

***Stormwater Management & Erosion Control Plan***

**24 & 30 Dale Street  
Andover, Massachusetts**

**Assessor's Map 138  
Parcel 17 & 18**

*Prepared on:*  
January 9, 2026

*Revised on:*  
March 13, 2026

*Prepared for:*

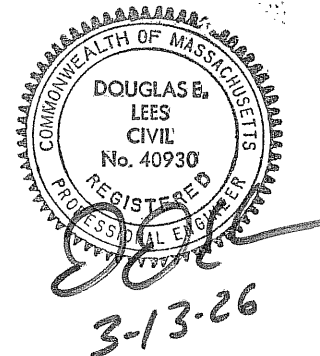
***Bryan Duby Construction***

*LEES Job No. 81502*

*Prepared by:*

***Land Engineering  
& Environmental Services, Inc.***

One Bridgeview Circle  
Tyngsboro, MA 01879



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### **Project Description**

The Applicant is proposing to construct nine townhouse style condominiums on two parcels located on Dale Street. The lots are shown as parcels 17 and 18 on Andover assessors map 138. The work includes razing the two existing houses, a garage and a shed to prepare the site for the new development. The new development includes nine townhouse style condominiums in three separate buildings with associated utilities, parking and landscaping as shown on the Site Development Plans.

### **Existing Conditions Site Description**

The project site consist of two abutting lots, each lot contains a single-family dwelling, driveway and yard areas. Parcel 17 also has a 2-story garage behind the existing house. The remainder of the properties is mostly lawn with a few trees scattered towards the rear of the lot. The land slopes north-easterly towards the neighboring property and Dale Street.

Soils on site have been mapped by the USDA as Pits, gravel and Udorthents, smoothed. Test holes conducted on site shows the soil as being sand and gravel with an observed water table at 10 feet, the soil logs are included in the appendix.

### **Proposed Conditions Site Description**

This project proposes raising the existing structures on site and constructing three new buildings, providing nine new townhouse units. Excess runoff from the new driveway, the front of the new roofs and the lawn areas in front of the buildings will be collected and treated with a Hydroworks hydrodynamic separator with a catch basin grate and then will be directed to a stormwater management area where it will be permitted to infiltrate. Roof gutters will be provided along the back sections of the proposed roofs to collect excess runoff and direct it to the above referenced stormwater management area. Straw wattle erosion controls will be placed on the downslope of the site prior to site disturbance and will remain until the site is stabilized.

The condo association will be responsible for maintaining the stormwater management area by periodically checking for standing water though the cleanout ports and keeping the gutters and downspouts clear.

The proposed design incorporates recognized best management practices (BMP's) for stormwater management and erosion control. Care has been taken in the selection of the appropriate BMP's for this project.

**Calculation Methodology**

The enclosed stormwater peak-rate runoff calculations were performed utilizing the stormwater modeling software HydroCAD. HydroCAD utilizes SCS TR-20 methodology.

**Peak Rate Attenuation**

**Stormwater Runoff Peak-Rate Analysis Tables**

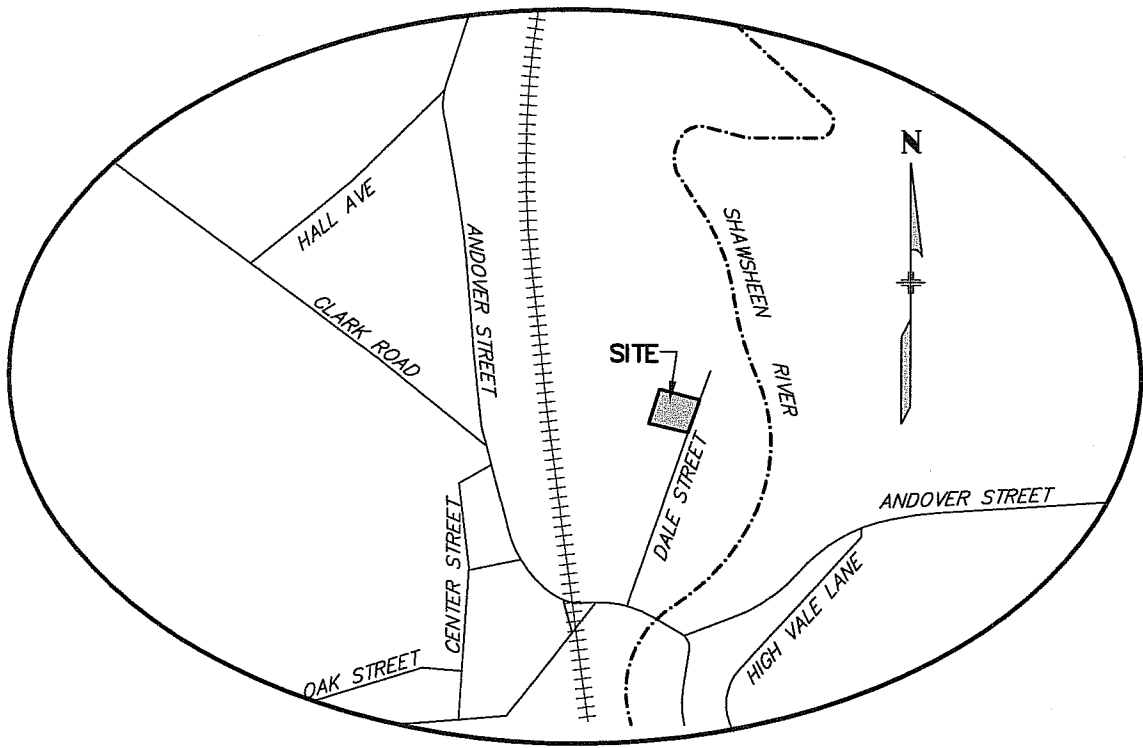
**Table 1 - Peak runoff from the site to Dale Street (DA#1)**

	<u>Design Storm Event</u>			
	<u>2-Year</u>	<u>10-Year</u>	<u>25-Year</u>	<u>100-Year</u>
Pre-Development Conditions	0.1 cfs	0.3 cfs	0.6 cfs	1.2 cfs
Proposed Conditions	0.1 cfs	0.3 cfs	0.4 cfs	0.7 cfs

**Table 2 - Peak runoff from the site to northern lot line (DA#2)**

	<u>Design Storm Event</u>			
	<u>2-Year</u>	<u>10-Year</u>	<u>25-Year</u>	<u>100-Year</u>
Pre-Development Conditions	0.0 cfs	0.1 cfs	0.2 cfs	0.7 cfs
Proposed Conditions	0.0 cfs	0.1 cfs	0.1 cfs	0.3 cfs

As can be seen from the summary tables above, there is no increase in the theoretical rate of runoff from the 2, 10, 25 or 100-year storm events.



LOCUS MAP  
(NTS)

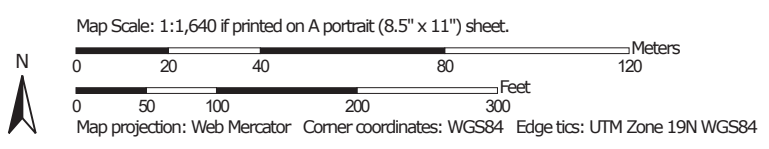
USGS



Soil Map—Essex County, Massachusetts, Northern Part

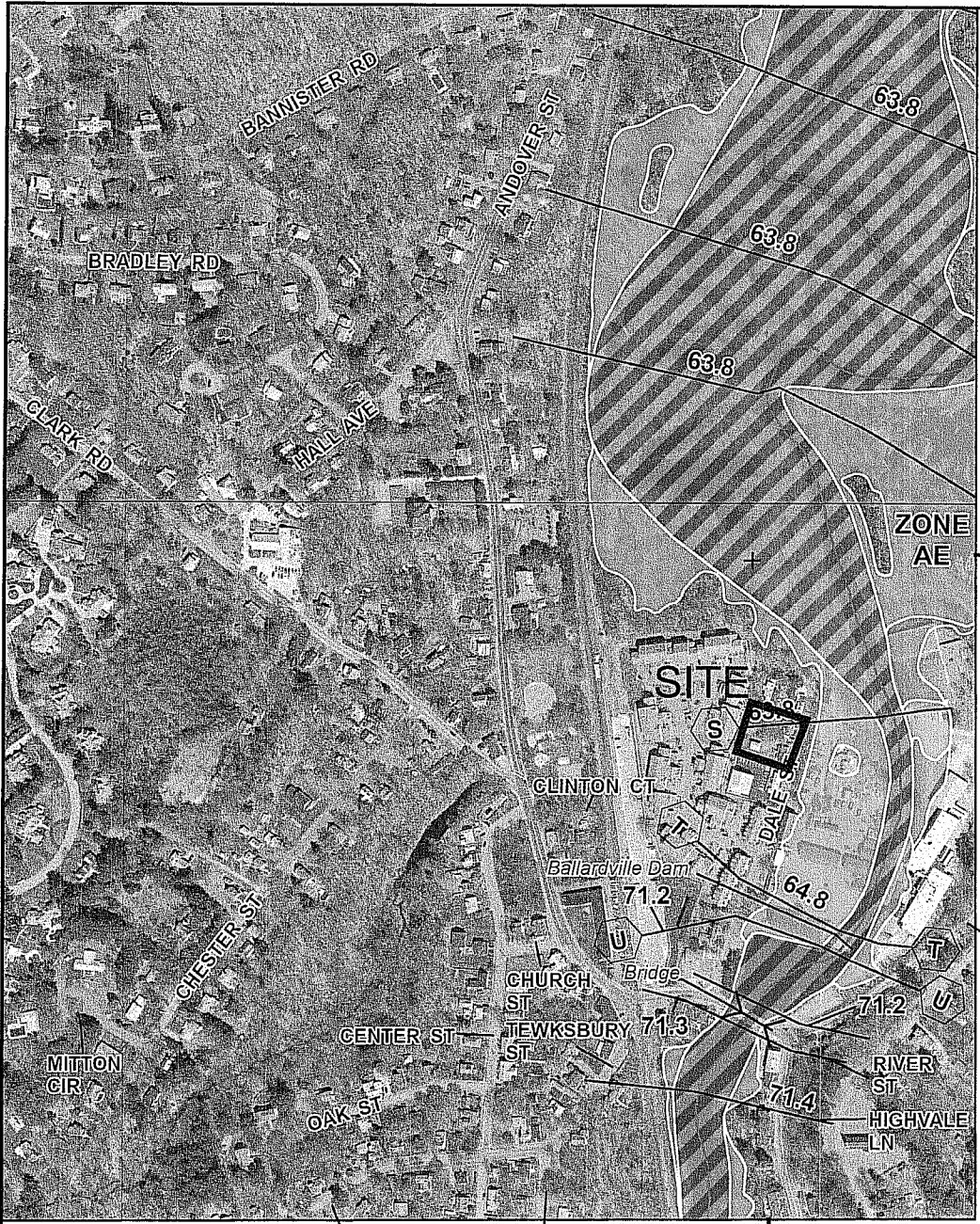


Soil Map may not be valid at this scale.



## Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
600	Pits, gravel	2.6	26.0%
651	Udorthents, smoothed	7.3	74.0%
<b>Totals for Area of Interest</b>		<b>9.8</b>	<b>100.0%</b>



POLE HILL DR

MARLAND ST

323<sup>000</sup>mE

42° 37' 30.0"

71° 9' 22.5"

47 22<sup>000</sup>mN



Map Projection:  
 NAD 1983 State Plane, Massachusetts Mainland,  
 Western Hemisphere; Vertical Datum: NAVD 88

1 inch = 500 feet

0                      500                      1,000

FEMA  
 National Flood Insurance Program

NATIONAL FLOOD INSURANCE PROGRAM  
 FLOOD INSURANCE RATE MAP

ESSEX COUNTY, MASSACHUSETTS  
 (All Jurisdictions)

PANEL 0218 OF 0600



Panel Contains:

COMMUNITY	NUMBER	PANEL	SUFFIX
ANDOVER, TOWN OF	250076	0218	G

VERSION NUMBER  
 2.6.3.6  
 MAP NUMBER  
 25009C0218G  
 MAP REVISED  
 July 8, 2025

This is an official FIRMette showing a portion of the above-referenced flood map created from the MSC FIRMette Web tool. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For additional information about how to make sure the map is current, please see the Flood Hazard Mapping Updates Overview Fact Sheet available on the FEMA Flood Map Service Center home page at <https://msc.fema.gov>.

**Land Engineering  
& Environmental Services, Inc.**

1 BRIDGEVIEW CIRCLE, SUITE 16  
TYNGSBORO, MA 01879  
TELEPHONE (978) 649-4642 / FAX (978) 649-0981

JOB 81502 - Dele St.  
SHEET NO. 1 OF 12  
CALCULATED BY DR DATE 3/13/06  
CHECKED BY \_\_\_\_\_ DATE \_\_\_\_\_  
SCALE \_\_\_\_\_

PRETREATMENT

Imp. Area to Prop. Catch Basin = 5,280 sf

$$\text{STORAGE} = \frac{5280 \text{ sf}}{43,560 \text{ sf/Ac}} \times \frac{750 \text{ lbs}}{\text{Acre-foot}} \times \frac{\text{CF}}{90 \text{ lbs}} \times \frac{10 \text{ Storms}}{\text{Year}}$$

= 10 CF

SEDIMENT VOLUME IN HYDROWORKS HS3 = 10 CF ✓

POLLUTENT REMOVAL

TOTAL Post Const. Imp. x 1.0"

$$= 13,525 \times 1" / 12" = \underline{1,127 \text{ CF}}$$

STORAGE PROVIDED (POND #1) (SEE ATTACHED)

$$= \underline{3,795 \text{ CF}} \checkmark$$

**81502.Prop - Town Regs**

Type III 24-hr 100-Year Rainfall=8.94"

Prepared by {enter your company name here}

Printed 3/12/2026

HydroCAD® 10.00-26 s/n 02454 © 2020 HydroCAD Software Solutions LLC

**Stage-Area-Storage for Pond P1: Pond 1**

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
0.00	1,604	0	2.60	1,604	2,489
0.05	1,604	32	2.65	1,604	2,546
0.10	1,604	64	2.70	1,604	2,602
0.15	1,604	96	2.75	1,604	2,658
0.20	1,604	128	2.80	1,604	2,713
0.25	1,604	160	2.85	1,604	2,768
0.30	1,604	192	2.90	1,604	2,822
0.35	1,604	225	2.95	1,604	2,875
0.40	1,604	257	3.00	1,604	2,928
0.45	1,604	289	3.05	1,604	2,979
0.50	1,604	321	3.10	1,604	3,030
0.55	1,604	353	3.15	1,604	3,080
0.60	1,604	385	3.20	1,604	3,129
0.65	1,604	417	3.25	1,604	3,177
0.70	1,604	449	3.30	1,604	3,224
0.75	1,604	481	3.35	1,604	3,270
0.80	1,604	513	3.40	1,604	3,314
0.85	1,604	545	3.45	1,604	3,356
0.90	1,604	577	3.50	1,604	3,396
0.95	1,604	609	3.55	1,604	3,434
1.00	1,604	641	3.60	1,604	3,470
1.05	1,604	674	3.65	1,604	3,505
1.10	1,604	706	3.70	1,604	3,538
1.15	1,604	738	3.75	1,604	3,571
1.20	1,604	770	3.80	1,604	3,603
1.25	1,604	802	3.85	1,604	3,635
1.30	1,604	868	3.90	1,604	3,667
1.35	1,604	934	3.95	1,604	3,699
1.40	1,604	999	4.00	1,604	3,731
1.45	1,604	1,065	4.05	1,604	3,763
1.50	1,604	1,130	4.10	1,604	3,795
1.55	1,604	1,195	4.15	1,604	3,827
1.60	1,604	1,260	4.20	1,604	3,859
1.65	1,604	1,324	4.25	1,604	3,892
1.70	1,604	1,388			
1.75	1,604	1,453			
1.80	1,604	1,516			
1.85	1,604	1,580			
1.90	1,604	1,643			
1.95	1,604	1,706			
2.00	1,604	1,768			
2.05	1,604	1,830			
2.10	1,604	1,892			
2.15	1,604	1,954			
2.20	1,604	2,015			
2.25	1,604	2,076			
2.30	1,604	2,136			
2.35	1,604	2,196			
2.40	1,604	2,255			
2.45	1,604	2,314			
2.50	1,604	2,373			
2.55	1,604	2,431			

*Z Peak SDRI  
@ 4.1*

**Land Engineering  
& Environmental Services, Inc.**

1 BRIDGEVIEW CIRCLE, SUITE 16  
TYNGSBORO, MA 01879  
TELEPHONE (978) 649-4642 / FAX (978) 649-0981

JOB 01502 - Dale St.  
SHEET NO. 2 OF 2  
CALCULATED BY W DATE 3/13/26  
CHECKED BY \_\_\_\_\_ DATE \_\_\_\_\_  
SCALE \_\_\_\_\_

STANDARD #3 ~ RECHARGE

TOTAL POST DEVELOPMENT IMP. = 13,255 SF

"A" SOILS IMP = 13,255 SF

ReV = 13,255 SF (0.6 inches) = 663 CF

RECHARGE IMPERVIOS PROVIDED

TO POND DA #1B + DA #3

IMP = 5,290 + 6,340 + 750 = 12,380 SF

Adjusted Minimum Recharge Volume

$\frac{\text{Recharged Imp}}{\text{Total Imp}} = \frac{12,380}{13,255} = 93\% > 65\%$  ✓

ReV = 663 CF  $\left(\frac{1}{0.93}\right) = 713$  CF

RECHARGE VOLUME PROVIDED

POND #1 ⇒ 3,795 CF (SEE ATTACHED PEAK STORAGE)

DRAWDOWN CALCULATIONS

$K_A = 0.003347 \text{ ft/min} \times 60 \text{ min/hr} = 0.20 \text{ ft/hr}$

$T_d = \frac{3795 \text{ CF}}{0.20 \text{ ft/hr} (1605 \text{ SF})} = 12 \text{ hours}$  ✓

Stage-Area-Storage for Pond P1: Pond 1

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
0.00	1,604	0	2.60	1,604	2,489
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2.40	1,604	2,255			
2.45	1,604	2,314			
2.50	1,604	2,373			
2.55	1,604	2,431			

~ Peak Spill  
@ 4.1

**Land Engineering  
& Environmental Services, Inc.**

1 BRIDGEVIEW CIRCLE, SUITE 16  
TYNGSBORO, MA 01879  
TELEPHONE (978) 649-4642 / FAX (978) 649-0981

JOB 81507 - DALE ST.  
SHEET NO. 3 OF \_\_\_\_\_  
CALCULATED BY LD DATE 3/13/26  
CHECKED BY \_\_\_\_\_ DATE \_\_\_\_\_  
SCALE \_\_\_\_\_

GROUNDWATER MOUNDING CALCS

TEST PIT ~ SAND & GRAVEL

$$S_y - \text{SPECIFIC YIELD} = 0.24$$

$$K - \text{HYDRAULIC CONDUCTIVITY} = 39 \text{ ft/day}$$

$$\text{Pond Bottom} = 67.75$$

$$\text{ESTHWT} = \frac{66.00}{1.75'}$$

$$\omega = \frac{3795 \text{ cf}}{(1605 \text{ sf})(1 \text{ day})} = 2.36 \text{ ft/day}$$

$$h(72 \text{ hours}) = 0.06 \text{ ft} < 2.0 \text{ ft}$$

(SEE A QTE SOLV COLES ATTACHED)

Transient Water-Table Rise Beneath a Rectangular Recharge Area  
Groundwater Mounding Solution by Hantush (1967)

Aquifer Properties:

Hydraulic conductivity,  $K = 39$  ft/day  
Specific yield,  $S_y = 0.24$   
Initial saturated thickness,  $h(0) = 12$  ft

Recharge Area Properties:

Recharge rate,  $w = 2.36$  ft/day  
Simulation time,  $t = 3$  day  
Time when recharge stops,  $t(0) = 1$  day  
X coordinate at center of recharge area,  $X = 30$  ft  
Y coordinate at center of recharge area,  $Y = 54$  ft  
Length in x direction,  $l = 15$  ft  
Length in y direction,  $a = 27$  ft

Water-Table Rise at Center of Recharge Area:

t (day)	h (ft)
0.3	0.518116
0.6	0.623775
0.9	0.685804
1.2	0.28123
1.5	0.175101
1.8	0.129954
2.1	0.103931
2.4	0.0867957
2.7	0.0745957
3	0.0654443

Note: recovery begins after 1 day.

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Report generated by AQTESOLV v4.02.002 ([www.aqtesolv.com](http://www.aqtesolv.com)) on 03/12/26 at 13:53:32.  
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**Stormwater and Erosion & Sedimentation Control Plan**  
**#23 Morrison Road – Single-Family Dwelling**

**Responsible party:**

Bryan Duby Construction  
665 Boston Road, Unit 6  
Billerica, MA 01821

**Size of Construction Project:**

Size of Property: **21,811+/- SF**  
Total Area of Construction disturbances: **21,811+/- SF**

**The maintenance program shall be the responsibility of the developer during construction and until the site is stabilized and shall consist of:**

1. The Contractor shall create and maintain a list of responsible personnel, with contact information, responsible for construction period pollution and erosion control. Responsible parties shall document all control activities and ensure compliance with local, state and federal construction permits and regulations.
2. The site contractor shall prepare his site-specific construction sequencing plan along with stockpile locations and other relevant construction considerations for use in constructing the project and for compliance with local, state and federal permits.
3. All erosion control measures will be inspected at least once a week and following any storm event of 0.5 inches or greater.
4. Sediment buildup will be removed from straw wattle barriers when it has reached one-third the height of said barrier. Sediment controls are to remain in place until the site is stabilized.
5. Any temporary sediment basins shall be cleaned when sediment has accumulated within 12" of the outlet elevation and prior to any forecasted significant rainfall event.
6. Temporary and permanent seeding and planting will be inspected for bare spots, washouts, and healthy growth. Any bare spots and/or washouts will be repaired and reseeded in a timely manner.
7. All straw wattles will be maintained during construction and removed and discarded at an approved facility once the site is stabilized.

### *Construction Sequence*

1. Call Digsafe
2. Construct temporary and permanent sediment and erosion control facilities. Erosion and sediment control measures shall be installed prior to any earth moving operation that will influence stormwater runoff.
3. Schedule preconstruction meeting with the Town officials if required.
4. Raze existing buildings and site improvements.
3. Cut and clear trees in construction areas only.
4. All permanent ditches, swales, detention, retention and sedimentation basins to be stabilized using vegetative and non-structural bmp's prior to directing runoff to them.
5. Clear and dispose of debris.
6. Construct temporary culverts or diversion channels as required.
7. begin building construction
8. Install underground utilities.
9. Grade and gravel driveway, which shall be stabilized immediately after grading.
10. Maintain construction access/exit to minimize offsite tracking of soil.
11. Begin permanent and temporary seeding and mulching. All cut and fill slopes shall be seeded and mulched or protected with stone rip rap within 72 hours of their construction to prevent erosion.
12. Daily, or as required, construct temporary berms, drains, ditches, silt fences, sediment traps, etc., mulch and seed as required.
13. Pave driveway.
14. Inspect and maintain all erosion and sediment control measures.
15. Complete permanent seeding and landscaping.
16. Remove trapped sediments from collector devices as appropriate and then remove temporary erosion control measures.

### *Temporary Erosion Control Measures*

1. Erosion controls shall be installed along the down slope perimeter of the site.
2. Straw wattle erosion barriers are to be maintained and cleaned until all slopes have been adequately stabilized.
3. All disturbed areas shall be protected with stone rip-rap to prevent erosion or have a minimum of 4 inches of loam placed and seeded and mulched.
4. Fill material shall be free from stumps, wood, roots, etc.
5. The bottom of any temporary sediment basins shall be periodically cleaned, with the sediment removed to a secure location so as to prevent siltation of natural waterways.
6. After all disturbed areas have been stabilized, the temporary erosion control measures are to be removed and accumulated sediment disposed in a secure location.
7. Earth stockpiles are to have silt fence or straw wattles installed on the downslope side.
8. Erosion control measures shall be periodically inspected during the life of the project and after each storm. All damaged silt fences and straw wattles shall be repaired. Sediment deposits shall periodically be removed.
9. Erosion control measures shall be removed when the disturbed area is stabilized. Disturbed area resulting from the silt fence or straw wattle removal operation shall be permanently seeded. All accumulated sediment should be removed and properly disposed of.
10. The disturbed area shall be kept to a minimum, and the duration of exposure shall be less than a maximum of six weeks.
11. All graded areas shall be stabilized with stone rip rap or loamed and seeded to prevent future erosion.
12. All seeded areas shall be fertilized.
13. All seeded areas shall be mulched within 24 hours after seeding. A good quality of mulch straw should be used.

**Operation and Maintenance Plan**  
**#24 & #30 Dale Street**

***Owner/Person Responsible for Operation and Maintenance***

Condominium Association for 24 & 30 Dale Street.

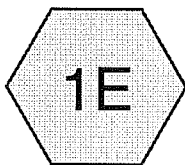
Title Reference: Essex North District Registry of Deeds  
Deed Book 10731, Page 126 and  
Deed Book 7534, Page 132

1. The landscaped and lawn areas shall be regularly maintained and tributary sources of sediment quickly stabilized and landscaped surfaces restored.
2. The parking areas are to be inspected monthly and any debris or rubbish shall be picked up and placed in dumpsters.
4. Sediment buildup in the parking area shall be monitored and excessive quantities swept when necessary and removed by the landscaper.
5. The Stormwater Management Area shall be inspected for standing water twice a year. If standing water is observed for an extended period (more than 72 hours), verify that the Hydroworks HydroStorm unit is functioning properly.
6. The Inspection and Maintenance of the Hydroworks Hydrostorm should be as follows:
  1. Inspect and check condition of each unit at least twice a year, once in the spring and once in the fall.
  2. Ascertain that the unit is functioning properly (no blockages or obstructions).
  3. Check for oil through the oil cleanout port. Remove any oil separately by using a small portable pump.
  4. Measure amount of solid materials that have accumulated in the sump (Unit should be cleaned when the sediment depth is eight inches).
  5. Pump down unit (at least once a year) and thoroughly inspect separation chamber, separation screen and oil baffle.
  6. Inspect internal components for damage or loosening of bolts.

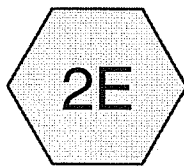
*Appendix*

## *HydroCAD Calculations*

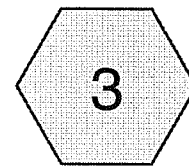
### *Existing Conditions*



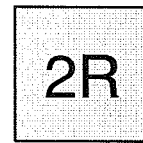
To Dale Street



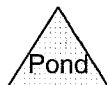
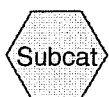
To northern Lot Line



Off Site



Lot Line



***2-Year Storm Event***

**81502.Exist - Town Regs**

Type III 24-hr 2-Year Rainfall=3.15"

Prepared by {enter your company name here}

Printed 3/12/2026

HydroCAD® 10.00-26 s/n 02454 © 2020 HydroCAD Software Solutions LLC

Page 2

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points  
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment 1E: To Dale Street**      Runoff Area=10,553 sf   35.43% Impervious   Runoff Depth>0.37"  
Tc=5.0 min   CN=61   Runoff=0.1 cfs   325 cf

**Subcatchment 2E: To northern Lot Line**      Runoff Area=11,251 sf   6.93% Impervious   Runoff Depth>0.00"  
Tc=5.0 min   CN=40   Runoff=0.0 cfs   0 cf

**Subcatchment 3: Off Site**      Runoff Area=3,250 sf   23.08% Impervious   Runoff Depth>0.15"  
Tc=5.0 min   CN=53   Runoff=0.0 cfs   41 cf

**Reach 2R: Lot Line**      Inflow=0.0 cfs   41 cf  
Outflow=0.0 cfs   41 cf

**Total Runoff Area = 25,054 sf   Runoff Volume = 366 cf   Average Runoff Depth = 0.18"**  
**78.97% Pervious = 19,785 sf   21.03% Impervious = 5,269 sf**

**81502.Exist - Town Regs**

Type III 24-hr 2-Year Rainfall=3.15"

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**Summary for Subcatchment 1E: To Dale Street**

Runoff = 0.1 cfs @ 12.12 hrs, Volume= 325 cf, Depth&gt; 0.37"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr 2-Year Rainfall=3.15"

Area (sf)	CN	Description
1,190	30	Woods, Good, HSG A
544	76	Gravel roads, HSG A
1,896	98	Roofs, HSG A
1,843	98	Paved parking, HSG A
5,080	39	>75% Grass cover, Good, HSG A
10,553	61	Weighted Average
6,814		64.57% Pervious Area
3,739		35.43% Impervious Area

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

**Summary for Subcatchment 2E: To northern Lot Line**

Runoff = 0.0 cfs @ 20.00 hrs, Volume= 0 cf, Depth&gt; 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr 2-Year Rainfall=3.15"

Area (sf)	CN	Description
3,850	30	Woods, Good, HSG A
62	76	Gravel roads, HSG A
755	98	Roofs, HSG A
25	98	Paved parking, HSG A
6,559	39	>75% Grass cover, Good, HSG A
11,251	40	Weighted Average
10,471		93.07% Pervious Area
780		6.93% Impervious Area

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

**Summary for Subcatchment 3: Off Site**

Runoff = 0.0 cfs @ 12.38 hrs, Volume= 41 cf, Depth&gt; 0.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr 2-Year Rainfall=3.15"

**81502.Exist - Town Regs**

Type III 24-hr 2-Year Rainfall=3.15"

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Area (sf)	CN	Description
750	98	Paved parking, HSG A
2,500	39	>75% Grass cover, Good, HSG A
3,250	53	Weighted Average
2,500		76.92% Pervious Area
750		23.08% Impervious Area

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

**Summary for Reach 2R: Lot Line**

Inflow Area = 14,501 sf, 10.55% Impervious, Inflow Depth > 0.03" for 2-Year event  
 Inflow = 0.0 cfs @ 12.38 hrs, Volume= 41 cf  
 Outflow = 0.0 cfs @ 12.38 hrs, Volume= 41 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

*10-Year Storm Event*

**81502.Exist - Town Regs**

Type III 24-hr 10-Year Rainfall=4.83"

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Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points  
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment 1E: To Dale Street**      Runoff Area=10,553 sf   35.43% Impervious   Runoff Depth>1.15"  
Tc=5.0 min   CN=61   Runoff=0.3 cfs   1,008 cf

**Subcatchment 2E: To northern Lot Line**      Runoff Area=11,251 sf   6.93% Impervious   Runoff Depth>0.16"  
Tc=5.0 min   CN=40   Runoff=0.0 cfs   148 cf

**Subcatchment 3: Off Site**      Runoff Area=3,250 sf   23.08% Impervious   Runoff Depth>0.69"  
Tc=5.0 min   CN=53   Runoff=0.1 cfs   187 cf

**Reach 2R: Lot Line**      Inflow=0.1 cfs   335 cf  
Outflow=0.1 cfs   335 cf

**Total Runoff Area = 25,054 sf   Runoff Volume = 1,343 cf   Average Runoff Depth = 0.64"**  
**78.97% Pervious = 19,785 sf   21.03% Impervious = 5,269 sf**

**81502.Exist - Town Regs**

Type III 24-hr 10-Year Rainfall=4.83"

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**Summary for Subcatchment 1E: To Dale Street**

Runoff = 0.3 cfs @ 12.09 hrs, Volume= 1,008 cf, Depth> 1.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr 10-Year Rainfall=4.83"

Area (sf)	CN	Description
1,190	30	Woods, Good, HSG A
544	76	Gravel roads, HSG A
1,896	98	Roofs, HSG A
1,843	98	Paved parking, HSG A
5,080	39	>75% Grass cover, Good, HSG A
10,553	61	Weighted Average
6,814		64.57% Pervious Area
3,739		35.43% Impervious Area

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

**Summary for Subcatchment 2E: To northern Lot Line**

Runoff = 0.0 cfs @ 12.46 hrs, Volume= 148 cf, Depth> 0.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr 10-Year Rainfall=4.83"

Area (sf)	CN	Description
3,850	30	Woods, Good, HSG A
62	76	Gravel roads, HSG A
755	98	Roofs, HSG A
25	98	Paved parking, HSG A
6,559	39	>75% Grass cover, Good, HSG A
11,251	40	Weighted Average
10,471		93.07% Pervious Area
780		6.93% Impervious Area

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

**Summary for Subcatchment 3: Off Site**

Runoff = 0.1 cfs @ 12.11 hrs, Volume= 187 cf, Depth> 0.69"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr 10-Year Rainfall=4.83"

**81502.Exist - Town Regs**

Type III 24-hr 10-Year Rainfall=4.83"

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Area (sf)	CN	Description
750	98	Paved parking, HSG A
2,500	39	>75% Grass cover, Good, HSG A
3,250	53	Weighted Average
2,500		76.92% Pervious Area
750		23.08% Impervious Area

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

**Summary for Reach 2R: Lot Line**

Inflow Area = 14,501 sf, 10.55% Impervious, Inflow Depth > 0.28" for 10-Year event  
 Inflow = 0.1 cfs @ 12.11 hrs, Volume= 335 cf  
 Outflow = 0.1 cfs @ 12.11 hrs, Volume= 335 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

*25-Year Storm Event*

**81502.Exist - Town Regs**

Type III 24-hr 25-Year Rainfall=6.16"

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Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points  
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment 1E: To Dale Street**      Runoff Area=10,553 sf   35.43% Impervious   Runoff Depth>1.93"  
Tc=5.0 min   CN=61   Runoff=0.6 cfs   1,700 cf

**Subcatchment 2E: To northern Lot Line**      Runoff Area=11,251 sf   6.93% Impervious   Runoff Depth>0.47"  
Tc=5.0 min   CN=40   Runoff=0.1 cfs   438 cf

**Subcatchment 3: Off Site**      Runoff Area=3,250 sf   23.08% Impervious   Runoff Depth>1.31"  
Tc=5.0 min   CN=53   Runoff=0.1 cfs   354 cf

**Reach 2R: Lot Line**      Inflow=0.2 cfs   792 cf  
Outflow=0.2 cfs   792 cf

**Total Runoff Area = 25,054 sf   Runoff Volume = 2,491 cf   Average Runoff Depth = 1.19"**  
**78.97% Pervious = 19,785 sf   21.03% Impervious = 5,269 sf**

**81502.Exist - Town Regs**

Type III 24-hr 25-Year Rainfall=6.16"

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**Summary for Subcatchment 1E: To Dale Street**

Runoff = 0.6 cfs @ 12.09 hrs, Volume= 1,700 cf, Depth> 1.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr 25-Year Rainfall=6.16"

Area (sf)	CN	Description
1,190	30	Woods, Good, HSG A
544	76	Gravel roads, HSG A
1,896	98	Roofs, HSG A
1,843	98	Paved parking, HSG A
5,080	39	>75% Grass cover, Good, HSG A
10,553	61	Weighted Average
6,814		64.57% Pervious Area
3,739		35.43% Impervious Area

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

**Summary for Subcatchment 2E: To northern Lot Line**

Runoff = 0.1 cfs @ 12.29 hrs, Volume= 438 cf, Depth> 0.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr 25-Year Rainfall=6.16"

Area (sf)	CN	Description
3,850	30	Woods, Good, HSG A
62	76	Gravel roads, HSG A
755	98	Roofs, HSG A
25	98	Paved parking, HSG A
6,559	39	>75% Grass cover, Good, HSG A
11,251	40	Weighted Average
10,471		93.07% Pervious Area
780		6.93% Impervious Area

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

**Summary for Subcatchment 3: Off Site**

Runoff = 0.1 cfs @ 12.09 hrs, Volume= 354 cf, Depth> 1.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr 25-Year Rainfall=6.16"

**81502.Exist - Town Regs**

Type III 24-hr 25-Year Rainfall=6.16"

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Area (sf)	CN	Description
750	98	Paved parking, HSG A
2,500	39	>75% Grass cover, Good, HSG A
3,250	53	Weighted Average
2,500		76.92% Pervious Area
750		23.08% Impervious Area

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

**Summary for Reach 2R: Lot Line**

Inflow Area = 14,501 sf, 10.55% Impervious, Inflow Depth > 0.66" for 25-Year event  
 Inflow = 0.2 cfs @ 12.12 hrs, Volume= 792 cf  
 Outflow = 0.2 cfs @ 12.12 hrs, Volume= 792 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

*100-Year Storm Event*

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**81502.Exist - Town Regs**

Type III 24-hr 100-Year Rainfall=8.94"

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Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points  
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment 1E: To Dale Street**      Runoff Area=10,553 sf   35.43% Impervious   Runoff Depth>3.87"  
Tc=5.0 min   CN=61   Runoff=1.2 cfs   3,402 cf

**Subcatchment 2E: To northern Lot Line**      Runoff Area=11,251 sf   6.93% Impervious   Runoff Depth>1.50"  
Tc=5.0 min   CN=40   Runoff=0.4 cfs   1,405 cf

**Subcatchment 3: Off Site**      Runoff Area=3,250 sf   23.08% Impervious   Runoff Depth>2.93"  
Tc=5.0 min   CN=53   Runoff=0.3 cfs   795 cf

**Reach 2R: Lot Line**      Inflow=0.7 cfs   2,200 cf  
Outflow=0.7 cfs   2,200 cf

**Total Runoff Area = 25,054 sf   Runoff Volume = 5,602 cf   Average Runoff Depth = 2.68"**  
**78.97% Pervious = 19,785 sf   21.03% Impervious = 5,269 sf**

**81502.Exist - Town Regs**

Type III 24-hr 100-Year Rainfall=8.94"

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**Summary for Subcatchment 1E: To Dale Street**

Runoff = 1.2 cfs @ 12.08 hrs, Volume= 3,402 cf, Depth> 3.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr 100-Year Rainfall=8.94"

Area (sf)	CN	Description
1,190	30	Woods, Good, HSG A
544	76	Gravel roads, HSG A
1,896	98	Roofs, HSG A
1,843	98	Paved parking, HSG A
5,080	39	>75% Grass cover, Good, HSG A
10,553	61	Weighted Average
6,814		64.57% Pervious Area
3,739		35.43% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					<b>Direct Entry, Minimum</b>

**Summary for Subcatchment 2E: To northern Lot Line**

Runoff = 0.4 cfs @ 12.10 hrs, Volume= 1,405 cf, Depth> 1.50"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr 100-Year Rainfall=8.94"

Area (sf)	CN	Description
3,850	30	Woods, Good, HSG A
62	76	Gravel roads, HSG A
755	98	Roofs, HSG A
25	98	Paved parking, HSG A
6,559	39	>75% Grass cover, Good, HSG A
11,251	40	Weighted Average
10,471		93.07% Pervious Area
780		6.93% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					<b>Direct Entry, Minimum</b>

**Summary for Subcatchment 3: Off Site**

Runoff = 0.3 cfs @ 12.09 hrs, Volume= 795 cf, Depth> 2.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr 100-Year Rainfall=8.94"

**81502.Exist - Town Regs**

Type III 24-hr 100-Year Rainfall=8.94"

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Area (sf)	CN	Description
750	98	Paved parking, HSG A
2,500	39	>75% Grass cover, Good, HSG A
3,250	53	Weighted Average
2,500		76.92% Pervious Area
750		23.08% Impervious Area

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

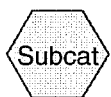
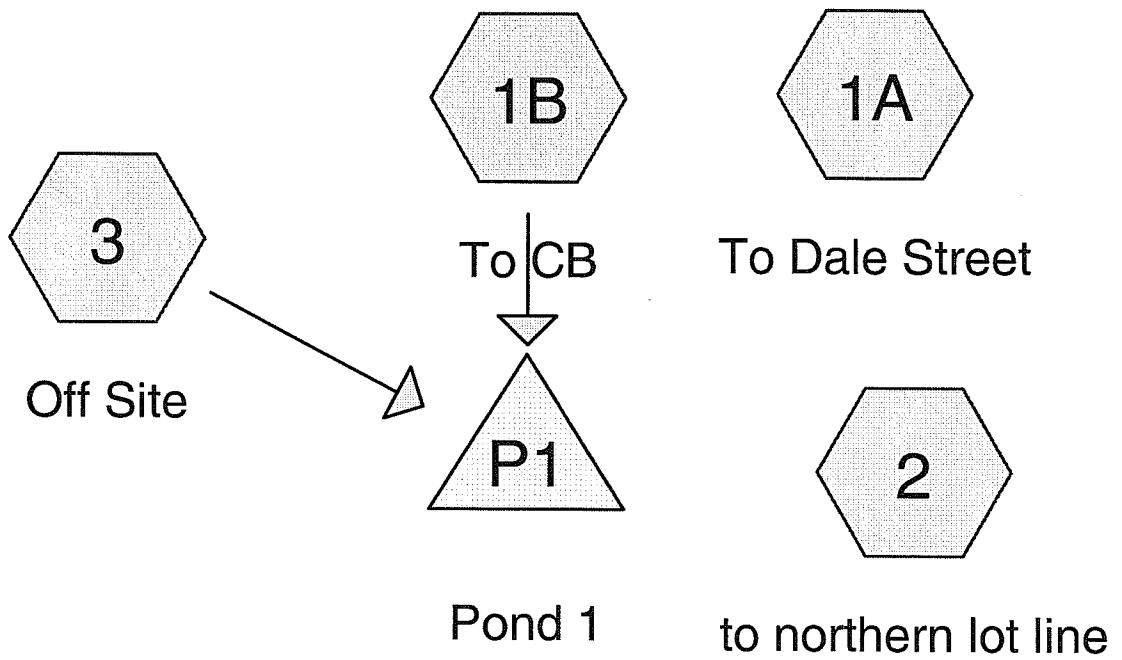
**Summary for Reach 2R: Lot Line**

Inflow Area = 14,501 sf, 10.55% Impervious, Inflow Depth > 1.82" for 100-Year event  
 Inflow = 0.7 cfs @ 12.09 hrs, Volume= 2,200 cf  
 Outflow = 0.7 cfs @ 12.09 hrs, Volume= 2,200 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

**HydroCAD Calculations**

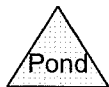
**Proposed Conditions**



Subcat



Reach



Pond



Link

**Routing Diagram for 81502.Prop - Town Regs**

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*2-Year Storm Event*

**81502.Prop - Town Regs**

Type III 24-hr 2-Year Rainfall=3.15"

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Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points  
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment 1A: To Dale Street**      Runoff Area=4,520 sf   19.36% Impervious   Runoff Depth>0.92"  
Tc=5.0 min   CN=74   Runoff=0.1 cfs   345 cf

**Subcatchment 1B: To CB**      Runoff Area=15,277 sf   76.13% Impervious   Runoff Depth>2.08"  
Tc=5.0 min   CN=91   Runoff=0.9 cfs   2,652 cf

**Subcatchment 2: to northern lot line**      Runoff Area=2,035 sf   0.00% Impervious   Runoff Depth>0.63"  
Tc=5.0 min   CN=68   Runoff=0.0 cfs   107 cf

**Subcatchment 3: Off Site**      Runoff Area=3,250 sf   23.08% Impervious   Runoff Depth>0.15"  
Tc=5.0 min   CN=53   Runoff=0.0 cfs   41 cf

**Pond P1: Pond 1**      Peak Elev=0.66'   Storage=425 cf   Inflow=0.9 cfs   2,693 cf  
Outflow=0.3 cfs   2,691 cf

**Total Runoff Area = 25,082 sf   Runoff Volume = 3,145 cf   Average Runoff Depth = 1.50"**  
**47.15% Pervious = 11,827 sf   52.85% Impervious = 13,255 sf**

**81502.Prop - Town Regs**

Type III 24-hr 2-Year Rainfall=3.15"

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**Summary for Subcatchment 1A: To Dale Street**

Runoff = 0.1 cfs @ 12.09 hrs, Volume= 345 cf, Depth&gt; 0.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr 2-Year Rainfall=3.15"

Area (sf)	CN	Description
680	98	Paved parking, HSG A
3,645	68	<50% Grass cover, Poor, HSG A
195	98	Roofs, HSG A
4,520	74	Weighted Average
3,645		80.64% Pervious Area
875		19.36% Impervious Area

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

**Summary for Subcatchment 1B: To CB**

Runoff = 0.9 cfs @ 12.07 hrs, Volume= 2,652 cf, Depth&gt; 2.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr 2-Year Rainfall=3.15"

Area (sf)	CN	Description
5,290	98	Paved parking, HSG A
3,647	68	<50% Grass cover, Poor, HSG A
6,340	98	Roofs, HSG A
15,277	91	Weighted Average
3,647		23.87% Pervious Area
11,630		76.13% Impervious Area

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

**Summary for Subcatchment 2: to northern lot line**

Runoff = 0.0 cfs @ 12.10 hrs, Volume= 107 cf, Depth&gt; 0.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr 2-Year Rainfall=3.15"

Area (sf)	CN	Description
2,035	68	<50% Grass cover, Poor, HSG A
2,035		100.00% Pervious Area

**81502.Prop - Town Regs**

Type III 24-hr 2-Year Rainfall=3.15"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					<b>Direct Entry, Minimum</b>

**Summary for Subcatchment 3: Off Site**

Runoff = 0.0 cfs @ 12.38 hrs, Volume= 41 cf, Depth> 0.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr 2-Year Rainfall=3.15"

Area (sf)	CN	Description
750	98	Paved parking, HSG A
2,500	39	>75% Grass cover, Good, HSG A
3,250	53	Weighted Average
2,500		76.92% Pervious Area
750		23.08% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					<b>Direct Entry, minimum</b>

**Summary for Pond P1: Pond 1**

Inflow Area = 18,527 sf, 66.82% Impervious, Inflow Depth > 1.74" for 2-Year event  
 Inflow = 0.9 cfs @ 12.07 hrs, Volume= 2,693 cf  
 Outflow = 0.3 cfs @ 11.90 hrs, Volume= 2,691 cf, Atten= 66%, Lag= 0.0 min  
 Discarded = 0.3 cfs @ 11.90 hrs, Volume= 2,691 cf

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Peak Elev= 0.66' @ 12.36 hrs Surf.Area= 1,604 sf Storage= 425 cf

Plug-Flow detention time= 7.3 min calculated for 2,691 cf (100% of inflow)  
 Center-of-Mass det. time= 7.1 min ( 779.7 - 772.5 )

Volume	Invert	Avail.Storage	Storage Description
#1A	0.00'	1,949 cf	<b>30.00'W x 53.46'L x 4.25'H Field A</b> 6,816 cf Overall - 1,942 cf Embedded = 4,874 cf x 40.0% Voids
#2A	1.25'	1,942 cf	<b>ADS_StormTech DC-780 +Cap</b> x 42 Inside #1 Effective Size= 45.4"W x 30.0"H => 6.49 sf x 7.12'L = 46.2 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 42 Chambers in 6 Rows
		3,892 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	<b>8.270 in/hr Exfiltration over Surface area</b>

**81502.Prop - Town Regs**

*Type III 24-hr 2-Year Rainfall=3.15"*

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**Discarded OutFlow** Max=0.3 cfs @ 11.90 hrs HW=0.05' (Free Discharge)

↑1=Exfiltration (Exfiltration Controls 0.3 cfs)

*10-Year Storm Event*

**81502.Prop - Town Regs**

Type III 24-hr 10-Year Rainfall=4.83"

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**Summary for Subcatchment 1A: To Dale Street**

Runoff = 0.3 cfs @ 12.08 hrs, Volume= 778 cf, Depth> 2.06"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr 10-Year Rainfall=4.83"

Area (sf)	CN	Description
680	98	Paved parking, HSG A
3,645	68	<50% Grass cover, Poor, HSG A
195	98	Roofs, HSG A
4,520	74	Weighted Average
3,645		80.64% Pervious Area
875		19.36% Impervious Area

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

**Summary for Subcatchment 1B: To CB**

Runoff = 1.5 cfs @ 12.07 hrs, Volume= 4,594 cf, Depth> 3.61"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr 10-Year Rainfall=4.83"

Area (sf)	CN	Description
5,290	98	Paved parking, HSG A
3,647	68	<50% Grass cover, Poor, HSG A
6,340	98	Roofs, HSG A
15,277	91	Weighted Average
3,647		23.87% Pervious Area
11,630		76.13% Impervious Area

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

**Summary for Subcatchment 2: to northern lot line**

Runoff = 0.1 cfs @ 12.08 hrs, Volume= 274 cf, Depth> 1.61"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr 10-Year Rainfall=4.83"

Area (sf)	CN	Description
2,035	68	<50% Grass cover, Poor, HSG A
2,035		100.00% Pervious Area

**81502.Prop - Town Regs**

Type III 24-hr 10-Year Rainfall=4.83"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					<b>Direct Entry, Minimum</b>

**Summary for Subcatchment 3: Off Site**

Runoff = 0.1 cfs @ 12.11 hrs, Volume= 187 cf, Depth> 0.69"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr 10-Year Rainfall=4.83"

Area (sf)	CN	Description
750	98	Paved parking, HSG A
2,500	39	>75% Grass cover, Good, HSG A
3,250	53	Weighted Average
2,500		76.92% Pervious Area
750		23.08% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					<b>Direct Entry, minimum</b>

**Summary for Pond P1: Pond 1**

Inflow Area = 18,527 sf, 66.82% Impervious, Inflow Depth > 3.10" for 10-Year event  
 Inflow = 1.6 cfs @ 12.07 hrs, Volume= 4,781 cf  
 Outflow = 0.3 cfs @ 11.75 hrs, Volume= 4,779 cf, Atten= 80%, Lag= 0.0 min  
 Discarded = 0.3 cfs @ 11.75 hrs, Volume= 4,779 cf

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Peak Elev= 1.59' @ 12.51 hrs Surf.Area= 1,604 sf Storage= 1,246 cf

Plug-Flow detention time= 23.8 min calculated for 4,779 cf (100% of inflow)  
 Center-of-Mass det. time= 23.6 min ( 785.0 - 761.4 )

Volume	Invert	Avail.Storage	Storage Description
#1A	0.00'	1,949 cf	<b>30.00'W x 53.46'L x 4.25'H Field A</b> 6,816 cf Overall - 1,942 cf Embedded = 4,874 cf x 40.0% Voids
#2A	1.25'	1,942 cf	<b>ADS StormTech DC-780 +Cap</b> x 42 Inside #1 Effective Size= 45.4"W x 30.0"H => 6.49 sf x 7.12'L = 46.2 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 42 Chambers in 6 Rows
		3,892 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	<b>8.270 in/hr Exfiltration over Surface area</b>

**81502.Prop - Town Regs**

*Type III 24-hr 10-Year Rainfall=4.83"*

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**Discarded OutFlow** Max=0.3 cfs @ 11.75 hrs HW=0.06' (Free Discharge)  
↳ **1=Exfiltration** (Exfiltration Controls 0.3 cfs)

***25-Year Storm Event***

**81502.Prop - Town Regs**

Type III 24-hr 25-Year Rainfall=6.16"

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Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points  
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment 1A: To Dale Street**      Runoff Area=4,520 sf   19.36% Impervious   Runoff Depth>3.09"  
Tc=5.0 min   CN=74   Runoff=0.4 cfs   1,165 cf

**Subcatchment 1B: To CB**      Runoff Area=15,277 sf   76.13% Impervious   Runoff Depth>4.83"  
Tc=5.0 min   CN=91   Runoff=2.0 cfs   6,152 cf

**Subcatchment 2: to northern lot line**      Runoff Area=2,035 sf   0.00% Impervious   Runoff Depth>2.54"  
Tc=5.0 min   CN=68   Runoff=0.1 cfs   430 cf

**Subcatchment 3: Off Site**      Runoff Area=3,250 sf   23.08% Impervious   Runoff Depth>1.31"  
Tc=5.0 min   CN=53   Runoff=0.1 cfs   354 cf

**Pond P1: Pond 1**      Peak Elev=2.20'   Storage=2,011 cf   Inflow=2.1 cfs   6,506 cf  
Outflow=0.3 cfs   6,503 cf

**Total Runoff Area = 25,082 sf   Runoff Volume = 8,101 cf   Average Runoff Depth = 3.88"**  
**47.15% Pervious = 11,827 sf   52.85% Impervious = 13,255 sf**

**81502.Prop - Town Regs**

Type III 24-hr 25-Year Rainfall=6.16"

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**Summary for Subcatchment 1A: To Dale Street**

Runoff = 0.4 cfs @ 12.08 hrs, Volume= 1,165 cf, Depth> 3.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr 25-Year Rainfall=6.16"

Area (sf)	CN	Description
680	98	Paved parking, HSG A
3,645	68	<50% Grass cover, Poor, HSG A
195	98	Roofs, HSG A
4,520	74	Weighted Average
3,645		80.64% Pervious Area
875		19.36% Impervious Area

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

**Summary for Subcatchment 1B: To CB**

Runoff = 2.0 cfs @ 12.07 hrs, Volume= 6,152 cf, Depth> 4.83"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr 25-Year Rainfall=6.16"

Area (sf)	CN	Description
5,290	98	Paved parking, HSG A
3,647	68	<50% Grass cover, Poor, HSG A
6,340	98	Roofs, HSG A
15,277	91	Weighted Average
3,647		23.87% Pervious Area
11,630		76.13% Impervious Area

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

**Summary for Subcatchment 2: to northern lot line**

Runoff = 0.1 cfs @ 12.08 hrs, Volume= 430 cf, Depth> 2.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr 25-Year Rainfall=6.16"

Area (sf)	CN	Description
2,035	68	<50% Grass cover, Poor, HSG A
2,035		100.00% Pervious Area

**81502.Prop - Town Regs**

Type III 24-hr 25-Year Rainfall=6.16"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					<b>Direct Entry, Minimum</b>

**Summary for Subcatchment 3: Off Site**

Runoff = 0.1 cfs @ 12.09 hrs, Volume= 354 cf, Depth> 1.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr 25-Year Rainfall=6.16"

Area (sf)	CN	Description
750	98	Paved parking, HSG A
2,500	39	>75% Grass cover, Good, HSG A
3,250	53	Weighted Average
2,500		76.92% Pervious Area
750		23.08% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					<b>Direct Entry, minimum</b>

**Summary for Pond P1: Pond 1**

Inflow Area = 18,527 sf, 66.82% Impervious, Inflow Depth > 4.21" for 25-Year event  
 Inflow = 2.1 cfs @ 12.07 hrs, Volume= 6,506 cf  
 Outflow = 0.3 cfs @ 11.65 hrs, Volume= 6,503 cf, Atten= 85%, Lag= 0.0 min  
 Discarded = 0.3 cfs @ 11.65 hrs, Volume= 6,503 cf

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Peak Elev= 2.20' @ 12.57 hrs Surf.Area= 1,604 sf Storage= 2,011 cf

Plug-Flow detention time= 43.0 min calculated for 6,503 cf (100% of inflow)  
 Center-of-Mass det. time= 42.7 min ( 799.1 - 756.4 )

Volume	Invert	Avail.Storage	Storage Description
#1A	0.00'	1,949 cf	<b>30.00'W x 53.46'L x 4.25'H Field A</b> 6,816 cf Overall - 1,942 cf Embedded = 4,874 cf x 40.0% Voids
#2A	1.25'	1,942 cf	<b>ADS_StormTech DC-780 +Cap</b> x 42 Inside #1 Effective Size= 45.4"W x 30.0"H => 6.49 sf x 7.12'L = 46.2 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 42 Chambers in 6 Rows
		3,892 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	<b>8.270 in/hr Exfiltration over Surface area</b>

**81502.Prop - Town Regs**

*Type III 24-hr 25-Year Rainfall=6.16"*

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**Discarded OutFlow** Max=0.3 cfs @ 11.65 hrs HW=0.04' (Free Discharge)

↳ **1=Exfiltration** (Exfiltration Controls 0.3 cfs)

*100-Year Storm Event*

**81502.Prop - Town Regs**

Type III 24-hr 100-Year Rainfall=8.94"

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Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points  
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

<b>Subcatchment 1A: To Dale Street</b>	Runoff Area=4,520 sf 19.36% Impervious Runoff Depth>5.42" Tc=5.0 min CN=74 Runoff=0.7 cfs 2,042 cf
<b>Subcatchment 1B: To CB</b>	Runoff Area=15,277 sf 76.13% Impervious Runoff Depth>7.40" Tc=5.0 min CN=91 Runoff=3.0 cfs 9,420 cf
<b>Subcatchment 2: to northern lot line</b>	Runoff Area=2,035 sf 0.00% Impervious Runoff Depth>4.70" Tc=5.0 min CN=68 Runoff=0.3 cfs 797 cf
<b>Subcatchment 3: Off Site</b>	Runoff Area=3,250 sf 23.08% Impervious Runoff Depth>2.93" Tc=5.0 min CN=53 Runoff=0.3 cfs 795 cf
<b>Pond P1: Pond 1</b>	Peak Elev=4.11' Storage=3,804 cf Inflow=3.3 cfs 10,214 cf Outflow=0.3 cfs 10,210 cf

**Total Runoff Area = 25,082 sf Runoff Volume = 13,053 cf Average Runoff Depth = 6.25"**  
**47.15% Pervious = 11,827 sf 52.85% Impervious = 13,255 sf**

**81502.Prop - Town Regs**

Type III 24-hr 100-Year Rainfall=8.94"

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**Summary for Subcatchment 1A: To Dale Street**

Runoff = 0.7 cfs @ 12.07 hrs, Volume= 2,042 cf, Depth&gt; 5.42"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr 100-Year Rainfall=8.94"

Area (sf)	CN	Description
680	98	Paved parking, HSG A
3,645	68	<50% Grass cover, Poor, HSG A
195	98	Roofs, HSG A
4,520	74	Weighted Average
3,645		80.64% Pervious Area
875		19.36% Impervious Area

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

**Summary for Subcatchment 1B: To CB**

Runoff = 3.0 cfs @ 12.07 hrs, Volume= 9,420 cf, Depth&gt; 7.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr 100-Year Rainfall=8.94"

Area (sf)	CN	Description
5,290	98	Paved parking, HSG A
3,647	68	<50% Grass cover, Poor, HSG A
6,340	98	Roofs, HSG A
15,277	91	Weighted Average
3,647		23.87% Pervious Area
11,630		76.13% Impervious Area

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

**Summary for Subcatchment 2: to northern lot line**

Runoff = 0.3 cfs @ 12.08 hrs, Volume= 797 cf, Depth&gt; 4.70"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr 100-Year Rainfall=8.94"

Area (sf)	CN	Description
2,035	68	<50% Grass cover, Poor, HSG A
2,035		100.00% Pervious Area

**81502.Prop - Town Regs**

Type III 24-hr 100-Year Rainfall=8.94"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					<b>Direct Entry, Minimum</b>

**Summary for Subcatchment 3: Off Site**

Runoff = 0.3 cfs @ 12.09 hrs, Volume= 795 cf, Depth> 2.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr 100-Year Rainfall=8.94"

Area (sf)	CN	Description
750	98	Paved parking, HSG A
2,500	39	>75% Grass cover, Good, HSG A
3,250	53	Weighted Average
2,500		76.92% Pervious Area
750		23.08% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					<b>Direct Entry, minimum</b>

**Summary for Pond P1: Pond 1**

Inflow Area = 18,527 sf, 66.82% Impervious, Inflow Depth > 6.62" for 100-Year event  
 Inflow = 3.3 cfs @ 12.07 hrs, Volume= 10,214 cf  
 Outflow = 0.3 cfs @ 11.45 hrs, Volume= 10,210 cf, Atten= 91%, Lag= 0.0 min  
 Discarded = 0.3 cfs @ 11.45 hrs, Volume= 10,210 cf

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Peak Elev= 4.11' @ 12.92 hrs Surf.Area= 1,604 sf Storage= 3,804 cf

Plug-Flow detention time= 94.9 min calculated for 10,209 cf (100% of inflow)  
 Center-of-Mass det. time= 94.7 min ( 844.9 - 750.2 )

Volume	Invert	Avail.Storage	Storage Description
#1A	0.00'	1,949 cf	<b>30.00'W x 53.46'L x 4.25'H Field A</b> 6,816 cf Overall - 1,942 cf Embedded = 4,874 cf x 40.0% Voids
#2A	1.25'	1,942 cf	<b>ADS_StormTech DC-780 +Cap</b> x 42 Inside #1 Effective Size= 45.4"W x 30.0"H => 6.49 sf x 7.12'L = 46.2 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 42 Chambers in 6 Rows
		3,892 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	<b>8.270 in/hr Exfiltration over Surface area</b>

**81502.Prop - Town Regs**

*Type III 24-hr 100-Year Rainfall=8.94"*

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**Discarded OutFlow** Max=0.3 cfs @ 11.45 hrs HW=0.04' (Free Discharge)  
↳1=Exfiltration (Exfiltration Controls 0.3 cfs)

## ***Test Pit Log***



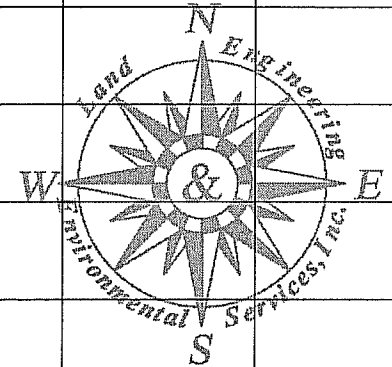
Commonwealth of Massachusetts

City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

Deep Observation Hole Number: # 1

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
12"	A	10YR <sup>3/2</sup>				fsl				fri	
36"	B	2.5Y <sup>5/4</sup>				ls				fri	
126"	C	2.5Y <sup>6/4</sup>	120"	2.5Y		Sand & gravel				loose	



Additional Notes mottles @ 120"

Exist. Elev @ 76.0 ESHWT @ 66.0



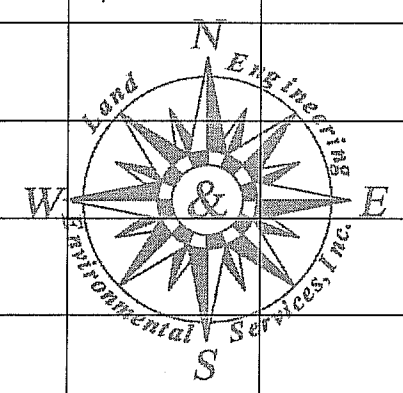
Commonwealth of Massachusetts

City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

Deep Observation Hole Number: # 2

Depth (In.)	Soil Horizon/Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
10"	A	10YR 3/2				fsl				fri	
30"	B	2.5Y 5/4				ls				fri	
60"	C	2.5Y 5/6				sand				loose	
	LARGE		BOULDERS								



Additional Notes

EXIST. ELEV @ 73.0      BOULDERS @ 69.0





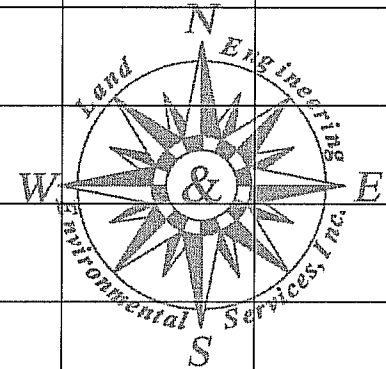
Commonwealth of Massachusetts

City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

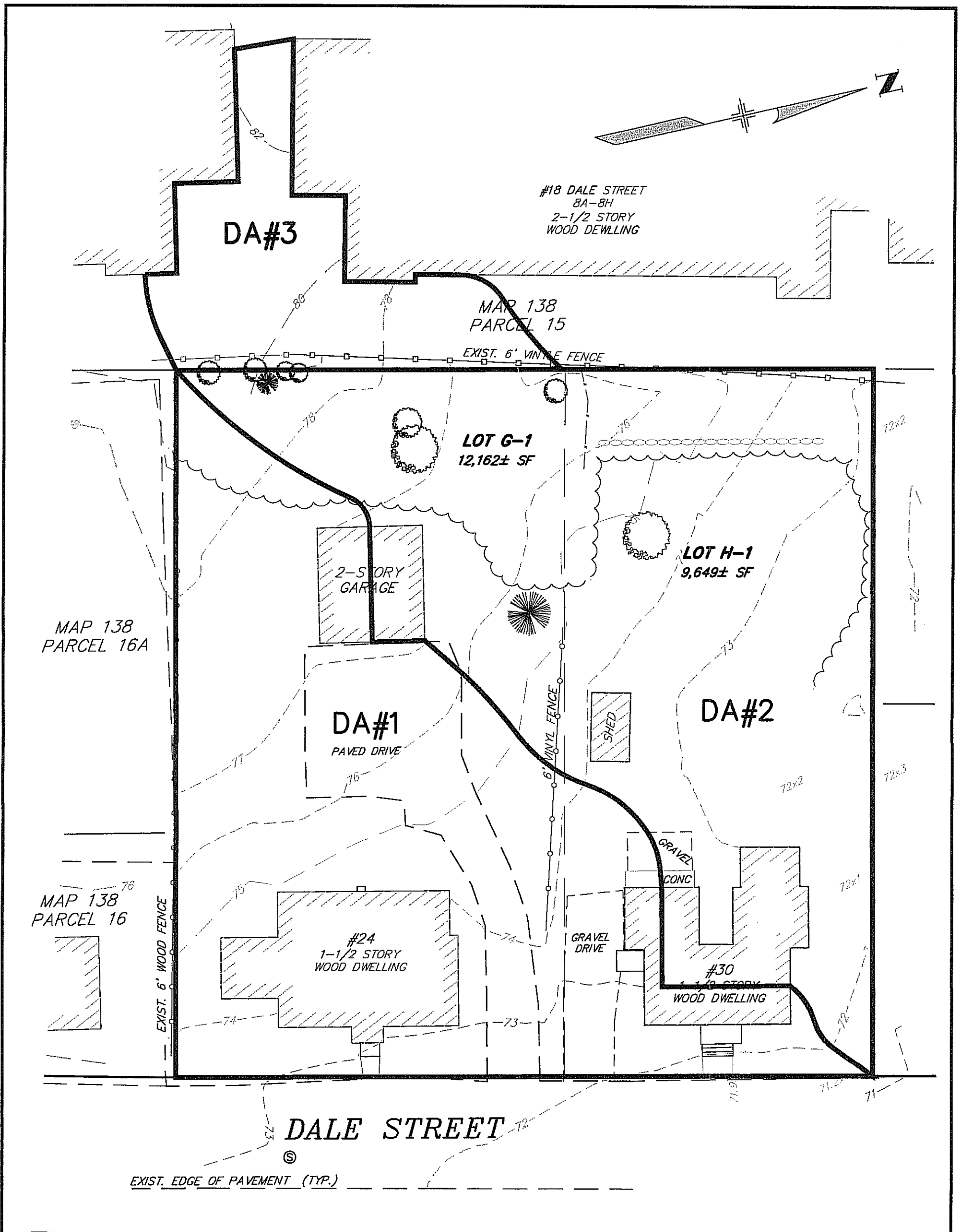
Deep Observation Hole Number: #4

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
10"	A	10YR <sup>3/2</sup>				fsl				fri	
30"	B	2.5Y <sup>6/5</sup>				ls				fri	
102"	C	2.5Y <sup>6/3</sup>				sand				loose	

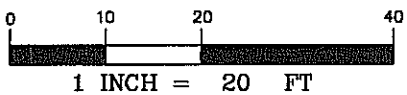


Additional Notes \_\_\_\_\_

EXIST. ELEV. @ 73.5      BOTTOM OF HOLE @ 65.0



GRAPHIC SCALE



**EXISTING DRAINAGE PLAN**

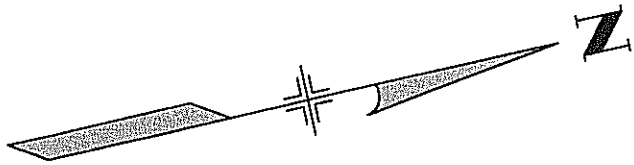
#24 & #30 DALE STREET  
ANDOVER, MASSACHUSETTS  
MAP 138 - PARCEL 17 & 18  
SCALE 1=20' MARCH 13, 2026

PREPARED FOR  
**BRYAN DUBY CONSTRUCTION**

PREPARED BY  
**Land Engineering & Environmental Services, Inc.**  
One Bridgeview Circle, Tyngsboro, Massachusetts 01879  
Telephone (978) 649-4642

JOB# 81502

SHEET 1 OF 2



#18 DALE STREET  
8A-8H  
2-1/2 STORY  
WOOD DEWLLING

DA#3

MAP 138  
PARCEL 15

MAP 138  
PARCEL 16A

DA#1B

DA#2

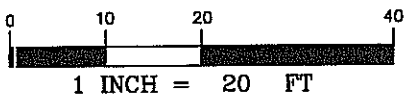
MAP 138  
PARCEL 16

DA#1A

DALE STREET

EXIST. EDGE OF PAVEMENT (TYP.)

GRAPHIC SCALE



1 INCH = 20 FT

**PROPOSED DRAINAGE PLAN**

#24 & #30 DALE STREET  
ANDOVER, MASSACHUSETTS  
MAP 138 - PARCEL 17 & 18  
SCALE 1=20' MARCH 13, 2026

PREPARED FOR  
**BRYAN DUBY CONSTRUCTION**

PREPARED BY  
**Land Engineering &  
Environmental Services, Inc.**

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SHEET 2 OF 2