assessed
108. Field Evaluation of a Stormwater Sand Filter
109. Innovative Leaf Compost System Used to Filter Runoff in Northwest
110. Bioretention as a Stormwater Treatment Practice
111. Multi-Chamber Treatment Train Developed for Stormwater Hot Spots

Open Channels and Swales
112. Performance of Biofilters in the Pacific Northwest
113. Runoff and Groundwater Dynamics of Two Swales in Florida
114. Performance of Grassed Swales Along East Coast Highways
115. Pollutant Removal Pathways in Florida Swales
116. Ditches or Biological Filters? Classifying Pollutant Removal in Open Channels
117. Performance of Dry and Wet Biofilters Investigated in Seattle
118. Level Spreader/Filter Strip System Assessed in Virginia

Other
119. Performance of Oil/Grit Separators in Removing Pollutants at Small Sites
120. Performance of a Proprietary Stormwater Treatment Device: The Stormceptor
121. New Developments in Street Sweeper Technology
122. The Value of More Frequent Cleanouts of Storm Drain Inlets

Section 9: Watershed Protection Tool #7 - Control of Non-Stormwater Discharges

123. Dealing with Septic System Impacts
124. Recirculating Sand Filters: An Alternative to Conventional Septic Systems
125. Use of Tracers to Identify Sources of Contamination in Dry Weather Flow

Section 10: Watershed Protection Tool #8 - Watershed Stewardship
Watershed Education

126. Understanding Watershed Behavior
127. On Watershed Education

Watershed Advocacy
128. Choosing the Right Watershed Management Structure

Pollution Prevention at Home
129. The Peculiarities of Perviousness
130. Toward a Low Input Lawn
131. Homeowner Survey Reveals Lawn Management Practices in Virginia
132. Nitrate Leaching Potential From Lawns and Turfgrass
133. Insecticide Impact on Urban and Suburban Wildlife
134. Minimizing the Impact of Golf Courses on Streams
135. Groundwater Impacts of Golf Course Development in Cape Cod

Pollution Prevention at Work
136. Practical Pollution Prevention Practices Outlined for West Coast Service Stations
137. Practical Pollution Prevention Emphasized for Industrial Stormwater
138. Milwaukee Survey Used to Design Pollution Prevention Program

139. Rating Deicing Agents: Road Salt Stands Firm
140. Pollution Prevention for Auto Recyclers

Watershed Monitoring

141. An Introduction to Stormwater Indicators

Stream Restoration
142. Assessing the Potential for Urban Watershed Restoration
143. Stormwater Retrofits: Tools for Watershed Enhancement
144. Sligo Creek: Comprehensive Stream Restoration
145. Bioengineering in Four Mile Run, Virginia
146. Coconut Rolls Used For Natural Streambank Stabilization
147. Pipers Creek: Salmon Habitat Restoration in the Pacific Northwest
148. The Longevity of Instream Habitat Structures
149. Stream Daylighting in Berkeley, CA Creek
150. Parallel Pipe Systems as a Stream Protection Technique

Assumptions on Pollutant Removal
Elizabeth Haven's Estates

Proposed Conditions

From stormceptor Sizing Program:
TSS 81% removal

Removal assumptions from overview of P8 model **(A, B, C)**

A For a dry pond, 6 hour drawdown time need a device area to imp of .2453 for 85%
For a dry pond, 6 hour drawdown time need a device area to imp of .0402 for 70%

our dry pond is 2120 sf

our imp area is 2.91 acres, or 126760 sf

ratio is 0.017 The area is so small, we cannot really expect any reduction in pollutants from it's function as a dry pond

B For an infiltration basin in B soil, .5 Inch/hour, need a device area to imp of .0094 for 70%
For an infiltration basin in B soil, 1 Inch/hour, need a device area to imp of .00289 for 70%
assume for 0.625 I, area ratio is 0.0083

For an infiltration basin in B soil, .5 Inch/hour, need a device area to imp of .02 for 85%
For an infiltration basin in B soil, 1 Inch/hour, need a device area to imp of .0122 for 85%
assume for 0.625 I, area ratio is 0.0177

Our dry pond is also an infiltration basin

2120/126760 is 0.017

in theory, we should be able to get 70% removal using this device as a infiltration basin

How about removal for our infiltrators?

1.19 acres of paving: is 51,836 sf

our infiltrator area is:4050 sf

ratio is 0.078

Should be able to get equilvelent of 85 % removal or better

Existing Conditions

Buffer /Swale ratios

C For a buffer/swale in B soil, .5 Inch/hour, need a device area to imp of .0370 for 70%
For a buffer/swale in B soil, 1 Inch/hour, need a device area to imp of .0289 for 70%
use .5 in/hour for this area (fill)

For a buffer/swale in B soil, .5 Inch/hour, need a device area to imp of .0982 for 85%
For a buffer/swale in B soil, 1 Inch/hour, need a device area to imp of .0698 for 85%
assume for 0.625 I, area ratio is 0.0177
use .5 in/inch for this area (fill)

Appendix E

Assumptions on Pollutant Removal
Elizabeth Haven's Estates

Existing Conditions

How much area in ditch and to south wetland between existing pipe and wetland?

4' x 200 and 30' x 20' is 1400 sf

pavement in city system:1.176 acres: is 51,227
ratio is 0.0273
for 70% need 0.037
assume we get 35% TSS removal
Grade is not flat coming out of existing pipe.

Conclusions: for existing conditions, use 35% removal using natural buffer from City system
(half of 70% charts for buffers)
For Central basin, use 70% removal charts for infiltratration
For stormceptor use 81 % TSS
for infiltrators, use 85% chart for infiltrators

P8 removal efficiencies for various conditions
Elizabeth Haven's

	tss	tp	tkn	copper	lead	zinc	bc
85% chart for drypond 6 hour device 5	85.0%	53.2%	45.8%	45.8%	76.7%	45.8%	76.7%
For Stormceptor 81% tss, 75% rest	**81.0%**	**39.9%**	**34.4%**	**34.4%**	**57.5%**	**34.4%**	**57.5%**
natural buffer .5 soil device 15	70.0%	42.1%	38.7%	38.7%	84.9%	38.7%	64.9%
this site, existing	**35.0%**	**21.1%**	**19.4%**	**19.4%**	**42.5%**	**19.4%**	**32.5%**
inilftrators 85% (surface infiltrators)	85.0%	70.7%	68.3%	68.3%	81.9%	58.3%	81.9%
Infiltrators 70% (central pond)	70.0%	58.2%	56.0%	56.0%	67.2%	47.8%	67.2%

E

Pollutant removal,existing conditions								Sheet 4 of 4	
Average Storm (Providence 1980)			For runoff from basins with paving associated with a 2 year return storm						
EXISTING		mg/l							
Pollutants in runoff		**tss**	**tp**	**tkn**	**copper**	**lead**	**zinc**	**bc**
1.083 af		54.5	0.26	0.53	50.7	0.129	0.129	15000
Total loading , lbs		167.69	0.80	1.63	156.00	0.40	0.40	
	% of flow		% reductions					
	on to site in							
	a 2 yr storm	**tss**	**tp**	**tkn**	**copper**	**lead**	**zinc**	**bc**
South		81.0%	39.9%	34.4%	34.4%	57.5%	34.4%	57.5%
0.317 af	net reduction	35.4%	17.5%	15.0%	15.0%	25.2%	15.0%	25.2%
#s	removed lbs	16.64	0.04	0.07	6.57	0.03	0.02	3775.08
North	70.0%	0	0	0	0	0	0	0
0.766	removed lbs	0	0	0	0	0	0	0
EXISTING								
Total pollutants loaded to site		167.69	0.80	1.63	156.00	0.40	0.40	
Total removal, all runoff lbs		**16.64**	**0.04**	**0.07**	**6.57**	**0.03**	**0.02**	
Percent removal		9.92%	4.89%	4.21%	4.21%	7.05%	4.21%	
Proposed								
		tss	**tp**	**tkn**	**copper**	**lead**	**zinc**	**bc**
Total Loading Lbs		**MG/l**						
Acreft: 1.372	**af**	**54.5**	**0.26**	**0.53**	**50.7**	**0.129**	**0.129**	**15000**
Total Loading Lbs		**203.25**	**0.97**	**1.98**	**189.08**	**0.48**	**0.48**	
		tss	**tp**	**tkn**	**copper**	**lead**	**zinc**	**bc**
Proposed removal								
1.102 loading	**lds**	**163.25**	**0.78**	**1.59**	**151.87**	**0.39**	**0.39**	
Storm ceptor								
		81.0%	**39.9%**	**34.4%**	**34.4%**	**57.5%**	**34.4%**	**57.5%**
1.102 AF	**#s removed**	**132.23**	**0.31**	**0.55**	**52.17**	**0.22**	**0.13**	
into infiltration basin		**70.0%**	**58.2%**	**56.0%**	**56.0%**	**67.2%**	**47.8%**	**67.2%**
1.102	**#s removed**	**21.71**	**0.27**	**0.58**	**55.83**	**0.11**	**0.12**	
		tss	**tp**	**tkn**	**copper**	**lead**	**zinc**	**bc**
Proposed removal								
0.27 loading	**lds**	**40.00**	**0.19**	**0.39**	**37.21**	**0.09**	**0.09**	
into surface infiltrators		**85.0%**	**70.7%**	**68.3%**	**68.3%**	**81.9%**	**58.3%**	**81.9%**
0.27	**#s removed**	**34.00**	**0.13**	**0.27**	**25.41**	**0.08**	**0.06**	
PROPOSED								
Total pollutants loaded to site		203.25	0.97	1.98	189.08	0.48	0.48	
total removed		166.23	0.45	0.81	77.58	0.30	0.19	
percentage removed		81.8%	46.0%	41.0%	41.0%	62.3%	39.1%	

E

Contract For Sale and Purchase

5900 Imperial Lakes Blvd
Mulberry, Florida 33860
(863) 644-6681

NEW LONDON	CONNECTICUT		AUGUST 15	2016
COUNTY	STATE		MONTH/DATE	YEAR

Buyer: Address: City: State: Zip: Phone: (H) (B)	Seller: RED FEATHER, LLC Address: City: State: Zip: Phone: (H) (B)

Buyer hereby offers to purchase the following described property based upon the following terms:

TOTAL PURCHASE PRICE of said property is Shall be paid as follows, to-wit: $_____

Earnest Money Deposit (10%)
Held by: $_____
Cotter, Greenfield, Manfredi & Lenes, PC
34 Courthouse Sq, 3rd Floor, Norwich, CT 06360
860-887-1695

Balance Due at Closing but subject to proration and adjustments. See Next Column (B) $_____

Balance payable as follows: (B) _____

Remaining balance due in cash at closing.

1) Title Insurance: At the closing of this transaction, Seller shall have issued by Cotter, Greenfield, Manfredi & Lenes, PC **, a commitment for title insurance agreeing to insure title to said property and upon closing, Seller shall purchase and have delivered to Buyer, a title insurance policy on the real property covered hereunder in the amount of the full purchase price, after all necessary instruments are filed of record.**

2) Closing Date: In the event the title shall be proven to be uninsurable, Seller shall have a period of ninety (90) days within which to cure defects in title, and this sale shall be closed within ten (10) days after notice of such curing to Buyer. Upon Seller's failure to correct uninsurability within the time limit, the earnest money deposit shall be returned to Buyer upon demand, and all rights and liabilities arising hereunder shall terminate. Subject to the aforesaid curative period, this sale shall be closed on or before: SEPTEMBER 29, 2016 . If any necessary closing documentation is not available on the closing date, then Seller may, at his sole option, extend the closing date up to an additional thirty (30) days.

3) Conveyance: Seller agrees to convey title to the aforesaid property to Buyer by WARRANTY Deed, free and clear of all encumbrances or liens except easements, restrictions, reservations of record and any applicable Governmental Rules, laws or regulations.

4) Costs: The cost of state & municipality conveyance taxes thereon shall be paid by SELLER . Buyer will pay a reasonable closing fee to the closing agent. Buyer shall properly execute any required notes and mortgages and place the required stamps thereon and pay intangible tax, recording costs, document preparation and any other costs associated with Buyer's financing**. Unless otherwise specified herein, the form of the mortgage will be in a form typically used by lenders in the area for this type of property.**

5) Acceptance: This instrument shall become effective as a contract when signed by Agent, Buyer, and Seller. If not signed by all parties on or before Monday, August 22, 2016 any monies deposited shall be refunded and this instrument shall be void. However, this offer shall remain binding upon Buyer through the date stated in this paragraph 5. A legible facsimile copy or scanned email of this Contract and any signatures hereon shall be considered for all purposes as an original.

6) Binding Contract: This Contract is intended as a legally binding contract and the parties shall be bound by all terms stated herein and on the reverse side hereof and addendum (attached hereto ☐) (none attached ☐). If not understood, seek competent advice prior to signing.

7) Special Agreement(s): _____

By affixing your signatures below, the parties agree to each of the forgoing provisions and that Higgenbotham Auctioneers International, Ltd., ("Agent") **is acting as agent for the Seller.**

Accepted this _____ day of _____, 20_____.

Buyer(s)	**Seller(s)**
_____	_____
Printed Name: _____	**Printed Name:** _____
_____	_____
Printed Name: _____	**Printed Name:** _____

Higgenbotham Auctioneers International, Ltd., Inc.,
(Referring Agent)
Robert H. Glass JR., Broker (Agent for the Seller) **BY:** _____

8) Proration; Credits: Taxes, assessments, rent, interest, insurance and other expenses and revenue of Property shall be prorated through day before closing. Cash at closing shall be increased or decreased as may be required by prorations. Advance rent and security deposits will be credited to Buyer and escrow deposits held by mortgagee will be credited to Seller. Taxes shall be prorated based on the current year's tax with due allowance made for maximum allowable discount, homestead and other exemptions. If closing occurs at a date when the current year's millage is not fixed and current year's assessment is available, taxes will be prorated based upon such assessment and the prior year's millage. If current year's assessment is not available, then taxes will be prorated on the prior year's tax. If there are completed improvements on the Real Property by January 1st of year of closing, which improvements were not in existence on January 1st of the prior year, then taxes shall be prorated based upon the prior year's millage and at an equitable assessment to be agreed upon between the parties, failing which, request will be made to the County Property Appraiser (aka Tax Assessor) for an informal assessment taking into consideration available exemptions. Any tax proration based on an estimate shall, at request of either Buyer or Seller, be subsequently readjusted upon receipt of tax bill on condition that a statement to that effect is in the closing statement. **Buyer should not rely on the seller's current property taxes as the amount of property taxes that the buyer may be obligated to pay in the year subsequent to purchase. A change of ownership or property improvements triggers reassessments of the property that could result in higher property taxes. If you have any questions concerning valuation, contact the county property appraiser's office for information. Buyer should not rely on the seller's current property taxes as the amount of property taxes that the buyer may be obligated to pay in the year subsequent to purchase. A change of ownership or property improvements triggers reassessments of the property that could result in higher property taxes. If you have any questions concerning valuation, contact the county property appraiser's office for information.**

9) Full Agreement: No agreements unless incorporated in this Contract shall be binding upon Agent, Buyer, or Seller.

10) Inspection: Upon the signing of this Contract, Buyer affirms that Buyer has personally inspected this property, or it has been inspected by its representative with power to act in Buyer's behalf. Buyer specifically warrants that it has performed all necessary due diligence in the inspection of the subject property and any improvements thereon including, if desired, wood destroying organisms, environmental assessments, boundary surveys, and governmental regulation inquiry. Buyer affirms that it has not relied upon any statement or representation by Agent or Seller as any inducement to purchase the subject property.

11) Assignment: This Contract may be assigned, however, the original contracting party shall remain liable for any and all obligations herein through the closing of this transaction.

12) Default/Litigation: If Buyer fails to perform this Contract within the time specified, including payment of all deposit(s), the deposit(s) paid by Buyer and deposit(s) agreed to be paid, may be retained by or for the account of Seller as agreed upon liquidated damages, consideration for the execution of this Contract and in full settlement of any claims; whereupon, Buyer and Seller shall be relieved of all obligations under this Contract, or Seller, at Seller's option, may proceed in equity to enforce Seller's rights under this Contract. If for any reason other than failure of Seller to make Seller's title marketable after diligent effort, Seller fails, neglects or refuses to perform this Contract, the Buyer may seek specific performance or elect to receive the return of Buyer's deposit(s) without thereby waiving any action for damages resulting from Seller's breach. In any litigation brought to enforce any of the terms of this Contract, the successful party shall be entitled to recover, in addition to all other damages, his attorney's fees and court costs incurred in said litigation.

13) Commission: The Seller agrees to pay said Agent the amounts stated in seller/broker employment agreement at the time of closing this transaction, unless amended herein. If Buyer fails to perform this Contract within the time herein specified, time being of the essence of this agreement, the deposit made by Buyer shall be forfeited, and the amount of such deposit shall be divided equally between Agent and Seller provided, however, that the amount received or retained by Agent shall not exceed the full amount of said commission, any excess to be paid Seller. If the transaction shall not be closed because of refusal of Seller to perform, then Seller shall pay the commission to the Agent on demand. Failure or refusal of wife or husband of Seller or Buyer to execute a deed or mortgage required hereunder shall be deemed default on the part of such Seller or Buyer.

14) Plain Meaning: The Words "Agent", "Buyer", and "Seller", herein employed shall include their heirs, administrators, executors and successors, and said words, and any pronouns relative thereto, shall include the masculine, feminine and neuter gender, and the singular and plural number, wherever the context so admits or requires.

15) Risk of Loss: If the improvements are damaged by fire or other casualty before the closing hereunder and can be restored to substantially the same condition as now within a period of ninety (90) days thereafter, Seller shall so restore the improvements and the closing date hereinabove set shall be extended accordingly, but if such restoration cannot be completed within that time, this Contract shall be declared canceled.

16) Auctioneer Remarks: The parties hereto acknowledge that this purchase is being made at public auction and the parties are thereby bound by all terms and conditions stated in the auctioneer's opening remarks.

17) Radon Gas: Radon is a naturally occurring radioactive gas that, when it has accumulated in a building in sufficient quantities, may present health risks to persons who are exposed to it over time. Levels of radon that exceed Federal and State guidelines have been found in buildings. Additional information regarding radon and radon testing may be obtained from your county public health unit.

18) "AS IS" Clause: The undersigned Buyer does hereby acknowledge that the subject property is purchased at public auction, and that a prerequisite to bidding is that all property, whether real or personal, is purchased absolutely "AS IS" with no warranty whatsoever as to the condition of the same.

19) IRC§1031 Exchange: The parties hereto agree to fully cooperate with the other to facilitate a like-kind exchange pursuant to the provisions of Section 1031 of the Internal Revenue Code.

20) No Financing Contingency: The Buyer understands and acknowledges that this Contract IS NOT contingent upon Buyer obtaining financing.