MIDDLE TOWN HIGH SCHOOL
AND
VOCATIONAL AGRICULTURE CENTER

MIDDLETOWN, CONNECTICUT

HYDROGRAPHIC

AND

STORMWATER DRAINAGE ANALYSES

REVISED

NOVEMBER 19, 2003

CONSULTING
ENGINEERS INC.

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INTRODUCTION

The purpose of this project is to construct the new Middletown High School, as well as associated parking areas, relocated access road and new athletic fields. The proposed site is located on Town property adjacent to Wilderman,s Way and presently houses Woodrow Wilson Middle School and Keigwin Middle School, their parking areas and numerous athletic fields. The existing Woodrow Wilson Middle School will be demolished as part of this project. New and relocated utilities including water, sanitary and electrical will be required to accommodate the project.

The Stormwater analysis required for this project will be broken into 2 sections. Section 1 is the Hydrographical Analysis, which will analyze pre and post conditions in order to insure that the proposed project does not increase runoff over existing conditions. Section 2- Storm Drainage Design includes the design of drainage structures, storm drainage pipe systems, and outlet protection. Section 3 includes the design of cross culverts under Wilderman's, Way, the student parking area driveway and the access road which crosses over East Swamp Brook, Also a temporary cross culvert for use during phase 1 of construction has been designed. Section 4 includes swale and channel designs. Section 5 is the design of Water Quality Structures.

All flows from this project will eventually discharge into East Swamp Brook, which is a regulated stream and included in the Middletown Flood Insurance Study. Since an existing twin cross culvert which carries East Swamp Brook under an existing access road to an existing athletic field will be replaced and also because regarding is to take place within the 100 year flood limits, a Hydraulic Analysis is required and will be submitted under separate cover.

SECTION 1 – HYDROGRAPHIC ANALYSIS

For this analysis the site has bee broken into 2 major drainage areas. The Southern Area (Drainage Area 1) and the Northern Area (Drainage Area 2). Due to regarding and the construction of the new school runoff characteristics will change slightly from existing conditions.
A description of the drainage areas, are as follows:

Southern Area (Drainage Area 1) – Existing

The total drainage area is 60 Acres. The upper reaches consist of 46 acres of residential single family lots and roads. The lower reach consists of 14 acres of open fields.

Southern Area (Drainage Area 1) – Proposed

The total drainage area is 60 acres For this analysis the area has been broken up into 2 sub areas. Sub area 1 consists of the same upper reach as existing along with 5.4 acres of open fields in the lower reach. Sub area 2 consists of 8.6 acres of school building, parking area s and small grass areas.

The discharge point for both existing and proposed conditions is into East Swamp Brook at the upstream side of the existing cross culverts under Wilderman,s Way.

Northern Area (Drainage Area 2)-Existing

The Total drainage area is 85 +/- acres. The total area has been divided into 4 sub areas. Sub area1 has an area of 10.6 acres and is comprised of residential single, family homes with some heavy brush. There is an existing detention basin, which regulates outflows to the lower reaches of the overall drainage area. Sub area 2 consists of 9.4 acres of overland brush and woods on steep slopes. Sub Area 3 is comprised of 11.35 acres of grass and athletic fields. Sub area 4 has a total drainage area of 54 +/-acres. 21 acres of this sub area is overland brush and woods on steep slopes. 22 acres consists of athletic fields and grass and 11 acres is comprised of school buildings and parking areas.

Northern Area (Drainage Area 2)-Proposed

The total drainage area is 85 +/- acres. Sub areas 1 and 2 are the same as existing conditions. Sub area 3 consists of 5.5 acres of brush and woods on steep slopes along with 21 acres of athletic fields and grass. Sub area 4 has a total area of 29+/- acres. 5 acres being school buildings and parking areas, 13 acres being heavy brush and woods on steep slopes and 11 acres being athletic fields and grass. Sub area 5 consists of 9 acres of school building and parking areas.

The discharge point for both existing and proposed conditions is into East Swamp Brook via a cross culvert crossing under Wilderman's Way just south of the Keigwin Middle School.

DESIGN CRITERIA

The rational method was used to develop discharges for the 2, 10, 25, 50, and 100 year return periods. Runoff coefficients and rainfall intensities were obtain from the Connecticut Department of Transportation's Drainage Manual 2000. Times of concentration were determined using methods found in the NRCS TR-55 program. Using the Hydraflow Hydrographs 2002 computer program developed by Intelisolve, hydrographs were developed, routed and combined to determine pre and post flows for the design storms at the 2 discharge points.

RESULTS

Results for both drainage areas indicate that post- conditions will produce peak flow at their respective points of discharge, less than the peak flows for pre-conditions for all frequencies. This is due to the fact that the hydrographs for the proposed sub areas which include the school and parking areas will peak much sooner than existing conditions which translates into a combined outflow hydrograph with peak flows less than existing. Therefore detention will not be required. A summary of runoff rates can be seen below. Section 1 calculations can be found in Appendix 1. Existing and proposed drainage area maps can be found in the back insert.

SUMMARY OF RUNOFF RATES.

Watershed	Storm Frequency				
D.A. 1	2Year	10 Year	25 Year	50 Year	100Year
Pre Development Runoff	43.8 cfs	64.7 cfs	76.2 cfs	85.6 cfs	95.0 cfs
Post Development Runoff	40.3 cfs	59.6 cfs	70.2 cfs	78.8 cfs	87.5 cfs
Increase/Decrease after development	- 3.5cfs	-5.1cfs	-6.0cfs	-6.8cfs	-7.5cfs

D.A2	2Year	10 Year	25 Year	50 Year	100Year
Pre Development Runoff	54.2 cfs	78.0 cfs	91.1 cfs	101.2 cfs	111.2 cfs
Post Development Runoff	47.2 cfs	67.9 cfs	79.3 cfs	88.1 cfs	96.8 cfs
Increase/Decrease after development	-7.0cfs	-10.1cfs	-11.8cfs	-13.1cfs	-14.4 cfs

SECTION 2 – STORM DRAINAGE DESIGN

Storm drainage for this project has been broken into 3 areas. The Southern Area, The Northern area and Wilderman's Way area. Description's of each area are as follows.

Southern Area .

There is one drainage system in this area and has been designated Sa. It drains approximately 10 acres fields ,parking areas and approximately one quarter of the proposed school roof.. The system will outlet into a water Quality pond before discharging into the East Swamp Brook .

Northern Area

There are 4 drainage systems in this area which all drain to the northern discharge point described in Section 1

System Na will drain approximately 39 Acres including sub areas 1 and 2 of Drainage area 2 as described in Section 1. The rest of the Area drains athletic fields. The system will outlet adjacent to wetlands. A riprap apron has been deigned at the outlet.

System Nb will drain approximately 2.2 acres athletic fields and will outlet adjacent to wetlands. A riprap apron has been designed at the outlet.

Systems Nc and Ne will drain approximately 3.3 acres. The systems will drain the access road, and parking areas. The systems will outlet into a water quality pond before discharging to East Swamp brook through a new culvert.

Systems Nd will drain approximately 6.3 acres. The systems will drain parking areas and approximately 3 quarters of the high school. The systems will outlet adjacent to the wetlands. A riprap apron has been designed at the outlet

Wilderderman's Way

The project will require the relocation of a portion of Wilderman,s Way. Four systems will drain the road at low points. These systems each have 2 basins outletting adjacent to East Swamp Brook. Riprap aprons have been designed at the outlets.

DESIGN CRITERIA

The rational method was used to develop discharges for the 10 year return periods. Runoff coefficients and rainfall intensities were obtain from the Connecticut Department of Transportation's Drainage Manual 2000. Times of concentration were determined using methods found in the NRCS TR-55 program. Using the Hydraflow Storm Sewers 2000 computer program developed by Intelisolve, gutter flow, storm sewer and hydraulic gradeline calculations were

performed. Riprap outlet protection was designed using methods outlined in the "2002 Connecticut Guidelines for Soil Erosion and Sediment Control".

Calculations can be found in Appendix 2. Drainage area maps can be found in the back insert.

SECTION 3– CROSS CULVERT DESIGNS

Cross Culverts were designed using design storm criteria outlined in the CDOT's Drainage Manual 2000 and the inlet/outlet control as outlined in HEC-5

Drive to Student Parking Area

A 24" rcp was designed to accommodate flows from the Water quality pond which drains systems Nc and Ne. Flows used were determined from storm sewer analysis.

Relocated Culvert under Wilderman's Way

A 3'h x10w ' box culvert was designed for the 50 year storm and checked for the 100 year storm. A foot of native streambed material will be placed in the culvert to provide fish passage. Therefore the hydraulic opening will be 2 x 10.

Access Rd. to Ball Field

A 4'h x 16' w box culvert was designed for the 100 year storm since this structure carries East Swamp Brook. The design was performed using tailwater w/o backwater effects from the CT River, from the FEMA study. A Separate Hydraulic Analysis of East Swamp Brook will be submitted under separate cover.
A foot of native streambed material will be placed in the culvert to provide fish passage. Therefore the hydraulic opening will be 3 x 16.

Temporary Access Road.

A 36" ccmp was designed to accommodate flows under a proposed temporary access Rd. The 5 year storm was used for design purposes.

Calculations can be found in Appendix 3

SECTION 4– SWALE AND CHANNEL DESIGNS

Swales and channels were designed using the Hydrain- Hychl computer program.

Swales at the top of the western side of the project will intercept flow from the upper reaches of the drainage area. These flows will be split to the north and south. Flows to the south will be intercepted by a catch basin and drain through system Na. Flows to the north will drain from the swale directly to the adjacent existing overland area . The swales will be grass lines with temporary erosion control lining.

A channel has been designed at the outlet of the box culvert crossing under Wilderman's Way. This channel will direct flow to the south to the location of the existing outlet. It will be protected with a synthetic lining.

Calculations can be found in Appendix 4

SECTION 5– WATER QUALITY DESIGN

Water quality designs for areas Na and Nb will be comprised of grass swales and outlet protection since minimal paved areas are within 20 feet of intercepting catch basins.

Wildrman's Way Drainage systems will have only 2 catch basins per system. These basins will have 4 foot sumps and will outlet onto riprap aprons. No other water quality measures are necessary.

Area Nd will carry flow from 3 basin s and the majority of the high school. Since the roof water is considered clean water , deep sumps and outlet protection will be used.

Areas Sa, Nc, and Ne will be carrying almost exclusively, flows from impervious sites . Therefore water quality ponds are being designed to treat the water quality flows which were determined using methods found in the Connecticut Stormwater quality Manual.

The water quality pond for Area Sa will have a forebay area that will contain the WQF and treat approximately 10% of the WQV. The wet pond area along with the forebay area will treat the total WQV before spilling over the outlet berm and draining into the adjacent wetlands.

The water quality pond for Area Nc and Ne will have a forebay area that will contain the WQF and treat approximately 40% of the WQV. The wet pond area along with the forebay area will treat the total WQV before outletting through a 24" RCP into the adjacent wetlands.

Water Quality Volume , Water Quality Flow Calculations as well as pond designs can be found in Appendix 5

APPENDIX 1

SECTION 1 HYDROGRAPHIC CALCULATIONS

CONSULTING ENGINEERS

SUBJECT MIDDLETOWN H.S. Sheet No. _____ of _____

Major Drainage Computations Computed By ECB Date 10-14-03

JOB NO. _____ Checked By _____ Date _____

DRAINAGE AREA 1

Existing Conditions

Residential Single Family & Roads C=.45

P = 50.2 in²

A = 50.2 in² x 200²/43560 FT² = 46 AC

Open Fields

P = 15.3 in²

A = 15.3 in² x 200²/43560 FT² = 14 AC

Tc:

Sheet Flow

L = 150' ΔH = 10 S = 7%

Shallow Conc (storm sys.)

L = 2050 ΔH = 208-44 = 164 = 8%

Shallow Conc.-overland

L = 900 ΔH = 44-22 = 22 S = 2.4%

TOTAL AREA = 60 ACres

M:dexda1.prn

TIME OF CONCENTRATION AND TRAVEL TIME Version 2.10

Project : Middletown High School User: ecb Date: 10-17-2003
County : Middlesex State: CT Checked: ____ Date: _____
Subtitle: Drainage Area 1-existing

Subarea #1 - SA1

Flow Type	2 year rain	Length (ft)	Slope (ft/ft)	Surface code	n	Area (sq/ft)	Wp (ft)	Velocity (ft/sec)	Time (hr)
Sheet	3.2	150	.09	h					0.271
Shallow Concent'd		2050	.08	p					0.099
Shallow Concent'd		900	.024	u					0.100
Open Channel		450						2	0.063
								Time of Concentration =	0.53*
									=====

--- Sheet Flow Surface Codes ---

A Smooth Surface
B Fallow (No Res.)
C Cultivated < 20 % Res.
D Cultivated > 20 % Res.
E Grass-Range, Short
F Grass, Dense
G Grass, Burmuda
H Woods, Light
I Woods, Dense
J Range, Natural

--- Shallow Concentrated --- Surface Codes ---

P Paved
U Unpaved

Hydraflow Hydrographs Diagram	Project: 1746 Middletown h.s drain area 1.gpw	1-04-2008

Hydrograph Return Period Recap

Hyd. No.	Hydrograph type (origin)	Inflow Hyd(s)	Peak Outflow (cfs)								Hydrograph description
			1-Yr	2-Yr	3-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr	
1	Rational	-------	-------	43.78	-------	-------	64.67	76.22	85.60	94.99	D.A. 1 SUB AREA 1

Proj. file: 1746 Middletown h.s drain area1 exist.gpw

Run date: 11-04-2003

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	olume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	Rational	43.78	1	32	84,048	----	------	------	D.A. 1 SUB AREA 1

Hydrograph Report

Hydraflow Hydrographs by Intelisolve

Hyd. No. 1

D.A. 1 SUB AREA 1

Hydrograph type	= Rational	Peak discharge	= 43.78 cfs
Storm frequency	= 2 yrs	Time interval	= 1 min
Drainage area	= 60.0 ac	Runoff coeff.	= 0.4
Intensity	= 1.824 in/hr	Time of conc. (Tc)	= 32 min
IDF Curve	= CDOT2000.idf	Asc/Rec limb fact	= 1/1

Hydrograph Volume = 84,048 cuft

Hydrograph Discharge Table

Time (hrs)	Outflow cfs)
0.42	34.20
0.43	35.57
0.45	36.94
0.47	38.30
0.48	39.67
0.50	41.04
0.52	42.41
0.53	43.78 <<
0.55	42.41
0.57	41.04
0.58	39.67
0.60	38.30
0.62	36.94
0.63	35.57
0.65	34.20

...End

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	Rational	64.67	1	32	124,168	----	------	------	D.A. 1 SUB AREA 1

Hydrograph Report

Hyd. No. 1

D.A. 1 SUB AREA 1

Hydrograph type	= Rational	Peak discharge	= 64.67 cfs
Storm frequency	= 10 yrs	Time interval	= 1 min
Drainage area	= 60.0 ac	Runoff coeff.	= 0.4
Intensity	= 2.695 in/hr	Time of conc. (Tc)	= 32 min
IDF Curve	= CDOT2000.idf	Asc/Rec limb fact	= 1/1

Hydrograph Volume = 124,168 cuft

Hydrograph Discharge Table

Time (hrs)	Outflow cfs)
0.40	48.50
0.42	50.52
0.43	52.55
0.45	54.57
0.47	56.59
0.48	58.61
0.50	60.63
0.52	62.65
0.53	64.67 <<
0.55	62.65
0.57	60.63
0.58	58.61
0.60	56.59
0.62	54.57
0.63	52.55
0.65	50.52

...End

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	Rational	76.22	1	32	146,344	----	------	------	D.A. 1 SUB AREA 1

Hydrograph Report

Hyd. No. 1

D.A. 1 SUB AREA 1

Hydrograph type	= Rational	Peak discharge	= 76.22 cfs
Storm frequency	= 25 yrs	Time interval	= 1 min
Drainage area	= 60.0 ac	Runoff coeff.	= 0.4
Intensity	= 3.176 in/hr	Time of conc. (Tc)	= 32 min
IDF Curve	= CDOT2000.idf	Asc/Rec limb fact	= 1/1

Hydrograph Volume = 146,344 cuft

Hydrograph Discharge Table

Time (hrs)	Outflow (cfs)
0.42	59.55
0.43	61.93
0.45	64.31
0.47	66.69
0.48	69.07
0.50	71.46
0.52	73.84
0.53	76.22 <<
0.55	73.84
0.57	71.46
0.58	69.07
0.60	66.69
0.62	64.31
0.63	61.93
0.65	59.55
0.67	57.17

...End

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	Rational	85.60	1	32	164,346	----	------	------	D.A. 1 SUB AREA 1

Hydrograph Report

Hydraflow Hydrographs by Intelisolve

Hyd. No. 1

D.A. 1 SUB AREA 1

Hydrograph type	= Rational	Peak discharge	= 85.60 cfs
Storm frequency	= 50 yrs	Time interval	= 1 min
Drainage area	= 60.0 ac	Runoff coeff.	= 0.4
Intensity	= 3.567 in/hr	Time of conc. (Tc)	= 32 min
IDF Curve	= CDOT2000.idf	Asc/Rec limb fact	= 1/1

Hydrograph Volume = 164,346 cuft

Hydrograph Discharge Table

Time (hrs)	Outflow (cfs)
0.42	66.87
0.43	69.55
0.45	72.22
0.47	74.90
0.48	77.57
0.50	80.25
0.52	82.92
0.53	85.60 <<
0.55	82.92
0.57	80.25
0.58	77.57
0.60	74.90
0.62	72.22
0.63	69.55
0.65	66.87

...End

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	Rational	94.99	1	32	182,382	----	------	------	D.A. 1 SUB AREA 1

Hydrograph Report

Hydraflow Hydrographs by Intelisolve

Hyd. No. 1

D.A. 1 SUB AREA 1

Hydrograph type	= Rational	Peak discharge	= 94.99 cfs
Storm frequency	= 100 yrs	Time interval	= 1 min
Drainage area	= 60.0 ac	Runoff coeff.	= 0.4
Intensity	= 3.958 in/hr	Time of conc. (Tc)	= 32 min
IDF Curve	= CDOT2000.idf	Asc/Rec limb fact	= 1/1

Hydrograph Volume = 182,382 cuft

Hydrograph Discharge Table

Time (hrs)	Outflow (cfs)
0.40	71.24
0.42	74.21
0.43	77.18
0.45	80.15
0.47	83.12
0.48	86.09
0.50	89.05
0.52	92.02
0.53	94.99 <<
0.55	92.02
0.57	89.05
0.58	86.09
0.60	83.12
0.62	80.15
0.63	77.18
0.65	74.21
0.67	71.24

...End

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SUBJECT Middletown H.S.
Major Drainage Computations
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Sheet No. _____ of _____
Computed By ECB Date 10-14-03
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DRAINAGE AREA 1

Proposed Conditions

Sub Area 1

Residential Single Family & Roads — C=.45

P= 50.2 in²

A= 50.2 in² x 200²/43560 Ft² = 4.6 AC

Open Fields — C=.25

5.4 AC

Sub Area 2

School and Paved Areas — C=.85

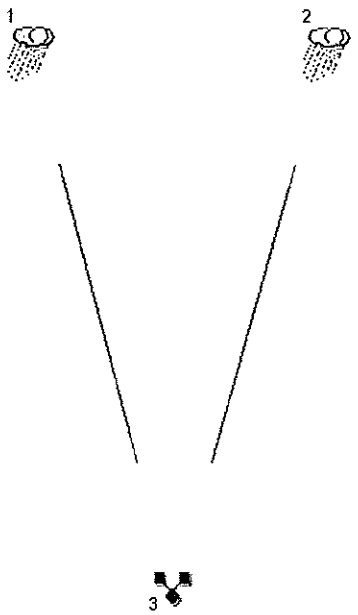
8.6 ± ___ Acres (From D.A. 2 EXIST)

Tc:

S.A. 1 - Same as D.A. 1-Existing Upper Reaches and Open Fields = 32 min

S.A. 2 Assume 10 min

TOTAL DA = 60 AC.



Hydraflow Hydrographs Diagram	Project: 1746 Middletown h.s drain area proposed 1w-o detrev	11-05-2008

Hydrograph Return Period Recap

Hyd. No.	Hydrograph type (origin)	Inflow Hyd(s)	Peak Outflow (cfs)								Hydrograph description
			1-Yr	2-Yr	3-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr	
1	Rational	-------	-------	40.31	-------	-------	59.56	70.19	78.83	87.48	D.A. 1 SUB AREA 1
2	Rational	-------	-------	25.48	-------	-------	35.13	40.37	44.31	47.91	D.A.1 SUBAREA 2
3	Combine	1, 2	-------	40.31	-------	-------	59.56	70.19	78.83	87.48	

Hydrograph Report

Hydraflow Hydrographs by Intelisolve

Hyd. No. 1

D.A. 1 SUB AREA 1

Hydrograph type	= Rational	Peak discharge	= 87.48 cfs
Storm frequency	= 100 yrs	Time interval	= 1 min
Drainage area	= 51.4 ac	Runoff coeff.	= 0.43
Intensity	= 3.958 in/hr	Time of conc. (Tc)	= 32 min
IDF Curve	= CDOT2000.idf	Asc/Rec limb fact	= 1/1

Hydrograph Volume = 167,958 cuft

Hydrograph Discharge Table

Time (hrs)	Outflow (cfs)
0.43	71.08
0.45	73.81
0.47	76.54
0.48	79.28
0.50	82.01
0.52	84.74
0.53	87.48 <<
0.55	84.74
0.57	82.01
0.58	79.28
0.60	76.54
0.62	73.81
0.63	71.08

...End

Hydrograph Report

Hyd. No. 2

D.A.1 SUBAREA 2

Hydrograph type	= Rational	Peak discharge	= 47.91 cfs
Storm frequency	= 100 yrs	Time interval	= 1 min
Drainage area	= 8.6 ac	Runoff coeff.	= 0.85
Intensity	= 6.554 in/hr	Time of conc. (Tc)	= 10 min
IDF Curve	= CDOT2000.idf	Asc/Rec limb fact	= 1/1

Hydrograph Volume = 28,745 cuft

Hydrograph Discharge Table

Time (hrs)	Outflow (cfs)
0.15	43.12
0.17	47.91 <<
0.18	43.12
0.20	38.33

...End

Hydrograph Report

Hyd. No. 3

Hydrograph type	= Combine	Peak discharge	= 87.48 cfs
Storm frequency	= 100 yrs	Time interval	= 1 min
Inflow hyds.	= 1, 2		

Hydrograph Volume = 196,703 cuft

Hydrograph Discharge Table

Time (hrs)	Hyd. 1 + (cfs)	Hyd. 2 = (cfs)	Outflow (cfs)
0.17	27.34	47.91 <<	75.25
0.18	30.07	43.12	73.19
0.20	32.80	38.33	71.13
0.43	71.08	0.00	71.08
0.45	73.81	0.00	73.81
0.47	76.54	0.00	76.54
0.48	79.28	0.00	79.28
0.50	82.01	0.00	82.01
0.52	84.74	0.00	84.74
0.53	87.48 <<	0.00	87.48 <<
0.55	84.74	0.00	84.74
0.57	82.01	0.00	82.01
0.58	79.28	0.00	79.28
0.60	76.54	0.00	76.54
0.62	73.81	0.00	73.81
0.63	71.08	0.00	71.08

...End

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SUBJECT Middletown H.S
Major Drainag e Computations
JOB NO. 1746

Sheet No. _____ of _____
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DRAINAGE AREA 2

Existing Conditions

Sub AREA 1

Area (overall)
P = 11.5 in²
A = 11.5 in² x 200²/43560 Ft² = 10.6 Ac TOTAC

Residential single Family & Roads C = .45
P = 10.0 in²
A = 10.0 in² x 200²/43560 Ft² = 9.2 AC

Overland - Brush C = .2
A = 10.6 Ac - 9.2 AC = 1.4 AC

TC:
Sheet Flow L = 100 ΔH = 4.5 S = 4.5%
Shallow Channel
L = 500 ΔH = 164 - 100 = 64' S = 12.8%

Sub Area 2

P = 10.2 in²
A = 10.2 in² x 200²/43560 Ft² = 9.4 AC

overland Brush/woods C = .2

Tc:
Sheet Flow L = 150 ΔH = 10 S = 6.6%
Shallow channel L = 970 ΔH = 130 S = 13%
Channel: (PIPE) 15" RCP L = 900 ΔH = 31' ± S = 3.4%

Sub Area 3

P = 12.4 in² A = 12.4 in² x 200²/43560 Ft² = 11.35
Fields / Park C = .35
Tc: sheet Flow L = 150 ΔH = 7 S = 4.6%
Shallow Conc. L = 730' ΔH = 48 S = 6.5%

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SUBJECT Middletown H.S. Major Drainage Computations
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DRAINAGE AREA 2

Existing Conditions (cont'd)

SUB AREA 4

TOTAL Area = 53.6 Ac (P_{tot} = 57.25 in²)

Buildings and pavement C = .8
P = 12.3 in²
A = 12.3 in² x 200²/43560 ft² = 11.3 Ac

Overland - Heavy Brush C = .2
P = 22.5 in²
A = 22.5 in² x 200²/43560 ft² = 20.66 Ac

∴ Fields and Grass C = .35
A = 21.6 Ac

Tc:
Sheet Flow L = 100 ΔH = 7 S = 7%
Shallow Conc L = 600' ΔH = 126' S = 21% - Overcut
Shallow Conc L = 1080' ΔH = 46' S = 4.2%
Channel L = 550 ΔH = 2 Assume Vel = 2 fps

TOTAL AREA = 84.95 Ac

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SUBJECT Middletown H.S
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Sheet No. ____ of ____
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Checked By ____ Date ____

EXIST. Detention Pond For S.A.I.

Information Comes From plans developed by BASCOM/MAGNOTTA INC For Saddle Ridge PHASE III dated July 2001.

Saddle Ridge Detention Pond

EL	AREA
100	800 FT²
102	2240 FT²
104	4480 FT²
106	7200 FT²
108	10560 FT²

Outlet Pipe = 18" RCP Invert = 100
12" ORIFICE/RCP Invert = 101 S = .7%
ORIFICE Below CB TOP = 1.47R x 10'-Span.

Weirs - Double CB - L = 16' - EL = 106.5
Stand Pipe = 12" - L = 3.14 EL = 105.5

Midtnda2.prn

TIME OF CONCENTRATION AND TRAVEL TIME — Version 2.10

Project : Middletown High School — User: ecb — Date: 10-20-2003
County : Middlesex — State: CT — Checked: ____ — Date: ____
Subtitle: Drainage Area 2- existing

Subarea #1 - sa1

Flow Type	2 year rain	Length (ft)	Slope (ft/ft)	Surface code	n	Area (sq/ft)	Wp (ft)	Velocity (ft/sec)	Time (hr)
Sheet	3.2	100	.045	h					0.259
Shallow Concent'd		500	.128	u					0.024
								Time of Concentration =	0.28*

Subarea #2 - sa2

Flow Type	2 year rain	Length (ft)	Slope (ft/ft)	Surface code	n	Area (sq/ft)	Wp (ft)	Velocity (ft/sec)	Time (hr)
Sheet	3.2	150	.066	h					0.307
Shallow Concent'd		970	.13	u					0.046
Open Channel		900	.034		.012	1.22	3.92		0.024
								Time of Concentration =	0.38*

Subarea #3 - sa3

Flow Type	2 year rain	Length (ft)	Slope (ft/ft)	Surface code	n	Area (sq/ft)	Wp (ft)	Velocity (ft/sec)	Time (hr)
Sheet	3.2	150	.046	e					0.162
Shallow Concent'd		730	.065	u					0.049
								Time of Concentration =	0.21*

Subarea #4 - sa4

Flow Type	2 year rain	Length (ft)	Slope (ft/ft)	Surface code	n	Area (sq/ft)	Wp (ft)	Velocity (ft/sec)	Time (hr)
Sheet	3.2	100	.07	h					0.217
Shallow Concent'd		600	.21	u					0.023
Shallow Concent'd		1080	.042	u					0.091
Open Channel		550						2	0.076
								Time of Concentration =	0.41*

--- Sheet Flow Surface Codes ---

A Smooth Surface	F Grass, Dense	--- Shallow Concentrated ---
B Fallow (No Res.)	G Grass, Burmuda	--- Surface Codes ---
C Cultivated < 20 % Res.	H Woods, Light	P Paved
D Cultivated > 20 % Res.	I Woods, Dense	U Unpaved
E Grass-Range, Short	J Range, Natural	

Hydrograph Return Period Recap

Hyd. No.	Hydrograph type (origin)	Inflow Hyd(s)	Peak Outflow (cfs)								Hydrograph description
			1-Yr	2-Yr	3-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr	
1	Rational	-------	-------	11.85	-------	-------	16.95	19.82	21.95	24.01	sub area 1
2	Rational	-------	-------	4.20	-------	-------	6.12	7.20	8.02	8.84	sub area 2
3	Rational	-------	-------	12.19	-------	-------	17.13	19.88	21.91	23.81	sub area 3
4	Rational	-------	-------	44.46	-------	-------	65.00	76.52	85.43	94.26	sub area 4
5	Reservoir	1	-------	4.96	-------	-------	6.16	6.58	6.88	7.25	sub div detention pond
6	Combine	2, 5	-------	9.02	-------	-------	12.14	13.59	14.68	15.74	sub 2 and resev.a
7	Combine	3, 6	-------	17.35	-------	-------	24.16	27.90	30.66	33.28	
8	Combine	4, 7	-------	54.16	-------	-------	78.02	91.13	101.23	111.22	

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	Rational	24.01	1	17	24,487	----	------	------	sub area 1
2	Rational	8.84	1	23	12,192	----	------	------	sub area 2
3	Rational	23.81	1	13	18,575	----	------	------	sub area 3
4	Rational	94.26	1	25	141,397	----	------	------	sub area 4
5	Reservoir	7.25	1	29	22,967	1	105.10	16,159	sub div detention pond
6	Combine	15.74	1	23	35,159	2, 5	------	------	sub 2 and resev.a
7	Combine	33.28	1	13	53,734	3, 6	------	------	
8	Combine	111.22	1	25	195,131	4, 7	------	------	

Hydrograph Report

Hyd. No. 1

sub area 1

Hydrograph type	= Rational	Peak discharge	= 24.01 cfs
Storm frequency	= 100 yrs	Time interval	= 1 min
Drainage area	= 10.6 ac	Runoff coeff.	= 0.42
Intensity	= 5.392 in/hr	Time of conc. (Tc)	= 17 min
IDF Curve	= CDOT2000.idf	Asc/Rec limb fact	= 1/1

Hydrograph Volume = 24,487 cuft

Hydrograph Discharge Table

Time (hrs)	Outflow (cfs)
0.23	19.77
0.25	21.18
0.27	22.59
0.28	24.01 <<
0.30	22.59
0.32	21.18
0.33	19.77

...End

Hydrograph Report

Hyd. No. 2

sub area 2

Hydrograph type	= Rational	Peak discharge	= 8.84 cfs
Storm frequency	= 100 yrs	Time interval	= 1 min
Drainage area	= 9.4 ac	Runoff coeff.	= 0.2
Intensity	= 4.699 in/hr	Time of conc. (Tc)	= 23 min
IDF Curve	= CDOT2000.idf	Asc/Rec limb fact	= 1/1

Hydrograph Volume = 12,192 cuft

Hydrograph Discharge Table

Time (hrs)	Outflow (cfs)
0.32	7.30
0.33	7.68
0.35	8.07
0.37	8.45
0.38	8.84 <<
0.40	8.45
0.42	8.07
0.43	7.68
0.45	7.30

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve

Hyd. No. 3

sub area 3

Hydrograph type	= Rational	Peak discharge	= 23.81 cfs
Storm frequency	= 100 yrs	Time interval	= 1 min
Drainage area	= 11.4 ac	Runoff coeff.	= 0.35
Intensity	= 5.995 in/hr	Time of conc. (Tc)	= 13 min
IDF Curve	= CDOT2000.idf	Asc/Rec limb fact	= 1/1

Hydrograph Volume = 18,575 cuft

Hydrograph Discharge Table

Time (hrs)	Outflow (cfs)
0.18	20.15
0.20	21.98
0.22	23.81 <<
0.23	21.98
0.25	20.15

...End

Hydrograph Report

Hyd. No. 4

sub area 4

Hydrograph type	= Rational	Peak discharge	= 94.26 cfs
Storm frequency	= 100 yrs	Time interval	= 1 min
Drainage area	= 53.6 ac	Runoff coeff.	= 0.39
Intensity	= 4.509 in/hr	Time of conc. (Tc)	= 25 min
IDF Curve	= CDOT2000.idf	Asc/Rec limb fact	= 1/1

Hydrograph Volume = 141,397 cuft

Hydrograph Discharge Table

Time (hrs)	Outflow (cfs)	
0.35	79.18	
0.37	82.95	
0.38	86.72	
0.40	90.49	
0.42	94.26	<<
0.43	90.49	
0.45	86.72	
0.47	82.95	
0.48	79.18	
0.50	75.41	

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve

Hyd. No. 5

sub div detention pond

Hydrograph type	= Reservoir	Peak discharge	= 7.25 cfs
Storm frequency	= 100 yrs	Time interval	= 1 min
Inflow hyd. No.	= 1	Reservoir name	= saddle ridge det.
Max. Elevation	= 105.10 ft	Max. Storage	= 16,159 cuft

Storage Indication method used.

Outflow hydrograph volume = 22,967 cuft

Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
0.28	24.01 <<	104.02	6.03	6.00	-----	-----	-----	-----	-----	-----	-----	6.00
0.30	22.59	104.20	6.27	6.21	-----	-----	-----	-----	-----	-----	-----	6.21
0.32	21.18	104.36	6.40	6.39	-----	-----	-----	-----	-----	-----	-----	6.39
0.33	19.77	104.50	6.55	6.55	-----	-----	-----	-----	-----	-----	-----	6.55
0.35	18.36	104.63	6.69	6.69	-----	-----	-----	-----	-----	-----	-----	6.69
0.37	16.95	104.74	6.83	6.81	-----	-----	-----	-----	-----	-----	-----	6.81
0.38	15.53	104.84	6.93	6.91	-----	-----	-----	-----	-----	-----	-----	6.91
0.40	14.12	104.92	7.00	6.99	-----	-----	-----	-----	-----	-----	-----	6.99
0.42	12.71	104.98	7.06	7.06	-----	-----	-----	-----	-----	-----	-----	7.06
0.43	11.30	105.04	7.14	7.11	0.03	-----	-----	-----	-----	-----	-----	7.14
0.45	9.89	105.07	7.20	7.14	0.06	-----	-----	-----	-----	-----	-----	7.20
0.47	8.47	105.09	7.24	7.16	0.08	-----	-----	-----	-----	-----	-----	7.24
0.48	7.06	105.10 <<	7.25	7.16	0.09	-----	-----	-----	-----	-----	-----	7.25 <<
0.50	5.65	105.09	7.23	7.15	0.08	-----	-----	-----	-----	-----	-----	7.23
0.52	4.24	105.06	7.19	7.13	0.06	-----	-----	-----	-----	-----	-----	7.19
0.53	2.82	105.03	7.12	7.10	0.02	-----	-----	-----	-----	-----	-----	7.12
0.55	1.41	104.98	7.05	7.05	-----	-----	-----	-----	-----	-----	-----	7.05
0.57	0.00	104.91	7.00	6.98	-----	-----	-----	-----	-----	-----	-----	6.98
0.58	0.00	104.84	6.94	6.91	-----	-----	-----	-----	-----	-----	-----	6.91
0.60	0.00	104.77	6.86	6.84	-----	-----	-----	-----	-----	-----	-----	6.84
0.62	0.00	104.70	6.78	6.76	-----	-----	-----	-----	-----	-----	-----	6.76
0.63	0.00	104.63	6.69	6.69	-----	-----	-----	-----	-----	-----	-----	6.69
0.65	0.00	104.56	6.61	6.61	-----	-----	-----	-----	-----	-----	-----	6.61
0.67	0.00	104.49	6.54	6.54	-----	-----	-----	-----	-----	-----	-----	6.54
0.68	0.00	104.43	6.47	6.47	-----	-----	-----	-----	-----	-----	-----	6.47
0.70	0.00	104.36	6.41	6.39	-----	-----	-----	-----	-----	-----	-----	6.39
0.72	0.00	104.30	6.35	6.32	-----	-----	-----	-----	-----	-----	-----	6.32
0.73	0.00	104.23	6.30	6.25	-----	-----	-----	-----	-----	-----	-----	6.25
0.75	0.00	104.17	6.23	6.17	-----	-----	-----	-----	-----	-----	-----	6.17
0.77	0.00	104.10	6.14	6.10	-----	-----	-----	-----	-----	-----	-----	6.10
0.78	0.00	104.04	6.05	6.03	-----	-----	-----	-----	-----	-----	-----	6.03
0.80	0.00	103.97	5.95	5.94	-----	-----	-----	-----	-----	-----	-----	5.94
0.82	0.00	103.86	5.81	5.81	-----	-----	-----	-----	-----	-----	-----	5.81

...End

Reservoir Report

Hydraflow Hydrographs by Intelisolve

Reservoir No. 1 - saddle ridge det. pond

Pond Data

Pond storage is based on known contour areas. Average end area method used.

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	100.00	800	0	0
2.00	102.00	2,240	3,040	3,040
4.00	104.00	4,480	6,720	9,760
6.00	106.00	7,200	11,680	21,440
8.00	108.00	10,560	17,760	39,200

Culvert / Orifice Structures

	[A]	[B]	[C]	[D]
Rise in	= 18.0	12.0	1.5	0.0
Span in	= 18.0	12.0	10.0	0.0
No. Barrels	= 1	1	1	0
Invert El. ft	= 100.00	101.00	105.00	0.00
Length ft	= 557.0	145.0	0.0	0.0
Slope %	= 7.50	0.70	0.00	0.00
N-Value	= .012	.012	.015	.000
Orif. Coeff.	= 0.60	0.60	0.60	0.00
Multi-Stage	= n/a	Yes	Yes	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len ft	= 16.00	3.14	0.00	0.00
Crest El. ft	= 106.50	105.50	0.00	0.00
Weir Coeff.	= 3.33	3.10	0.00	0.00
Weir Type	= Riser	Riser	---	---
Multi-Stage	= Yes	Yes	No	No

Exfiltration Rate = 0.00 in/hr/sqft Tailwater Elev. = 0.00 ft

Note: All outflows have been analyzed under inlet and outlet control.

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Total cfs
0.00	0	100.00	0.00	0.00	0.00	---	0.00	0.00	---	---	---	0.00
0.20	304	100.20	0.00	0.00	0.00	---	0.00	0.00	---	---	---	0.00
0.40	608	100.40	0.00	0.00	0.00	---	0.00	0.00	---	---	---	0.00
0.60	912	100.60	0.00	0.00	0.00	---	0.00	0.00	---	---	---	0.00
0.80	1,216	100.80	0.00	0.00	0.00	---	0.00	0.00	---	---	---	0.00
1.00	1,520	101.00	0.00	0.00	0.00	---	0.00	0.00	---	---	---	0.00
1.20	1,824	101.20	0.20	0.18	0.00	---	0.00	0.00	---	---	---	0.18
1.40	2,128	101.40	0.64	0.64	0.00	---	0.00	0.00	---	---	---	0.64
1.60	2,432	101.60	1.43	1.34	0.00	---	0.00	0.00	---	---	---	1.34
1.80	2,736	101.80	2.07	2.07	0.00	---	0.00	0.00	---	---	---	2.07
2.00	3,040	102.00	2.74	2.67	0.00	---	0.00	0.00	---	---	---	2.67
2.20	3,712	102.20	3.16	3.16	0.00	---	0.00	0.00	---	---	---	3.16
2.40	4,384	102.40	3.69	3.59	0.00	---	0.00	0.00	---	---	---	3.59
2.60	5,056	102.60	4.07	3.97	0.00	---	0.00	0.00	---	---	---	3.97
2.80	5,728	102.80	4.31	4.31	0.00	---	0.00	0.00	---	---	---	4.31
3.00	6,400	103.00	4.65	4.63	0.00	---	0.00	0.00	---	---	---	4.63
3.20	7,072	103.20	5.02	4.93	0.00	---	0.00	0.00	---	---	---	4.93
3.40	7,744	103.40	5.21	5.21	0.00	---	0.00	0.00	---	---	---	5.21

Continues on next page...

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Total cfs
3.60	8,416	103.60	5.53	5.48	0.00	---	0.00	0.00	---	---	---	5.48
3.80	9,088	103.80	5.73	5.73	0.00	---	0.00	0.00	---	---	---	5.73
4.00	9,760	104.00	6.00	5.98	0.00	---	0.00	0.00	---	---	---	5.98
4.20	10,928	104.20	6.27	6.21	0.00	---	0.00	0.00	---	---	---	6.21
4.40	12,096	104.40	6.44	6.44	0.00	---	0.00	0.00	---	---	---	6.44
4.60	13,264	104.60	6.66	6.66	0.00	---	0.00	0.00	---	---	---	6.66
4.80	14,432	104.80	6.90	6.87	0.00	---	0.00	0.00	---	---	---	6.87
5.00	15,600	105.00	7.07	7.07	0.00	---	0.00	0.00	---	---	---	7.07
5.20	16,768	105.20	7.44	7.26	0.18	---	0.00	0.00	---	---	---	7.44
5.40	17,936	105.40	7.69	7.40	0.29	---	0.00	0.00	---	---	---	7.69
5.60	19,104	105.60	8.16	7.50	0.36	---	0.00	0.31	---	---	---	8.16
5.80	20,272	105.80	9.42	7.39	0.42	---	0.00	1.60	---	---	---	9.42
6.00	21,440	106.00	11.05	7.14	0.48	---	0.00	3.44	---	---	---	11.05
6.20	23,216	106.20	12.93	6.70	0.52	---	0.00	5.70	---	---	---	12.93
6.40	24,992	106.40	14.94	6.06	0.57	---	0.00	8.31	---	---	---	14.94
6.60	26,768	106.60	17.96	4.46	0.58	---	1.68	11.23	---	---	---	17.96
6.80	28,544	106.80	20.41	2.06	0.27	---	8.75	9.33	---	---	---	20.41
7.00	30,320	107.00	21.08	1.26	0.16	---	12.05	7.61	---	---	---	21.08
7.20	32,096	107.20	21.51	0.90	0.12	---	13.72	6.77	---	---	---	21.51
7.40	33,872	107.40	21.88	0.69	0.09	---	14.84	6.25	---	---	---	21.86
7.60	35,648	107.60	22.23	0.55	0.07	---	15.70	5.90	---	---	---	22.23
7.80	37,424	107.80	22.57	0.46	0.06	---	16.37	5.65	---	---	---	22.53
8.00	39,200	108.00	22.89	0.39	0.05	---	16.93	5.47	---	---	---	22.84

...End

Hydrograph Report

Hyd. No. 6

sub 2 and resev.a

Hydrograph type	= Combine	Peak discharge	= 15.74 cfs
Storm frequency	= 100 yrs	Time interval	= 1 min
Inflow hyds.	= 2, 5		

Hydrograph Volume = 35,159 cuft

Hydrograph Discharge Table

Time (hrs)	Hyd. 2 + (cfs)	Hyd. 5 = (cfs)	Outflow (cfs)
0.30	6.91	6.21	13.12
0.32	7.30	6.39	13.69
0.33	7.68	6.55	14.23
0.35	8.07	6.69	14.76
0.37	8.45	6.81	15.26
0.38	8.84 <<	6.91	15.74 <<
0.40	8.45	6.99	15.44
0.42	8.07	7.06	15.13
0.43	7.68	7.14	14.82
0.45	7.30	7.20	14.50
0.47	6.91	7.24	14.15
0.48	6.53	7.25 <<	13.78
0.50	6.15	7.23	13.38
0.52	5.76	7.19	12.95

...End

Hydrograph Report

Hyd. No. 7

Hydrograph type = Combine
Storm frequency = 100 yrs
Inflow hyds. = 3, 6

Peak discharge = 33.28 cfs
Time interval = 1 min

Hydrograph Volume = 53,734 cuft

Hydrograph Discharge Table

Time (hrs)	Hyd. 3 + (cfs)	Hyd. 6 = (cfs)	Outflow (cfs)
0.18	20.15	7.89	28.04
0.20	21.98	8.68	30.66
0.22	23.81 <<	9.46	33.28 <<
0.23	21.98	10.24	32.22
0.25	20.15	11.02	31.17
0.27	18.32	11.78	30.10
0.28	16.49	12.53	29.02
0.30	14.65	13.12	27.78

...End

Hydrograph Report

Hyd. No. 8

Hydrograph type = Combine
Storm frequency = 100 yrs
Inflow hyds. = 4, 7

Peak discharge = 111.22 cfs
Time interval = 1 min

Hydrograph Volume = 195,131 cuft

Hydrograph Discharge Table

Time (hrs)	Hyd. 4 + (cfs)	Hyd. 7 = (cfs)	Outflow (cfs)
0.27	60.33	30.10	90.43
0.28	64.10	29.02	93.12
0.30	67.87	27.78	95.65
0.32	71.64	26.51	98.15
0.33	75.41	25.22	100.64
0.35	79.18	23.91	103.10
0.37	82.95	22.59	105.54
0.38	86.72	21.24	107.96
0.40	90.49	19.11	109.60
0.42	94.26 <<	16.96	111.22 <<
0.43	90.49	14.82	105.32
0.45	86.72	14.50	101.23
0.47	82.95	14.15	97.11
0.48	79.18	13.78	92.96

...End

CONSULTING ENGINEERS

SUBJECT Middletown H.S
Major Drainage Computations
JOB NO. 1746

Sheet No. ____ of ____
Computed By ECB Date 10-14-03
Checked By ____ Date ____

DRAINAGE AREA 2

Proposed Conditions

SUB AREA 1

Same as EXISTING

SUB AREA 2

D.A. same as Existing
Tc: sheet Flow
L=150 ΔH=10
shallow channel
L= 970 ΔH=190-60 = 13%
EXIST Storm syst to outlet removed
Combine with Sub Area 3.

SUB AREA 3

overland - brush - woods C=.2
P= 11.9 in²
A= 11.9 in² x 200²/43560 ft² = 10.92 AC
(Assume 1/2 To D.A. @ TOP of Bank Swale ∴ 5.46AC
Fields / Park areas C=.35
P= 23.0 in²
A= 23.0 in² x 200²/43560 ft² = 21 AC

Tc:
Sheet Flow: L=100 ΔH=5 S=5%
overland shallow conc. L=700' ΔH=100 S=14%
Assume 10min in Swales + PIPES

CONSULTING ENGINEERS

SUBJECT Middletown H. S
Major Drainage Computations
JOB NO. 1746

Sheet No. _____ of _____
Computed By ECB Date 10-14-03
Checked By _____ Date _____

DRAINAGE AREA 2

Proposed Conditions (Cont'd)

S.A. 4
Buildings + Parking = 4.66 AC C = .85
Overland - Heavy Brush = 13.26 AC C = .2
Fields & Grass = 11.53 AC C = .35

Tc = Same as Existing = 25 min.

S.A. 5
School & Paved Areas C = .85
TOTAL AREA
10. (200²)/43560 = 9.1 AC

Tc - Assume 10 min.

TOTAL DA 2 Area = 84.95 AC

Midda2pr.prn

TIME OF CONCENTRATION AND TRAVEL TIME — Version 2.10

Project : MIDDLETOWN HIGH SCHOOL — User: ECB — Date: 10-20-2003
County : MIDDLESEX — State: CT — Checked: ____ — Date: _____
Subtitle: DRAINAGE AREA 2 PROPOSED

Subarea #1 - SA1

Flow Type	2 year rain	Length (ft)	Slope (ft/ft)	Surface code	n	Area (sq/ft)	Wp (ft)	Velocity (ft/sec)	Time (hr)
Sheet	3.2	100	.045	H					0.259
Shallow Concent'd		500	.128	U					0.024
								Time of Concentration =	0.28*
									=====

Subarea #2 - SA2

Flow Type	2 year rain	Length (ft)	Slope (ft/ft)	Surface code	n	Area (sq/ft)	Wp (ft)	Velocity (ft/sec)	Time (hr)
Sheet	3.2	150	.066	H					0.307
Shallow Concent'd		970	.13	U					0.046
								Time of Concentration =	0.35*
									=====

Subarea #3 - SA3

Flow Type	2 year rain	Length (ft)	Slope (ft/ft)	Surface code	n	Area (sq/ft)	Wp (ft)	Velocity (ft/sec)	Time (hr)
Sheet	3.2	100	.05	H					0.248
Shallow Concent'd		700	.14	U					0.032
								Time of Concentration =	0.28*
									=====

Add 10 min through 3 wales & Pipes ∴ 16.8+10 = 27 min

Subarea #4 - SA4

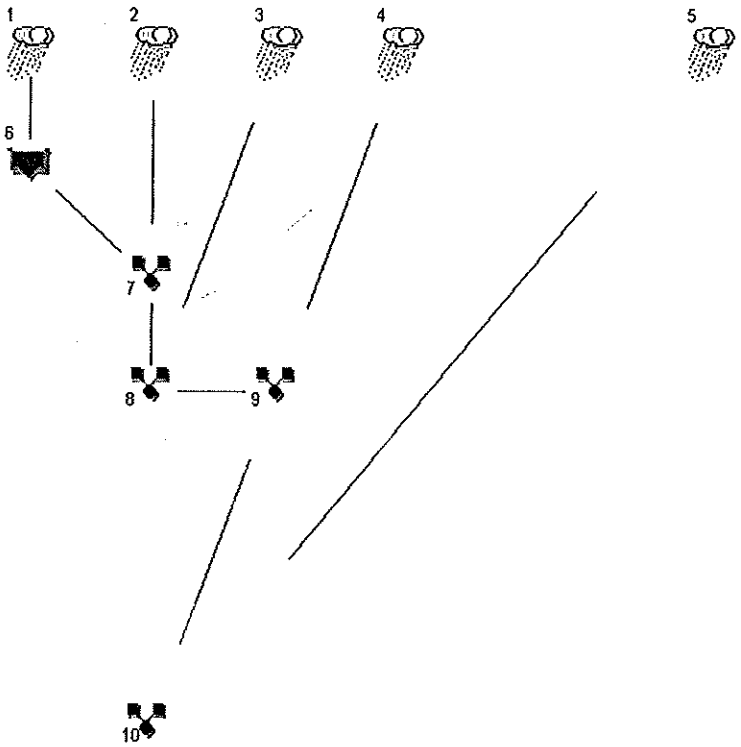
Flow Type	2 year rain	Length (ft)	Slope (ft/ft)	Surface code	n	Area (sq/ft)	Wp (ft)	Velocity (ft/sec)	Time (hr)
Sheet	3.2	100	.07	H					0.217
Shallow Concent'd		600	.21	U					0.023
Shallow Concent'd		1080	.042	U					0.091
Open Channel		550						2	0.076
								Time of Concentration =	0.41*
									=====

--- Sheet Flow Surface Codes ---

A Smooth Surface	F Grass, Dense	--- Shallow Concentrated ---	
B Fallow (No Res.)	G Grass, Burmuda	--- Surface Codes ---	
C Cultivated < 20 % Res.	H Woods, Light	P Paved	
D Cultivated > 20 % Res.	I Woods, Dense	U Unpaved	
E Grass-Range, Short	J Range, Natural		

S.A. 5

Assume 10 min


1
2
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4
5
6
7
8
9
10

Hydrograph Return Period Recap

Hyd. No.	Hydrograph type (origin)	Inflow Hyd(s)	Peak Outflow (cfs)								Hydrograph description
			1-Yr	2-Yr	3-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr	
1	Rational	-------	-------	11.85	-------	-------	16.95	19.82	21.95	24.01	sub area 1
2	Rational	-------	-------	4.20	-------	-------	6.12	7.20	8.02	8.84	sub area 2
3	Rational	-------	-------	17.18	-------	-------	25.20	29.69	33.21	36.71	sub area 3
4	Rational	-------	-------	22.50	-------	-------	32.90	38.73	43.24	47.71	sub area 4
5	Rational	-------	-------	26.96	-------	-------	37.17	42.71	46.89	50.69	sub area 5
6	Reservoir	1	-------	4.96	-------	-------	6.16	6.58	6.88	7.25	sub div detention pond
7	Combine	2, 6	-------	9.02	-------	-------	12.14	13.59	14.68	15.74	sub 2 and resev.a
8	Combine	3, 7	-------	25.61	-------	-------	36.42	42.21	46.70	51.21	
9	Combine	4, 8	-------	47.18	-------	-------	67.94	79.30	88.10	96.83	
10	Combine	5, 9	-------	47.18	-------	-------	67.94	79.30	88.10	96.83	

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	Rational	24.01	1	17	24,487	----	------	------	sub area 1
2	Rational	8.84	1	23	12,192	----	------	------	sub area 2
3	Rational	36.71	1	27	59,467	----	------	------	sub area 3
4	Rational	47.71	1	25	71,567	----	------	------	sub area 4
5	Rational	50.69	1	10	30,416	----	------	------	sub area 5
6	Reservoir	7.25	1	29	22,967	1	105.10	16,159	sub div detention pond
7	Combine	15.74	1	23	35,159	2, 6	------	------	sub 2 and resev.a
8	Combine	51.21	1	27	94,626	3, 7	------	------	
9	Combine	96.83	1	25	166,193	4, 8	------	------	
10	Combine	96.83	1	25	196,610	5, 9	------	------	

Hydrograph Report

Hyd. No. 1

sub area 1

Hydrograph type	= Rational	Peak discharge	= 24.01 cfs
Storm frequency	= 100 yrs	Time interval	= 1 min
Drainage area	= 10.6 ac	Runoff coeff.	= 0.42
Intensity	= 5.392 in/hr	Time of conc. (Tc)	= 17 min
IDF Curve	= CDOT2000.idf	Asc/Rec limb fact	= 1/1

Hydrograph Volume = 24,487 cuft

Hydrograph Discharge Table

Time (hrs)	Outflow (cfs)
0.02	1.41
0.03	2.82
0.05	4.24
0.07	5.65
0.08	7.06
0.10	8.47
0.12	9.89
0.13	11.30
0.15	12.71
0.17	14.12
0.18	15.53
0.20	16.95
0.22	18.36
0.23	19.77
0.25	21.18
0.27	22.59
0.28	24.01 <<
0.30	22.59
0.32	21.18
0.33	19.77
0.35	18.36
0.37	16.95
0.38	15.53
0.40	14.12
0.42	12.71
0.43	11.30
0.45	9.89
0.47	8.47
0.48	7.06
0.50	5.65
0.52	4.24
0.53	2.82
0.55	1.41

...End

Hydrograph Report

Hyd. No. 2

sub area 2

Hydrograph type	= Rational	Peak discharge	= 8.84 cfs
Storm frequency	= 100 yrs	Time interval	= 1 min
Drainage area	= 9.4 ac	Runoff coeff.	= 0.2
Intensity	= 4.699 in/hr	Time of conc. (Tc)	= 23 min
IDF Curve	= CDOT2000.idf	Asc/Rec limb fact	= 1/1

Hydrograph Volume = 12,192 cuft

Hydrograph Discharge Table

Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)
0.02	0.38	0.58	4.23
0.03	0.77	0.60	3.84
0.05	1.15	0.62	3.46
0.07	1.54	0.63	3.07
0.08	1.92	0.65	2.69
0.10	2.30	0.67	2.30
0.12	2.69	0.68	1.92
0.13	3.07	0.70	1.54
0.15	3.46	0.72	1.15
0.17	3.84	0.73	0.77
0.18	4.23	0.75	0.38
0.20	4.61		
0.22	4.99		
0.23	5.38	*...End*	
0.25	5.76		
0.27	6.15		
0.28	6.53		
0.30	6.91		
0.32	7.30		
0.33	7.68		
0.35	8.07		
0.37	8.45		
0.38	8.84 <<		
0.40	8.45		
0.42	8.07		
0.43	7.68		
0.45	7.30		
0.47	6.91		
0.48	6.53		
0.50	6.15		
0.52	5.76		
0.53	5.38		
0.55	4.99		
0.57	4.61		

Hydrograph Report

Hydraflow Hydrographs by Intelisolve

Hyd. No. 3

sub area 3

Hydrograph type	= Rational	Peak discharge	= 36.71 cfs
Storm frequency	= 100 yrs	Time interval	= 1 min
Drainage area	= 26.5 ac	Runoff coeff.	= 0.32
Intensity	= 4.335 in/hr	Time of conc. (Tc)	= 27 min
IDF Curve	= CDOT2000.idf	Asc/Rec limb fact	= 1/1

Hydrograph Volume = 59,467 cuft

Hydrograph Discharge Table

Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)
0.02	1.36	0.58	25.83
0.03	2.72	0.60	24.47
0.05	4.08	0.62	23.11
0.07	5.44	0.63	21.75
0.08	6.80	0.65	20.39
0.10	8.16	0.67	19.03
0.12	9.52	0.68	17.67
0.13	10.88	0.70	16.31
0.15	12.24	0.72	14.96
0.17	13.60	0.73	13.60
0.18	14.96	0.75	12.24
0.20	16.31	0.77	10.88
0.22	17.67	0.78	9.52
0.23	19.03	0.80	8.16
0.25	20.39	0.82	6.80
0.27	21.75	0.83	5.44
0.28	23.11	0.85	4.08
0.30	24.47	0.87	2.72
0.32	25.83	0.88	1.36
0.33	27.19		
0.35	28.55		
0.37	29.91	*...End*	
0.38	31.27		
0.40	32.63		
0.42	33.99		
0.43	35.35		
0.45	36.71 <<		
0.47	35.35		
0.48	33.99		
0.50	32.63		
0.52	31.27		
0.53	29.91		
0.55	28.55		
0.57	27.19		

Hydrograph Report

Hydraflow Hydrographs by Intelisolve

Hyd. No. 4

sub area 4

Hydrograph type	= Rational	Peak discharge	= 47.71 cfs
Storm frequency	= 100 yrs	Time interval	= 1 min
Drainage area	= 29.4 ac	Runoff coeff.	= 0.36
Intensity	= 4.509 in/hr	Time of conc. (Tc)	= 25 min
IDF Curve	= CDOT2000.idf	Asc/Rec limb fact	= 1/1

Hydrograph Volume = 71,567 cuft

Hydrograph Discharge Table

Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)
0.02	1.91	0.58	28.63
0.03	3.82	0.60	26.72
0.05	5.73	0.62	24.81
0.07	7.63	0.63	22.90
0.08	9.54	0.65	20.99
0.10	11.45	0.67	19.08
0.12	13.36	0.68	17.18
0.13	15.27	0.70	15.27
0.15	17.18	0.72	13.36
0.17	19.08	0.73	11.45
0.18	20.99	0.75	9.54
0.20	22.90	0.77	7.63
0.22	24.81	0.78	5.73
0.23	26.72	0.80	3.82
0.25	28.63	0.82	1.91
0.27	30.54		
0.28	32.44		
0.30	34.35	*...End*	
0.32	36.26		
0.33	38.17		
0.35	40.08		
0.37	41.99		
0.38	43.89		
0.40	45.80		
0.42	47.71 <<		
0.43	45.80		
0.45	43.89		
0.47	41.99		
0.48	40.08		
0.50	38.17		
0.52	36.26		
0.53	34.35		
0.55	32.44		
0.57	30.54		

Hydrograph Report

Hydraflow Hydrographs by Intelisolve

Hyd. No. 5

sub area 5

Hydrograph type	= Rational	Peak discharge	= 50.69 cfs
Storm frequency	= 100 yrs	Time interval	= 1 min
Drainage area	= 9.1 ac	Runoff coeff.	= 0.85
Intensity	= 6.554 in/hr	Time of conc. (Tc)	= 10 min
IDF Curve	= CDOT2000.idf	Asc/Rec limb fact	= 1/1

Hydrograph Volume = 30,416 cuft

Hydrograph Discharge Table

Time (hrs)	Outflow (cfs)
0.02	5.07
0.03	10.14
0.05	15.21
0.07	20.28
0.08	25.35
0.10	30.42
0.12	35.49
0.13	40.55
0.15	45.62
0.17	50.69 <<
0.18	45.62
0.20	40.55
0.22	35.49
0.23	30.42
0.25	25.35
0.27	20.28
0.28	15.21
0.30	10.14
0.32	5.07

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve

Hyd. No. 6

sub div detention pond

Hydrograph type	= Reservoir	Peak discharge	= 7.25 cfs
Storm frequency	= 100 yrs	Time interval	= 1 min
Inflow hyd. No.	= 1	Reservoir name	= saddle ridge det.
Max. Elevation	= 105.10 ft	Max. Storage	= 16,159 cuft

Storage Indication method used.

Outflow hydrograph volume = 22,967 cuft

Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
0.12	9.89	101.36	0.54	0.53	-----	-----	-----	-----	-----	-----	-----	0.53
0.13	11.30	101.73	1.84	1.81	-----	-----	-----	-----	-----	-----	-----	1.81
0.15	12.71	102.05	2.84	2.80	-----	-----	-----	-----	-----	-----	-----	2.80
0.17	14.12	102.24	3.26	3.24	-----	-----	-----	-----	-----	-----	-----	3.24
0.18	15.53	102.44	3.76	3.66	-----	-----	-----	-----	-----	-----	-----	3.66
0.20	16.95	102.66	4.15	4.07	-----	-----	-----	-----	-----	-----	-----	4.07
0.22	18.36	102.90	4.48	4.47	-----	-----	-----	-----	-----	-----	-----	4.47
0.23	19.77	103.16	4.93	4.86	-----	-----	-----	-----	-----	-----	-----	4.86
0.25	21.18	103.43	5.26	5.25	-----	-----	-----	-----	-----	-----	-----	5.25
0.27	22.59	103.72	5.66	5.64	-----	-----	-----	-----	-----	-----	-----	5.64
0.28	24.01 <<	104.02	6.03	6.00	-----	-----	-----	-----	-----	-----	-----	6.00
0.30	22.59	104.20	6.27	6.21	-----	-----	-----	-----	-----	-----	-----	6.21
0.32	21.18	104.36	6.40	6.39	-----	-----	-----	-----	-----	-----	-----	6.39
0.33	19.77	104.50	6.55	6.55	-----	-----	-----	-----	-----	-----	-----	6.55
0.35	18.36	104.63	6.69	6.69	-----	-----	-----	-----	-----	-----	-----	6.69
0.37	16.95	104.74	6.83	6.81	-----	-----	-----	-----	-----	-----	-----	6.81
0.38	15.53	104.84	6.93	6.91	-----	-----	-----	-----	-----	-----	-----	6.91
0.40	14.12	104.92	7.00	6.99	-----	-----	-----	-----	-----	-----	-----	6.99
0.42	12.71	104.98	7.06	7.06	-----	-----	-----	-----	-----	-----	-----	7.06
0.43	11.30	105.04	7.14	7.11	0.03	-----	-----	-----	-----	-----	-----	7.14
0.45	9.89	105.07	7.20	7.14	0.06	-----	-----	-----	-----	-----	-----	7.20
0.47	8.47	105.09	7.24	7.16	0.08	-----	-----	-----	-----	-----	-----	7.24
0.48	7.06	105.10 <<	7.25	7.16	0.09	-----	-----	-----	-----	-----	-----	7.25 <<
0.50	5.65	105.09	7.23	7.15	0.08	-----	-----	-----	-----	-----	-----	7.23
0.52	4.24	105.06	7.19	7.13	0.06	-----	-----	-----	-----	-----	-----	7.19
0.53	2.82	105.03	7.12	7.10	0.02	-----	-----	-----	-----	-----	-----	7.12
0.55	1.41	104.98	7.05	7.05	-----	-----	-----	-----	-----	-----	-----	7.05
0.57	0.00	104.91	7.00	6.98	-----	-----	-----	-----	-----	-----	-----	6.98
0.58	0.00	104.84	6.94	6.91	-----	-----	-----	-----	-----	-----	-----	6.91
0.60	0.00	104.77	6.86	6.84	-----	-----	-----	-----	-----	-----	-----	6.84
0.62	0.00	104.70	6.78	6.76	-----	-----	-----	-----	-----	-----	-----	6.76
0.63	0.00	104.63	6.69	6.69	-----	-----	-----	-----	-----	-----	-----	6.69
0.65	0.00	104.56	6.61	6.61	-----	-----	-----	-----	-----	-----	-----	6.61
0.67	0.00	104.49	6.54	6.54	-----	-----	-----	-----	-----	-----	-----	6.54
0.68	0.00	104.43	6.47	6.47	-----	-----	-----	-----	-----	-----	-----	6.47
0.70	0.00	104.36	6.41	6.39	-----	-----	-----	-----	-----	-----	-----	6.39
0.72	0.00	104.30	6.35	6.32	-----	-----	-----	-----	-----	-----	-----	6.32
0.73	0.00	104.23	6.30	6.25	-----	-----	-----	-----	-----	-----	-----	6.25

Continues on next page...

APPENDIX 2

SECTION 2- STORM DRAINAGE AND OUTLET PROTECTION CALCULATIONS

SUBJECT MIDDLETOWN HIGH SCHOOL
MIDDLETOWN, CT
JOB NO. 1716 D.A. Na

CONSULTING ENGINEERS

SHEET NO. 1 OF
COMPUTED BY E.C.B. DATE 11/7/03
CHECKED BY DATE

DATA SHEET FOR RATIONAL METHOD STORM DRAINAGE DESIGN

Q = CIA

NODE		AREA	RUNOFF COEFFICIENT C			TIME OF CONCENTRATION					
INLET I.D.	CROSS SLOPE	ACRES	DESCRIPTION	C VALUE	TOTAL AC	ELEV. DIFF. FT	LENGTH FT	SLOPE %	COVER	TIME MIN.	COMMENTS
Na-1		1.250	FIELDS	0.35	0.438					10	
		0.000		0.35	0.000						
		1.250			0.438						
Na-2		1.280	FIELDS	0.35	0.448					10	
		0.000		0	0.000						
		1.280			0.448						
Na-3		0.240	TRACK	0.85	0.20					10	
		0.580	FIELDS	0.35	0.20						
		0.820			0.41						
Na-4		0.240	TRACK	0.85	0.20					10	
		0.580	FIELDS	0.35	0.20						
		0.820			0.41						
Na-7		0.200	GRASS SLOPE	0.25	0.05						
(split into 7a	and 7b)	1.050	FIELDS	0.35	0.37					10	
		1.250			0.42						
Na-8		0.780	FIELDS	0.35	0.27					10	
		0.000			#VALUE!						
		0.780			#VALUE!						
Na-9		0.480	FIELD/SLOPES	0.3	0.14					10	
		0.000			0.00						
		0.480			0.14						
Na-10		1.330	FIELDS	0.35	0.47						
		0.000			0.00						
		1.330			0.47						
Na-11		0.900	FIELDS	0.35	0.32					10	
		0.720	SLOPES	0.25	0.18						
		1.620			0.50						
Na-12		0.430	FIELDS	0.35	0.15					10	
		0.460	SLOPES	0.25	0.12						
		0.890			0.27						
Na-13		1.080	FIELDS	0.35	0.38					10	
		0.000			0.00						
		1.080			0.38						
Na-14		0.770	GRASS/SLOPES	0.45	0.35					10	
		0.000			0.00						
		0.770			0.35						

SUBJECT MIDDLETOWN HIGH SCHOOL
MIDDLETOWN, CT
JOB NO. 1746 D.A. Na

CONSULTING ENGINEERS

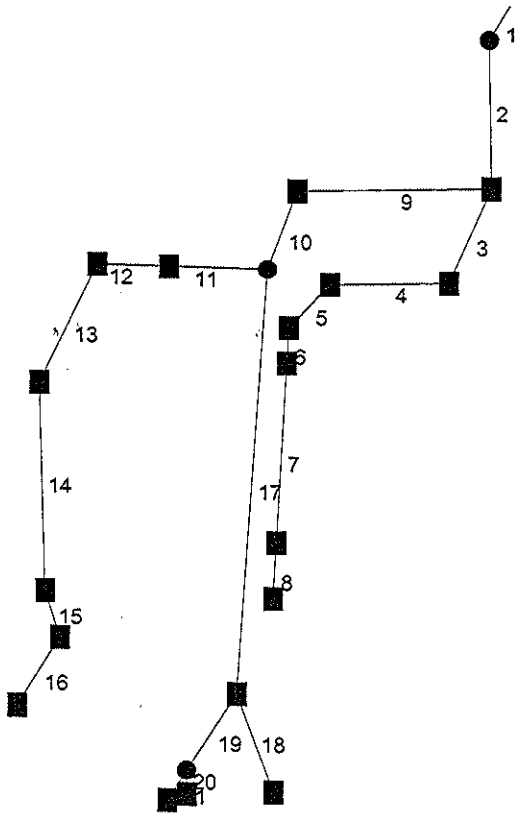
SHEET NO. 2 OF
COMPUTED BY E.C.B. DATE 11/7/03
CHECKED BY DATE

DATA SHEET FOR RATIONAL METHOD STORM DRAINAGE DESIGN

Q = CIA

NODE		AREA	RUNOFF COEFFICIENT C			TIME OF CONCENTRATION					
INLET I.D.	CROSS SLOPE	ACRES	DESCRIPTION	C VALUE	TOTAL AC	ELEV. DIFF. FT	LENGTH FT	SLOPE %	COVER	TIME MIN.	COMMENTS
Na-15		0.370	GRASS/SLOPES	0.25	0.093					10	
split	15a&15b	1.060	FIELDS	0.35	0.000						
		1.430			0.093						
Na-16		8.430	RESIDENTIAL	0.45	3.79				FROM	23	
maj D.A.2		1.400	WOODS	0.2	0.28				TR-55		
S.A 2		9.830			4.07						
Na-17		0.000	Q10=6.2CFS	0	0.00						
maj D.A.2		0.000		0	0.00						
S.A 1		0.000			0.00						
Na-18		5.460	OVERLAND/	0.2	1.09				FROM	17	
		0.000	WOODS	0	0.00				TR-55		
		5.460			1.09						

Hydraflow Plan View



Project file: Mid H.S DA Na.stm	IDF file: cdothtfd.IDF	No. Lines: 21	11-13-2003

Hydraflow Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr line No.	Line length (ft)	Defl angle (deg)	Junc type	Known Q (cfs)	Drng area (ac)	Runoff coeff (C)	Inlet time (min)	Invert El Dn (ft)	Line slope (%)	Invert El Up (ft)	Line size (in)	Line type	N value (n)	J-loss coeff (K)	Inlet/ Rim El (ft)	
1	End	50.0	127.0	MH	0.00	0.00	0.00	0.0	24.00	0.50	24.25	36	Cir	0.012	0.75	28.80	M.H.Na-1
2	1	175.0	-38.0	Grate	0.00	1.25	0.35	10.0	24.25	0.50	25.12	36	Cir	0.012	1.50	28.80	C-L CBNa-1
3	2	128.0	30.0	Grate	0.00	0.82	0.50	10.0	25.12	1.00	26.40	18	Cir	0.012	1.25	32.80	C-L CBNa-4
4	3	174.0	60.0	Grate	0.00	0.82	0.50	10.0	26.40	0.75	27.70	18	Cir	0.012	1.10	32.80	C-L CB Na-3
5	4	79.0	-40.0	Grate	0.00	0.63	0.33	10.0	27.70	0.51	28.10	18	Cir	0.012	1.10	31.80	Y.D. CB Na-7A
6	5	42.0	-45.0	Grate	0.00	0.63	0.33	10.0	28.10	0.50	28.31	15	Cir	0.012	0.50	31.80	Y.D. CB Na 7B
7	6	214.0	0.0	Grate	0.00	0.72	0.32	10.0	28.31	0.50	29.38	15	Cir	0.012	0.50	31.80	Y.D.CB Na 15A
8	7	66.0	0.0	Grate	0.00	0.72	0.32	10.0	29.38	0.50	29.71	15	Cir	0.012	1.00	31.80	Y.D.C.B. Na 15B
9	2	284.0	90.0	Grate	0.00	1.28	0.35	10.0	25.12	0.50	26.54	36	Cir	0.012	1.25	29.50	C-L CBNa -2
10	9	102.0	-64.0	MH	0.00	0.00	0.00	0.0	26.54	3.39	30.00	30	Cir	0.012	0.85	37.50	MHNa-2
11	10	144.0	66.0	Grate	0.00	0.78	0.35	10.0	30.50	1.00	31.94	18	Cir	0.012	0.50	39.90	C-L CBNa -8
12	11	105.0	0.0	Grate	0.00	0.48	0.30	10.0	31.94	1.00	32.99	18	Cir	0.012	1.25	39.90	C-L CB NA9
13	12	164.0	-60.0	Grate	0.00	1.33	0.35	10.0	33.24	5.95	43.00	15	Cir	0.012	0.70	49.80	C-L CB Na-10
14	13	247.0	-33.0	Grate	0.00	1.62	0.31	10.0	43.00	1.02	45.51	15	Cir	0.012	0.70	49.80	C-L CB NA-11
15	14	59.0	-20.0	Grate	0.00	0.89	0.30	0.0	45.51	1.00	46.10	15	Cir	0.012	1.25	49.80	C-L CB Na-12
16	15	102.0	60.0	Grate	0.00	5.46	0.20	17.0	46.10	23.24	69.80	15	Cir	0.024	1.00	79.80	C-L CBNA-18
17	10	505.0	-20.0	Grate	0.00	1.08	0.30	0.0	30.00	2.77	44.00	24	Cir	0.012	0.70	50.80	C-L CB Na 13
18	17	127.0	-30.0	Curb	0.00	0.77	0.45	10.0	47.00	11.02	61.00	12	Cir	0.024	1.00	71.70	C- CB Na-14
19	17	116.0	34.0	MH	0.00	0.00	0.00	0.0	46.00	9.74	57.30	24	Cir	0.012	0.75	61.30	MH Na 13
20	19	28.0	-40.0	Grate	0.00	9.43	0.41	23.0	57.30	1.43	57.70	24	Cir	0.012	1.00	61.70	C-LNa16
21	19	45.0	0.0	Grate	6.20	0.00	0.00	0.0	57.80	2.89	59.10	18	Cir	0.012	1.00	62.46	C-L Na-17

Project File: Mid H.S DA Na.stm | IDF File: cdothtfd.IDF | Total number of lines: 21 | Date: 11-13-2003

Hydraflow Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	Dns line No.
1	M.H.Na-1	36.05	36 c	50.0	24.00	24.25	0.500	25.91	26.17	0.66	End
2	C-L CBNa-1	36.34	36 c	175.0	24.25	25.12	0.497	26.83	27.05	1.34	1
3	C-L CBNa-4	7.02	18 c	128.0	25.12	26.40	1.000	28.38*	28.87*	0.31	2
4	C-L CB Na-3	5.49	18 c	174.0	26.40	27.70	0.747	29.18*	29.58*	0.16	3
5	Y.D. CB Na-7A	3.82	18 c	79.0	27.70	28.10	0.506	29.75*	29.84*	0.08	4
6	Y.D. CB Na 7B	2.94	15 c	42.0	28.10	28.31	0.500	29.92*	29.99*	0.04	5
7	Y.D.CB Na 15A	2.16	15 c	214.0	28.31	29.38	0.500	30.03	30.25	0.04	6
8	Y.D.C.B. Na 15B	1.11	15 c	66.0	29.38	29.71	0.500	30.29	30.30	0.06	7
9	C-L CBNa -2	30.33	36 c	284.0	25.12	26.54	0.500	28.38	28.78	0.56	2
10	MHNa-2	29.06	30 c	102.0	26.54	30.00	3.392	29.34	31.80	0.78	9
11	C-L CBNa -8	9.86	18 c	144.0	30.50	31.94	1.000	32.58*	33.66*	0.24	10
12	C-L CB NA9	8.96	18 c	105.0	31.94	32.99	1.000	33.90*	34.55*	0.50	11
13	C-L CB Na-10	8.52	15 c	164.0	33.24	43.00	5.951	35.05	44.14	0.57	12
14	C-L CB NA-11	6.96	15 c	247.0	43.00	45.51	1.016	44.71*	47.16*	0.35	13
15	C-L CB Na-12	5.11	15 c	59.0	45.51	46.10	1.000	47.51*	47.82*	0.34	14
16	C-L CBNA-18	4.16	15 c	102.0	46.10	69.80	23.235	48.16	70.62	0.37	15
17	C-L CB Na 13	20.84	24 c	505.0	30.00	44.00	2.772	32.58	45.62	0.64	10
18	C- CB Na-14	1.66	12 c	127.0	47.00	61.00	11.024	47.55	61.55	0.22	17
19	MH Na 13	18.76	24 c	116.0	46.00	57.30	9.741	47.53	58.83	0.61	17
20	C-LNa16	12.59	24 c	28.0	57.30	57.70	1.429	59.45	59.49	0.28	19
21	C-L Na-17	6.20	18 c	45.0	57.80	59.10	2.889	59.45	60.05	0.43	19

Project File: Mid H.S DA Na.stm	IDF File: cdothtfd.IDF	Total No. Lines: 21	Run Date: 11-13-2003

NOTES: c = circular; e = elliptical; b = box; Return period = 10 Yrs.; * Indicates surcharge condition.

Hydraflow Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	
1	End	50.0	0.00	28.71	0.00	0.00	9.86	0.0	26.2	3.0	36.05	51.09	7.56	36	0.50	24.25	24.00	26.17	25.91	28.80	27.00	M.H.Na-1
2	1	175.0	1.25	28.71	0.35	0.44	9.86	10.0	25.8	3.1	36.34	50.94	6.59	36	0.50	25.12	24.25	27.05	26.83	28.80	28.80	C-L CBNa-1
3	2	128.0	0.82	4.34	0.50	0.41	1.70	10.0	14.3	4.1	7.02	11.38	3.97	18	1.00	26.40	25.12	28.87	28.38	32.80	28.80	C-L CBNa-4
4	3	174.0	0.82	3.52	0.50	0.41	1.29	10.0	13.3	4.3	5.49	9.83	3.10	18	0.75	27.70	26.40	29.58	29.18	32.80	32.80	C-L CB Na-3
5	4	79.0	0.63	2.70	0.33	0.21	0.88	10.0	12.7	4.4	3.82	8.09	2.16	18	0.51	28.10	27.70	29.84	29.75	31.80	32.80	Y.D. CB Na-7A
6	5	42.0	0.63	2.07	0.33	0.21	0.67	10.0	12.4	4.4	2.94	4.95	2.40	15	0.50	28.31	28.10	29.99	29.92	31.80	31.80	Y.D. CB Na 7B
7	6	214.0	0.72	1.44	0.32	0.23	0.46	10.0	10.7	4.7	2.16	4.95	2.07	15	0.50	29.38	28.31	30.25	30.03	31.80	31.80	Y.D.CB Na 15A
8	7	66.0	0.72	0.72	0.32	0.23	0.23	10.0	10.0	4.8	1.11	4.95	1.55	15	0.50	29.71	29.38	30.30	30.29	31.80	31.80	Y.D.C.B. Na 15B
9	2	284.0	1.28	23.12	0.35	0.45	7.73	10.0	24.8	3.1	30.33	51.09	4.83	36	0.50	26.54	25.12	28.78	28.38	29.50	28.80	C-L CBNa -2
10	9	102.0	0.00	21.84	0.00	0.00	7.28	0.0	24.6	3.1	29.06	81.83	6.80	30	3.39	30.00	26.54	31.80	29.34	37.50	29.50	MHNa-2
11	10	144.0	0.78	10.56	0.35	0.27	2.74	10.0	19.1	3.6	9.86	11.38	5.58	18	1.00	31.94	30.50	33.66	32.58	39.90	37.50	C-L CBNa -8
12	11	105.0	0.48	9.78	0.30	0.14	2.47	10.0	18.8	3.6	8.96	11.38	5.07	18	1.00	32.99	31.94	34.55	33.90	39.90	39.90	C-L CB NA9
13	12	164.0	1.33	9.30	0.35	0.47	2.33	10.0	18.4	3.7	8.52	17.07	7.10	15	5.95	43.00	33.24	44.14	35.05	49.80	39.90	C-L CB Na-10
14	13	247.0	1.62	7.97	0.31	0.50	1.86	10.0	17.6	3.7	6.96	7.05	5.67	15	1.02	45.51	43.00	47.16	44.71	49.80	49.80	C-L CB NA-11
15	14	59.0	0.89	6.35	0.30	0.27	1.36	0.0	17.4	3.8	5.11	7.00	4.17	15	1.00	46.10	45.51	47.82	47.51	49.80	49.80	C-L CB Na-12
16	15	102.0	5.46	5.46	0.20	1.09	1.09	17.0	17.0	3.8	4.16	16.86	4.14	15	23.24	69.80	46.10	70.62	48.16	79.80	49.80	C-L CBNA-18
17	10	505.0	1.08	11.28	0.30	0.32	4.54	0.0	23.4	3.2	20.84	40.80	7.15	24	2.77	44.00	30.00	45.62	32.58	50.80	37.50	C-L CB Na 13
18	17	127.0	0.77	0.77	0.45	0.35	0.35	10.0	10.0	4.8	1.66	6.40	3.78	12	11.02	61.00	47.00	61.55	47.55	71.70	50.80	C- CB Na-14
19	17	116.0	0.00	9.43	0.00	0.00	3.87	0.0	23.1	3.2	18.76	76.48	7.25	24	9.74	57.30	46.00	58.83	47.53	61.30	50.80	MH Na 13
20	19	28.0	9.43	9.43	0.41	3.87	3.87	23.0	23.0	3.3	12.59	29.29	4.13	24	1.43	57.70	57.30	59.49	59.45	61.70	61.30	C-LNa16
21	19	45.0	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	6.20	19.34	4.38	18	2.89	59.10	57.80	60.05	59.45	62.46	61.30	C-L Na-17

Project File: Mid H.S DA Na.stm | IDF File: cdothtfd.IDF | Total number of lines: 21 | Run Date: 11-13-2003

NOTES: Intensity = 54.74 / (Inlet time + 10.80) ^ 0.80; Return period = 10 Yrs. ; Initial tailwater elevation = 25.91 (ft)

Hydraflow Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp line No
							Ht (in)	L (ft)	area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	depth (ft)	spread (ft)	depth (ft)	spread (ft)	Dep (in)	
1		0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	0.000	0.00	0.000	0.000	0.013	0.00	0.00	0.00	0.00	0.0	Off
2		2.10	0.00	2.10	0.00	Grate	0.0	0.00	3.98	3.00	1.66	Sag	2.00	0.100	0.030	0.000	0.20	2.13	0.23	2.13	2.00	1
3		1.97	0.00	1.97	0.00	Grate	0.0	0.00	3.98	3.00	1.66	Sag	2.00	0.100	0.030	0.000	0.19	1.94	0.22	1.95	2.00	2
4		1.97	0.00	1.97	0.00	Grate	0.0	0.00	3.98	3.00	1.66	Sag	2.00	0.100	0.030	0.000	0.19	1.94	0.22	1.95	2.00	3
5		1.00	0.00	1.00	0.00	Grate	0.0	0.00	0.80	1.00	1.00	Sag	2.00	0.100	0.030	0.000	0.20	2.14	0.23	2.14	2.00	4
6		1.00	0.00	1.00	0.00	Grate	0.0	0.00	0.80	1.00	1.00	Sag	2.00	0.100	0.030	0.000	0.20	2.14	0.23	2.14	2.00	5
7		1.11	0.00	1.11	0.00	Grate	0.0	0.00	0.80	1.00	1.00	Sag	2.00	0.100	0.030	0.000	0.22	2.68	0.25	2.68	2.00	6
8		1.11	0.00	1.11	0.00	Grate	0.0	0.00	0.80	1.00	1.00	Sag	2.00	0.100	0.030	0.000	0.22	2.68	0.25	2.68	2.00	7
9		2.15	0.00	2.15	0.00	Grate	0.0	0.00	3.98	3.00	1.66	Sag	2.00	0.100	0.030	0.000	0.21	2.25	0.23	2.25	2.00	2
10		0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	9
11		1.31	0.00	1.31	0.00	Grate	0.0	0.00	3.98	3.00	1.66	Sag	2.00	0.100	0.030	0.000	0.14	1.42	0.17	1.49	2.00	10
12		0.69	0.00	0.69	0.00	Grate	0.0	0.00	3.98	3.00	1.66	Sag	2.00	0.100	0.030	0.000	0.08	0.83	0.11	0.97	2.00	11
13		2.24	0.00	2.24	0.00	Grate	0.0	0.00	3.98	3.00	1.66	Sag	2.00	0.100	0.030	0.000	0.21	2.46	0.24	2.46	2.00	12
14		2.41	0.00	2.41	0.00	Grate	0.0	0.00	3.98	3.00	1.66	Sag	2.00	0.100	0.030	0.000	0.23	2.87	0.25	2.87	2.00	13
15		0.00	0.00	0.00	0.00	Grate	0.0	0.00	3.98	3.00	1.66	Sag	2.00	0.100	0.030	0.000	-0.03	-0.27	0.00	0.00	2.00	14
16		4.16	0.00	4.16	0.00	Grate	0.0	0.00	3.98	3.00	1.66	Sag	2.00	0.100	0.030	0.000	0.34	6.56	0.36	6.56	2.00	15
17		0.00	0.00	0.00	0.00	Grate	0.0	0.00	3.98	3.00	1.66	Sag	2.00	0.100	0.030	0.000	-0.03	-0.27	0.00	0.00	2.00	10
18		1.66	0.00	1.66	0.00	Curb	3.0	3.00	0.00	0.00	0.00	Sag	2.00	0.100	0.030	0.000	0.37	7.58	0.39	7.58	2.00	17
19		0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	17
20		12.59	0.00	12.59	0.00	Grate	0.0	0.00	3.98	3.00	1.66	Sag	2.00	0.100	0.030	0.000	0.73	19.81	0.76	19.81	2.00	19
21		6.20*	0.00	6.20	0.00	Grate	0.0	0.00	3.98	3.00	1.66	Sag	2.00	0.100	0.030	0.000	0.45	10.26	0.47	10.26	2.00	19

Project File: Mid H.S DA Na.stm | I-D-F File: cdothtfd.IDF | Total number of lines: 21 | Run Date: 11-13-2003

NOTES: Inlet N-Values = 0.012 ; Intensity = 54.74 / (Inlet time + 10.80) ^ 0.80; Return period = 10 Yrs. ; * Indicates Known Q added

Hydraflow FL-DOT Report

Line No	To Line	Type of struc	n - value	Len	Drainage Area C1 = 0.25 C2 = 0.35 C3 = 0.85			Time of conc	Time of flow in sect	Inten (I)	Total CA	Add Q / Total flow	Inlet elev	Elev of HGL / Elev of Crown / Elev of Invert			Rise / Span	HGL / Pipe	Actual / Full Flow		Date: 11-13-2003 Frequency: 10 yrs Project: Mid H.S DA Na.st
					Increment (ac)	Sub-total (ac)	Sum CA					Q		Up	Down	Fall	Size	Slope	Vel	Cap	
				(ft)				(min)	(min)	(in/hr)		(cfs)	(ft)	(ft)	(ft)	(ft)	(in)	(%)	(ft/s)	(cfs)	Line description
1	End	MH	0.012	50.0	0.00 0.00 0.00	1.44 3.58 0.48	0.36 1.25 0.41	26.23	0.11	3.0	9.86	0.00 36.05	28.80	26.17 27.25 24.25	25.91 27.00 24.00	0.26 0.25	36 36 Cir	0.51 0.50	7.56 7.23	36.05 51.09	M.H.Na-1
2	1	Grate	0.012	175.0	0.00 0.00 0.00	1.44 3.58 0.48	0.36 1.25 0.41	25.79	0.44	3.1	9.86	0.00 36.34	28.80	27.05 28.12 25.12	26.83 27.25 24.25	0.21 0.87	36 36 Cir	0.12 0.50	6.59 7.21	36.34 50.94	C-L CBNa-1
3	2	Grate	0.012	128.0	0.00 0.58 0.24	0.29 2.22 0.48	0.07 0.78 0.41	14.28	0.54	4.1	1.70	0.00 7.02	32.80	28.87 27.90 26.40	28.38 26.62 25.12	0.49 1.28	18 18 Cir	0.38 1.00	3.97 6.44	7.02 11.38	C-L CBNa-4
4	3	Grate	0.012	174.0	0.00 0.58 0.24	0.29 1.64 0.24	0.07 0.57 0.20	13.34	0.93	4.3	1.29	0.00 5.49	32.80	29.58 29.20 27.70	29.18 27.90 26.40	0.40 1.30	18 18 Cir	0.23 0.75	3.10 5.56	5.49 9.83	C-L CB Na-3
5	4	Grate	0.012	79.0	0.10 0.53 0.00	0.29 1.06 0.00	0.07 0.37 0.00	12.73	0.61	4.4	0.88	0.00 3.82	31.80	29.84 29.60 28.10	29.75 29.20 27.70	0.09 0.40	18 18 Cir	0.11 0.51	2.16 4.58	3.82 8.09	Y.D. CB Na-7A
6	5	Grate	0.012	42.0	0.00 0.00 0.00	0.19 0.53 0.00	0.05 0.19 0.00	12.44	0.29	4.4	0.67	0.00 2.94	31.80	29.99 29.56 28.31	29.92 29.35 28.10	0.07 0.21	15 15 Cir	0.18 0.50	2.40 4.03	2.94 4.95	Y.D. CB Na 7B
7	6	Grate	0.012	214.0	0.19 0.53 0.00	0.19 0.53 0.00	0.05 0.19 0.00	10.71	1.73	4.7	0.46	0.00 2.16	31.80	30.25 30.63 29.38	30.03 29.56 28.31	0.21 1.07	15 15 Cir	0.10 0.50	2.07 4.03	2.16 4.95	Y.D.CB Na 15A
8	7	Grate	0.012	66.0	0.00 0.00 0.00	0.00 0.00 0.00	0.00 0.00 0.00	10.00	0.71	4.8	0.23	0.00 1.11	31.80	30.30 30.96 29.71	30.29 30.63 29.38	0.01 0.33	15 15 Cir	0.02 0.50	1.55 4.03	1.11 4.95	Y.D.C.B. Na 15B
9	2	Grate	0.012	284.0	0.00 0.00 0.00	1.15 1.36 0.00	0.29 0.48 0.00	24.81	0.98	3.1	7.73	0.00 30.33	29.50	28.78 29.54 26.54	28.38 28.12 25.12	0.40 1.42	36 36 Cir	0.14 0.50	4.83 7.23	30.33 51.09	C-L CBNa-2
10	9	MH	0.012	102.0	0.00 0.00 0.00	1.15 1.36 0.00	0.29 0.48 0.00	24.56	0.25	3.1	7.28	0.00 29.06	37.50	31.80 32.50 30.00	29.34 29.04 26.54	2.46 3.46	30 30 Cir	2.42 3.39	6.80 16.67	29.06 81.83	MHNa-2

NOTES: Intensity = 54.74 / (Inlet time + 10.80) ^ 0.80 (in/hr); Initial tailwater elevation = 25.91 (ft)

Hydraflow FL-DOT Report

Line No	To Line	Type of struc	n - value	Len (ft)	Drainage Area C1 = 0.25 C2 = 0.35 C3 = 0.85 Increment (ac)	Drainage Area Sub-total (ac)	Drainage Area Sum CA	Time of conc (min)	Time of flow in sect (min)	Inten (I) (in/hr)	Total CA	Add Q / Total flow Q (cfs)	Inlet elev (ft)	Elev of HGL / Elev of Crown / Elev of Invert Up (ft)	Down (ft)	Fall (ft)	Rise / Span Size (in)	HGL / Pipe Slope (%)	Actual / Full Flow Vel (ft/s)	Cap (cfs)	Date: 11-13-2003 / Frequency: 10 yrs / Project: Mid H.S DA Na.st Line Description
11	10	Grate	0.012	144.0	0.00 0.00 0.00	1.15 1.36 0.00	0.29 0.48 0.00	19.10	0.43	3.6	2.74	0.00 9.86	39.90	33.66 33.44 31.94	32.58 32.00 30.50	1.08 1.44	18 18 Cir	0.75 1.00	5.58 6.44	9.86 11.38	C-L CBNa -8
12	11	Grate	0.012	105.0	0.00 0.00 0.00	1.15 1.36 0.00	0.29 0.48 0.00	18.76	0.35	3.6	2.47	0.00 8.96	39.90	34.55 34.49 32.99	33.90 33.44 31.94	0.65 1.05	18 18 Cir	0.62 1.00	5.07 6.44	8.96 11.38	C-L CB NA9
13	12	Grate	0.012	164.0	0.00 0.00 0.00	1.15 1.36 0.00	0.29 0.48 0.00	18.37	0.38	3.7	2.33	0.00 8.52	49.80	44.14 44.25 43.00	35.05 34.49 33.24	9.09 9.76	15 15 Cir	5.54 5.95	7.10 13.91	8.52 17.07	C-L CB Na-10
14	13	Grate	0.012	247.0	0.72 0.90 0.00	1.15 1.36 0.00	0.29 0.48 0.00	17.65	0.73	3.7	1.86	0.00 6.96	49.80	47.16 46.76 45.51	44.71 44.25 43.00	2.44 2.51	15 15 Cir	0.99 1.02	5.67 5.75	6.96 7.05	C-L CB NA-11
15	14	Grate	0.012	59.0	0.43 0.46 0.00	0.43 0.46 0.00	0.11 0.16 0.00	17.41	0.24	3.8	1.36	0.00 5.11	49.80	47.82 47.35 46.10	47.51 46.76 45.51	0.32 0.59	15 15 Cir	0.53 1.00	4.17 5.70	5.11 7.00	C-L CB Na-12
16	15	Grate	0.024	102.0	0.00 0.00 0.00	0.00 0.00 0.00	0.00 0.00 0.00	17.00	0.41	3.8	1.09	0.00 4.16	79.80	70.62 71.05 69.80	48.16 47.35 46.10	22.45 23.70	15 15 Cir	22.01 23.24	4.14 13.74	4.16 16.86	C-L CBNA-18
17	10	Grate	0.012	505.0	0.00 0.00 0.00	0.00 0.00 0.00	0.00 0.00 0.00	23.38	1.18	3.2	4.54	0.00 20.84	50.80	45.62 46.00 44.00	32.58 32.00 30.00	13.04 14.00	24 24 Cir	2.58 2.77	7.15 12.99	20.84 40.80	C-L CB Na 13
18	17	Curb	0.024	127.0	0.00 0.00 0.00	0.00 0.00 0.00	0.00 0.00 0.00	10.00	0.56	4.8	0.35	0.00 1.66	71.70	61.55 62.00 61.00	47.55 48.00 47.00	14.00 14.00	12 12 Cir	11.02 11.02	3.78 8.15	1.66 6.40	C- CB Na-14
19	17	MH	0.012	116.0	0.00 0.00 0.00	0.00 0.00 0.00	0.00 0.00 0.00	23.11	0.27	3.2	3.87	0.00 18.76	61.30	58.83 59.30 57.30	47.53 48.00 46.00	11.30 11.30	24 24 Cir	9.74 9.74	7.25 24.34	18.76 76.48	MH Na 13
20	19	Grate	0.012	28.0	0.00 0.00 0.00	0.00 0.00 0.00	0.00 0.00 0.00	23.00	0.11	3.3	3.87	0.00 12.59	61.70	59.49 59.70 57.70	59.45 59.30 57.30	0.04 0.40	24 24 Cir	0.14 1.43	4.13 9.32	12.59 29.29	C-LNa13

NOTES: Intensity = 54.74 / (Inlet time + 10.80) ^ 0.80 (in/hr); Initial tailwater elevation = 25.91 (ft)

Hydraflow FL-DOT Report

Line No	To Line	Type of struc	n - value	Len	Drainage Area C1 = 0.25 C2 = 0.35 C3 = 0.85			Time of conc	Time of flow in sect	Inten (I)	Total CA	Add Q / Total flow Q	Inlet elev	Elev of HGL / Elev of Crown / Elev of Invert			Rise Span	HGL Pipe	Actual Full Flow		Date: 11-13-2003 / Frequency: 10 yrs / Project: Mid H.S DA Na.st
					Incre-ment (ac)	Sub-total (ac)	Sum CA							Up	Down	Fall	Size	Slope	Vel	Cap	
				(ft)				(min)	(min)	(in/hr)		(cfs)	(ft)	(ft)	(ft)	(ft)	(in)	(%)	(ft/s)	(cfs)	Line description
21	19	Grate	0.012	45.0	0.00 0.00 0.00	0.00 0.00 0.00	0.00 0.00 0.00	0.00	0.17	0.0	0.00	6.20 6.20	62.46	60.05 60.60 59.10	59.45 59.30 57.80	0.60 1.30	18 18 Cir	1.34 2.89	4.38 10.94	6.20 19.34	C-L Na-17

NOTES: Intensity = 54.74 / (Inlet time + 10.80) ^ 0.80 (in/hr); Initial tailwater elevation = 25.91 (ft)

Hydraflow Hydraulic Grade Line Computations

Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
			Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf		Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf	Ave Sf	Enrgy loss		
	(in)	(cfs)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(ft)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(%)	(ft)	(K)	(ft)
1	36	36.05	24.00	25.91	1.91	4.76	7.57	0.89	26.81	0.459	50.0	24.25	26.17	1.92	4.78	7.54	0.88	27.05	0.454	0.457	0.228	0.75	0.66
2	36	36.34	24.25	26.83	2.58	6.48	5.61	0.49	27.32	0.234	175	25.12	27.05	1.93	4.80	7.57	0.89	27.94	0.456	0.345	0.604	1.50	1.34
3	18	7.02	25.12	28.38	1.50	1.77	3.97	0.25	28.63	0.381	128	26.40	28.87	1.50	1.77	3.97	0.25	29.12	0.381	0.381	0.487	1.25	0.31
4	18	5.49	26.40	28.16	1.50	1.77	3.11	0.15	29.33	0.233	174	27.70	29.58	1.50	1.77	3.10	0.15	29.73	0.233	0.233	0.405	1.10	0.16
5	18	3.82	27.70	29.75	1.50	1.77	2.16	0.07	29.82	0.113	79.0	28.10	29.84	1.50	1.77	2.16	0.07	29.91	0.112	0.113	0.089	1.10	0.08
6	15	2.94	28.10	29.92	1.25	1.23	2.40	0.09	30.01	0.177	42.0	28.31	29.99	1.25	1.23	2.40	0.09	30.08	0.177	0.177	0.074	0.50	0.04
7	15	2.16	28.31	30.03	1.25	1.23	1.76	0.05	30.08	0.095	214	29.38	30.25	0.87	0.91	2.38	0.09	30.33	0.139	0.117	0.251	0.50	0.04
8	15	1.11	29.38	30.29	0.91	0.96	1.16	0.02	30.31	0.032	66.0	29.71	30.30	0.59	0.57	1.93	0.06	30.36	0.120	0.076	0.050	1.00	0.06
9	36	30.33	25.12	28.38	3.00	7.07	4.29	0.29	28.67	0.176	284	26.54	28.78	2.24	5.66	5.36	0.45	29.23	0.214	0.195	0.554	1.25	0.56
10	30	29.06	26.54	29.34	2.50	4.91	5.92	0.55	29.88	0.428	102	30.00	31.80	1.80**	3.79	7.67	0.92	32.72	0.567	0.497	N/A	0.85	0.78
11	18	9.86	30.50	32.58	1.50	1.77	5.58	0.48	33.06	0.751	144	31.94	33.66	1.50	1.77	5.58	0.48	34.14	0.751	0.751	1.081	0.50	0.24
12	18	8.96	31.94	33.90	1.50	1.77	5.07	0.40	34.30	0.620	105	32.99	34.55	1.50	1.77	5.07	0.40	34.95	0.620	0.620	0.651	1.25	0.50
13	15	8.52	33.24	35.05	1.25	1.23	6.95	0.75	35.80	1.486	164	43.00	44.14	1.14**	1.17	7.26	0.82	44.96	1.295	1.390	N/A	0.70	0.57
14	15	6.96	43.00	44.71	1.25	1.23	5.67	0.50	45.21	0.990	247	45.51	47.16	1.25	1.23	5.67	0.50	47.66	0.989	0.990	2.444	0.70	0.35
15	15	5.11	45.51	47.51	1.25	1.23	4.17	0.27	47.78	0.535	59.0	46.10	47.82	1.25	1.23	4.17	0.27	48.09	0.535	0.535	0.315	1.25	0.34
16	15	4.16	46.10	48.16	1.25	1.23	3.39	0.18	48.34	1.414	102	69.80	70.62	0.82**	0.85	4.90	0.37	70.99	2.439	1.927	N/A	1.00	0.37
17	24	20.84	30.00	32.58	2.00	3.14	6.63	0.68	33.26	0.724	505	44.00	45.62	1.62**	2.72	7.66	0.91	46.53	0.742	0.733	N/A	0.70	0.64
18	12	1.66	47.00	47.55	0.55*	0.44	3.78	0.22	47.77	2.207	127	61.00	61.55	0.55**	0.44	3.78	0.22	61.77	2.207	2.207	N/A	1.00	0.22
19	24	18.76	46.00	47.53	1.53*	2.59	7.25	0.82	48.35	0.670	116	57.30	58.83	1.53**	2.59	7.25	0.82	59.65	0.670	0.670	N/A	0.75	0.61
20	24	12.59	57.30	59.45	2.00	3.14	4.01	0.25	59.70	0.264	28.0	57.70	59.49	1.79	2.96	4.25	0.28	59.77	0.234	0.249	0.070	1.00	0.28
21	18	6.20	57.80	59.45	1.50	1.77	3.51	0.19	59.64	0.297	45.0	59.10	60.05	0.95**	1.18	5.25	0.43	60.48	0.559	0.428	N/A	1.00	0.43

Project File: Mid H.S DA Na.stm | IDF File: cdothtfd.IDF | Total number of lines: 21 | Run Date: 11-13-2003

NOTES: Initial tailwater elevation = 25.91369 (ft), * Critical depth assumed., ** Critical depth assumed.

CONSULTING ENGINEERS

SUBJECT Middletown H.S. Area Sa

JOB NO. 1746

Sheet No. _____ of _____

Computed By ECB Date 11-10-03

Checked By _____ Date _____

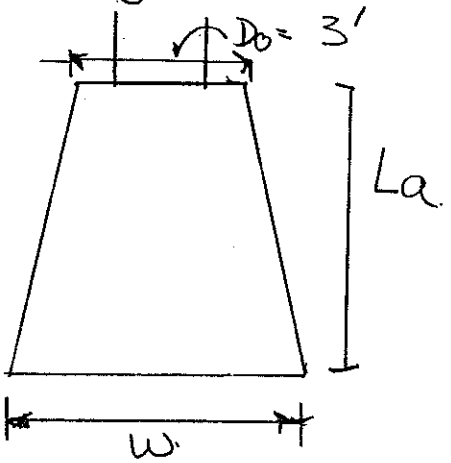
OUTLET Protection for Area No

Outlet PIPE = 36" RCP

$Q_{10\ OUT}$ = 36 CFS

Using E+S guidelines Fig. LS-4

$3D_o = 9'$



$$L_a = \frac{1.7Q}{D_o^{3/2}} + 8D_o = \frac{1.7(36)}{(3)^{3/2}} + 8(3) = 36'$$

$$W = 3D_o + L_a = 3(3) + 36 = 45 FT$$

$T_W = D_c = 1.8 FT$

$$d_{50} = \left(\frac{.02}{T_W}\right)\left(\frac{Q}{D_o}\right)^{4/3} = \left(\frac{.02}{1.8}\right)\left(\frac{36}{3}\right)^{4/3} = .30 FT$$

USE modified RIPRAP $d_{50\,MAX} = 0.42 FT$

SUBJECT MIDDLETOWN HIGH SCHOOL
MIDDLETOWN, CT
JOB NO. 1746 D.A. Nb

CONSULTING ENGINEERS

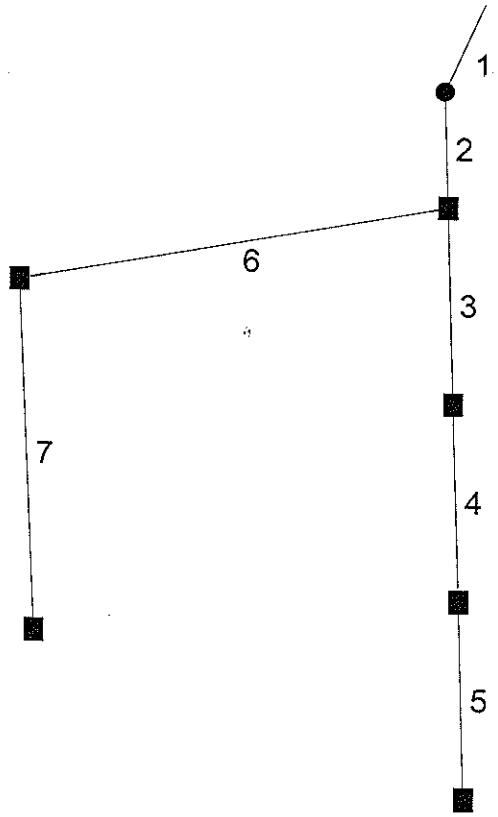
SHEET NO. 1 OF
COMPUTED BY E.C.B. DATE 11/7/03
CHECKED BY DATE

DATA SHEET FOR RATIONAL METHOD STORM DRAINAGE DESIGN

Q = CIA

NODE		AREA	RUNOFF COEFFICIENT C			TIME OF CONCENTRATION					
INLET I.D.	CROSS SLOPE	ACRES	DESCRIPTION	C VALUE	TOTAL AC	ELEV. DIFF. FT	LENGTH FT	SLOPE %	COVER	TIME MIN.	COMMENTS
Nb-1		0.230	BANK	0.25	0.058					10	
		0.470	FIELD	0.35	0.165						
		0.700			0.222						
Nb-2		0.370	BANK	0.25	0.093					10	
		0.440	FIELD	0.35	0.154						
		0.810			0.247						
Nb-3		0.180	FIELD	0.35	0.06					10	
		0.000	0	0	0.00						
		0.180			0.06						
Nb-4		0.160	FIELD	0.35	0.06					10	
		0.000	0	0	0.00						
		0.160			0.06						
Nb-5		0.190	FIELD	0.35	0.07						
		0.000	0	0	0.00					10	
		0.190			0.07						
Nb-6		0.160	FIELD	0.35	0.06						
		0.000	0	0	0.00					10	
		0.160			0.06						

Hydraflow Plan View



Project file: Mid H.S. DA Nb.stm	IDF file: Cdot2000.idf	No. Lines: 7	11-11-2003

Hydraflow Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr line No.	Line length (ft)	Defl angle (deg)	Junc type	Known Q (cfs)	Drng area (ac)	Runoff coeff (C)	Inlet time (min)	Invert El Dn (ft)	Line slope (%)	Invert El Up (ft)	Line size (in)	Line type	N value (n)	J-loss coeff (K)	Inlet/ Rim El (ft)	
1	End	42.0	120.0	MH	0.00	0.00	0.00	0.0	48.00	4.76	50.00	12	Cir	0.012	0.45	60.10	Nb-7 M.H.
2	1	48.0	-32.0	Grate	0.00	0.16	0.35	10.0	52.00	1.00	52.48	12	Cir	0.012	1.50	59.80	N b-6 C-L C.B.
3	2	82.0	0.0	Grate	0.00	0.19	0.35	10.0	52.48	1.00	53.30	6	Cir	0.012	0.50	59.80	Nb-5 Y.D.
4	3	82.0	0.0	Grate	0.00	0.16	0.35	10.0	53.30	1.00	54.12	6	Cir	0.012	0.50	59.80	Nb-4 Y.D.
5	4	82.0	0.0	Grate	0.00	0.18	0.35	10.0	54.12	1.00	54.94	6	Cir	0.012	1.00	59.80	Nb-3 Y.D.
6	2	222.0	84.0	Grate	0.00	0.81	0.30	10.0	52.48	1.00	54.70	12	Cir	0.012	1.50	59.80	N b-2 C-L C.B.
7	6	146.0	-85.0	Grate	0.00	0.70	0.32	10.0	54.70	1.00	56.16	12	Cir	0.012	1.00	59.80	N b-1 C-L C.B.

Project File: Mid H.S. DA Nb.stm | IDF File: Cdot2000.idf | Total number of lines: 7 | Date: 11-11-2003

Hydraflow Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	Dns line No.
1	Nb-7 M.H.	3.02	12 c	42.0	48.00	50.00	4.762	48.74	50.74	0.17	End
2	N b-6 C-L C.B.	3.04	12 c	48.0	52.00	52.48	1.000	53.00	53.22	0.55	1
3	Nb-5 Y.D.	0.85	6 c	82.0	52.48	53.30	1.000	53.78*	55.37*	0.14	2
4	Nb-4 Y.D.	0.55	6 c	82.0	53.30	54.12	1.000	55.52*	56.20*	0.06	3
5	Nb-3 Y.D.	0.30	6 c	82.0	54.12	54.94	1.000	56.26*	56.46*	0.04	4
6	N b-2 C-L C.B.	2.10	12 c	222.0	52.48	54.70	1.000	53.78	55.31	0.40	2
7	N b-1 C-L C.B.	1.08	12 c	146.0	54.70	56.16	1.000	55.72	56.60	0.16	6

Project File: Mid H.S. DA Nb.stm | IDF File: Cdot2000.idf | Total No. Lines: 7 | Run Date: 11-11-2003

NOTES: c = circular; e = elliptical; b = box; Return period = 10 Yrs.; * Indicates surcharge condition.

Hydraflow Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line		Incr	Total		Incr	Total	Inlet	Syst					Size	Slope	Up	Dn	Up	Dn	Up	Dn	
		(ft)	(ac)	(ac)	(C)			(min)	(min)	(in/hr)	(cfs)	(cfs)	(ft/s)	(in)	(%)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	
1	End	42.0	0.00	2.20	0.00	0.00	0.71	0.0	13.3	4.3	3.02	8.42	4.87	12	4.76	50.00	48.00	50.74	48.74	60.10	50.00	Nb-7 M.H.
2	1	48.0	0.16	2.20	0.35	0.06	0.71	10.0	13.1	4.3	3.04	3.86	4.37	12	1.00	52.48	52.00	53.22	53.00	59.80	60.10	N b-6 C-L C.B.
3	2	82.0	0.19	0.53	0.35	0.07	0.19	10.0	11.4	4.6	0.85	0.61	4.31	6	1.00	53.30	52.48	55.37	53.78	59.80	59.80	Nb-5 Y.D.
4	3	82.0	0.16	0.34	0.35	0.06	0.12	10.0	10.9	4.6	0.55	0.61	2.82	6	1.00	54.12	53.30	56.20	55.52	59.80	59.80	Nb-4 Y.D.
5	4	82.0	0.18	0.18	0.35	0.06	0.06	10.0	10.0	4.8	0.30	0.61	1.54	6	1.00	54.94	54.12	56.46	56.26	59.80	59.80	Nb-3 Y.D.
6	2	222.0	0.81	1.51	0.30	0.24	0.47	10.0	11.8	4.5	2.10	3.86	3.41	12	1.00	54.70	52.48	55.31	53.78	59.80	59.80	N b-2 C-L C.B.
7	6	146.0	0.70	0.70	0.32	0.22	0.22	10.0	10.0	4.8	1.08	3.86	2.30	12	1.00	56.16	54.70	56.60	55.72	59.80	59.80	N b-1 C-L C.B.

Project File: Mid H.S. DA Nb.stm

IDF File: Cdot2000.idf

Total number of lines: 7

Run Date: 11-11-2003

NOTES: Intensity = 54.74 / (Inlet time + 10.80) ^ 0.80; Return period = 10 Yrs. ; Initial tailwater elevation = 48.74 (ft)

Hydraflow Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp line No
							Ht (in)	L (ft)	area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	depth (ft)	spread (ft)	depth (ft)	spread (ft)	Dep (in)	
1	Nb-7	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	0.000	0.00	0.000	0.000	0.013	0.00	0.00	0.00	0.00	0.0	Off
2	Nb-6	0.27	0.00	0.27	0.00	Grate	0.0	0.00	0.09	1.66	3.00	Sag	2.00	0.100	0.030	0.000	0.28	4.76	0.31	4.76	2.00	1
3	Nb-5	0.32	0.00	0.32	0.00	Grate	0.0	0.00	0.11	1.00	1.00	Sag	2.00	0.100	0.030	0.000	0.27	4.19	0.29	4.19	2.00	2
4	Nb-4	0.27	0.00	0.27	0.00	Grate	0.0	0.00	0.09	1.00	1.00	Sag	2.00	0.100	0.030	0.000	0.28	4.76	0.31	4.76	2.00	3
5	Nb-3	0.30	0.00	0.30	0.00	Grate	0.0	0.00	0.10	1.00	1.00	Sag	2.00	0.100	0.030	0.000	0.29	5.02	0.32	5.02	2.00	4
6	Nb-2	1.17	0.00	1.17	0.00	Grate	0.0	0.00	0.40	1.66	3.00	Sag	2.00	0.100	0.030	0.000	0.27	4.28	0.30	4.28	2.00	2
7	Nb-1	1.08	0.00	1.08	0.00	Grate	0.0	0.00	0.37	1.66	3.00	Sag	2.00	0.100	0.030	0.000	0.27	4.21	0.29	4.21	2.00	6

Project File: Mid H.S. DA Nb.stm | I-D-F File: Cdot2000.idf | Total number of lines: 7 | Run Date: 11-11-2003

NOTES: Inlet N-Values = 0.012 ; Intensity = 54.74 / (Inlet time + 10.80) ^ 0.80; Return period = 10 Yrs. ; * Indicates Known Q added

Hydraflow FL-DOT Report

Line No	To Line	Type of struc	n - value	Len	Drainage Area C1 = 0.25 C2 = 0.35 C3 = 0.9			Time of conc	Time of flow in sect	Inten (I)	Total CA	Add Q / Total flow	Inlet elev	Elev of HGL / Elev of Crown / Elev of Invert			Rise / Span	HGL / Pipe	Actual / Full Flow		Date: 11-11-2003 / Frequency: 10 yrs / Project: Mid H.S. DA Nb.s
					Increment (ac)	Sub-total (ac)	Sum CA					Q		Up	Down	Fall	Size	Slope	Vel	Cap	Line description
				(ft)				(min)	(min)	(in/hr)		(cfs)	(ft)	(ft)	(ft)	(ft)	(in)	(%)	(ft/s)	(cfs)	
1	End	MH	0.012	42.0	0.00 0.00 0.00	0.60 0.91 0.00	0.15 0.32 0.00	13.31	0.18	4.3	0.71	0.00 3.02	60.10	50.74 51.00 50.00	48.74 49.00 48.00	2.00 2.00	12 12 Cir	4.76 4.76	4.87 10.72	3.02 8.42	Nb-7 M.H.
2	1	Grate	0.012	48.0	0.00 0.00 0.00	0.60 0.91 0.00	0.15 0.32 0.00	13.11	0.20	4.3	0.71	0.00 3.04	59.80	53.22 53.48 52.48	53.00 53.00 52.00	0.22 0.48	12 12 Cir	0.46 1.00	4.37 4.91	3.04 3.86	N b-6 C-L C.B.
3	2	Grate	0.012	82.0	0.00 0.00 0.00	0.00 0.00 0.00	0.00 0.00 0.00	11.36	0.31	4.6	0.19	0.00 0.85	59.80	55.37 53.80 53.30	53.78 52.98 52.48	1.60 0.82	6 6 Cir	1.95 1.00	4.31 3.09	0.85 0.61	Nb-5 Y.D.
4	3	Grate	0.012	82.0	0.00 0.00 0.00	0.00 0.00 0.00	0.00 0.00 0.00	10.89	0.48	4.6	0.12	0.00 0.55	59.80	56.20 54.62 54.12	55.52 53.80 53.30	0.68 0.82	6 6 Cir	0.83 1.00	2.82 3.09	0.55 0.61	Nb-4 Y.D.
5	4	Grate	0.012	82.0	0.00 0.00 0.00	0.00 0.00 0.00	0.00 0.00 0.00	10.00	0.89	4.8	0.06	0.00 0.30	59.80	56.46 55.44 54.94	56.26 54.62 54.12	0.20 0.82	6 6 Cir	0.25 1.00	1.54 3.09	0.30 0.61	Nb-3 Y.D.
6	2	Grate	0.012	222.0	0.37 0.44 0.00	0.60 0.91 0.00	0.15 0.32 0.00	11.78	1.34	4.5	0.47	0.00 2.10	59.80	55.31 55.70 54.70	53.78 53.48 52.48	1.54 2.22	12 12 Cir	0.69 1.00	3.41 4.91	2.10 3.86	N b-2 C-L C.B.
7	6	Grate	0.012	146.0	0.23 0.47 0.00	0.23 0.47 0.00	0.06 0.16 0.00	10.00	1.78	4.8	0.22	0.00 1.08	59.80	56.60 57.16 56.16	55.72 55.70 54.70	0.88 1.46	12 12 Cir	0.61 1.00	2.30 4.91	1.08 3.86	N b-1 C-L C.B.

NOTES: Intensity = 54.74 / (Inlet time + 10.80) ^ 0.80 (in/hr) ; Time of flow in section is based on full flow.; Initial tailwater elevation = 48.74 (ft)

Hydraflow Hydraulic Grade Line Computations

Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
			Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf		Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf	Ave Sf	Enrgy loss		
	(in)	(cfs)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(ft)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(%)	(ft)	(K)	(ft)
1	12	3.02	48.00	48.74	0.74	0.62	4.87	0.37	49.11	0.769	42.0	50.00	50.74	0.74**	0.62	4.87	0.37	51.11	0.769	0.769	N/A	0.45	0.17
2	12	3.04	52.00	53.00	1.00*	0.79	3.88	0.23	53.23	0.623	48.0	52.48	53.22	0.74	0.63	4.87	0.37	53.59	0.767	0.695	0.334	1.50	0.55
3	6	0.85	52.48	53.78	0.50	0.20	4.32	0.29	54.06	1.946	82.0	53.30	55.37	0.50	0.20	4.31	0.29	55.66	1.945	1.945	1.595	0.50	0.14
4	6	0.55	53.30	55.52	0.50	0.20	2.82	0.12	55.64	0.829	82.0	54.12	56.20	0.50	0.20	2.82	0.12	56.32	0.829	0.829	0.680	0.50	0.06
5	6	0.30	54.12	56.26	0.50	0.20	1.54	0.04	56.29	0.248	82.0	54.94	56.46	0.50	0.20	1.54	0.04	56.50	0.248	0.248	0.204	1.00	0.04
6	12	2.10	52.48	53.78	1.00	0.79	2.68	0.11	53.89	0.297	222	54.70	55.31	0.61**	0.51	4.15	0.27	55.58	0.610	0.454	N/A	1.50	0.40
7	12	1.08	54.70	55.72	1.00	0.79	1.37	0.03	55.75	0.078	146	56.16	56.60	0.44**	0.33	3.23	0.16	56.76	0.486	0.282	N/A	1.00	0.16

Project File: Mid H.S. DA Nb.stm | IDF File: Cdot2000.idf | Total number of lines: 7 | Run Date: 11-11-2003

NOTES: Initial tailwater elevation = 48.73759 (ft) , * Crown depth assumed., ** Critical depth assumed.

CONSULTING ENGINEERS

SUBJECT Middletown H.S
AREA Sb-2
JOB NO. 1746

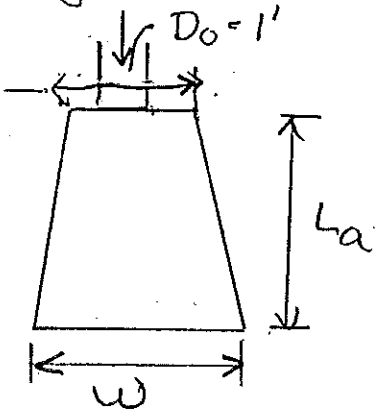
Sheet No. _____ of _____
Computed By ECB Date 11-6-03
Checked By _____ Date _____

Outlet Protection for Area Nb :

Outlet Pipe = 12" RCP
$Q_{10\,out} = 3.1\,cfs$

using E+S guidelines Fig LS-4

$3D_o = 3'$



$$La = \frac{1.7\,Q}{D_o^{3/2}} + 8D_o = \frac{1.7(3.1)}{1^{3/2}} + 8(1) = 13.27\,ft$$
SAY 13

$$W = 3D_o + La = 3(1) + 13 = 16\,ft.$$

$$d_{50} = \left(\frac{.02}{Tw}\right)\left(\frac{Q}{D_o}\right)^{4/3} = \left(\frac{.02}{.75}\right)\left(\frac{3.1}{1}\right)^{4/3} = .12\,ft.$$

$Tw = D_c = .75$

use modified Riprap $d_{50\,max} = .42\,ft.$

SUBJECT MIDDLETOWN HIGH SCHOOL
MIDDLETOWN, CT
JOB NO. 1746

CONSULTING ENGINEERS

SHEET NO. 1 OF
COMPUTED BY J.A.V. DATE 11/7/2003
CHECKED BY DATE

DATA SHEET FOR RATIONAL METHOD STORM DRAINAGE DESIGN

Q = CIA

NODE		AREA	RUNOFF COEFFICIENT C			TIME OF CONCENTRATION					
INLET I.D.	CROSS SLOPE	ACRES	DESCRIPTION	C VALUE	TOTAL AC	ELEV. DIFF. FT	LENGTH FT	SLOPE %	COVER	TIME MIN.	COMMENTS
NC-1		0.330	PAVEMENT	0.85	0.281					10	
SAG		0.240	GRASS	0.35	0.084						
		0.570			0.365						
NC-2		0.060	PAVEMENT	0.85	0.051					10	
SAG		0.150	GRASS	0.35	0.053						
		0.210			0.104						
NC-3		0.150	PAVEMENT	0.85	0.13					10	
SAG		0.060	GRASS	0.35	0.02						
		0.210			0.15						
NC-4		0.070	WALK	0.85	0.06					10	
SAG		0.040	FIELD	0.35	0.01						
		0.110			0.07						
NC-5		0.090	PAVEMENT	0.85	0.08						
SAG		0.020	GRASS	0.35	0.01					10	
		0.110			0.08						
NC-6		0.060	PAVEMENT	0.85	0.05					5	
SAG		0.010	GRASS	0.2	0.00						
		0.070			0.05						
NC-7											
SAG		0.130	GRASS	0.35	0.05					10	
		0.130			0.05						
NC-8		0.110	PAVEMENT	0.85	0.09						
		0.060	GRASS	0.35	0.02					10	
		0.170			0.11						
NC-9		0.420	PAVEMENT	0.85	0.36						
		0.360	GRASS	0.35	0.13					10	
		0.780			0.48						
NC-10		0.300	PAVEMENT	0.85	0.26						
		0.130	GRASS	0.35	0.05					10	
		0.430			0.30						
NC-11		0.030	PAVEMENT	0.85	0.03						
SAG		0.130	GRASS	0.35	0.05					10	
COURTYD		0.160			0.07						
NC-12		0.050	PAVEMENT	0.85	0.04						
SAG		0.110	GRASS	0.35	0.04					10	
COURTYD		0.160			0.08						

SUBJECT MIDDLETOWN HIGH SCHOOL
MIDDLETOWN, CT
JOB NO. 1746

CONSULTING ENGINEERS

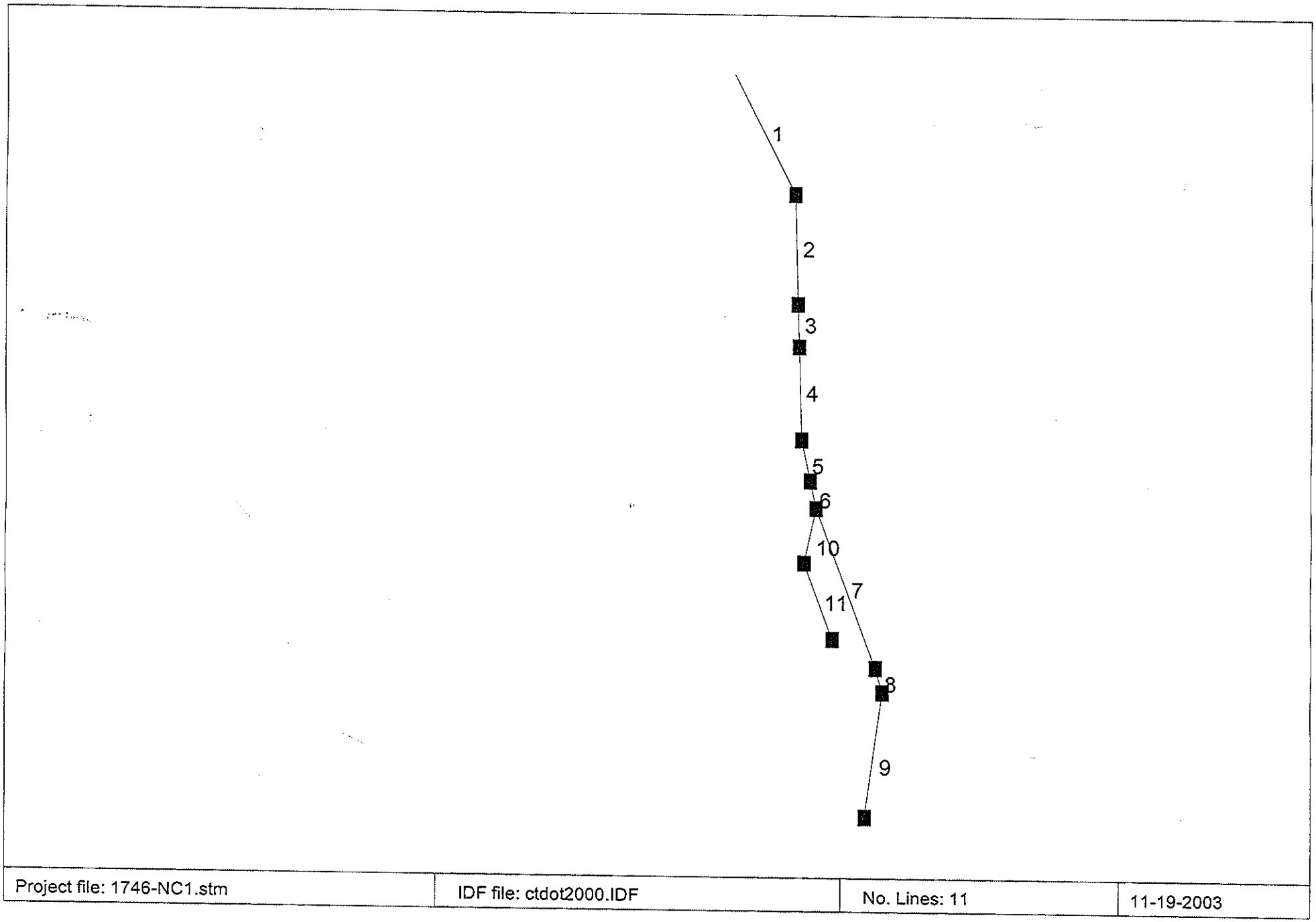
SHEET NO. 1 OF
COMPUTED BY J.A.V. DATE 11/7/03
CHECKED BY DATE

DATA SHEET FOR RATIONAL METHOD STORM DRAINAGE DESIGN

Q = CIA

NODE		AREA	RUNOFF COEFFICIENT C			TIME OF CONCENTRATION					
INLET I.D.	CROSS SLOPE	ACRES	DESCRIPTION	C VALUE	TOTAL AC	ELEV. DIFF. FT	LENGTH FT	SLOPE %	COVER	TIME MIN.	COMMENTS
NC-1		0.090	PAVEMENT	0.85	0.077					10	
SAG		0.000	GRASS	0.35	0.000						
		0.090			0.077						
NC-2		0.060	PAVEMENT	0.85	0.051					10	
SAG		0.150	GRASS	0.35	0.053						
		0.210			0.104						
NC-3		0.150	PAVEMENT	0.85	0.13					10	
SAG		0.060	GRASS	0.35	0.02						
		0.210			0.15						
NC-6		0.060	PAVEMENT	0.85	0.05					5	
SAG		0.010	GRASS	0.2	0.00						
		0.070			0.05						
NC-7		0.380	PAVEMENT	0.85	0.32						
SAG		0.760	GRASS	0.35	0.27					10	
		1.140			0.59						
NC-8		0.070	PAVEMENT	0.85	0.06						
		0.020	GRASS	0.35	0.01					10	
		0.090			0.07						
NC-9		0.470	PAVEMENT	0.85	0.40						
		0.110	GRASS	0.35	0.04					10	
		0.580			0.44						
NC-10		0.300	PAVEMENT	0.85	0.26						
		0.130	GRASS	0.35	0.05					10	
		0.430			0.30						
NC-13		0.070	PAVEMENT	0.85	0.06						
SAG		0.020	GRASS	0.35	0.01					5	
		0.090			0.07						
NC-14		0.120	PAVEMENT	0.85	0.10						
		0.010	GRASS	0.35	0.00					5	
		0.130			0.11						
NC-15		0.070	PAVEMENT	0.85	0.06						
		0.030	GRASS	0.35	0.01					5	
		0.100			0.07						

Hydraflow Plan View



Project file: 1746-NC1.stm	IDF file: ctdot2000.IDF	No. Lines: 11	11-19-2003

Hydraflow Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr line No.	Line length (ft)	Defl angle (deg)	Junc type	Known Q (cfs)	Drng area (ac)	Runoff coeff (C)	Inlet time (min)	Invert El Dn (ft)	Line slope (%)	Invert El Up (ft)	Line size (in)	Line type	N value (n)	J-loss coeff (K)	Inlet/ Rim El (ft)	
1	End	100.0	58.0	Comb	0.00	0.43	0.70	10.0	20.00	0.50	20.50	18	Cir	0.012	0.70	24.83	NC-10 - OUT
2	1	77.0	30.0	Comb	0.00	0.58	0.76	10.0	20.50	0.65	21.00	18	Cir	0.012	0.50	24.83	NC-9 - NC-10
3	2	30.0	0.0	Comb	0.00	0.13	0.81	5.0	21.00	0.80	21.24	15	Cir	0.012	0.50	25.92	NC14-NC9
4	3	66.0	0.0	Comb	0.00	0.09	0.74	5.0	21.24	0.50	21.57	15	Cir	0.012	0.70	25.92	NC13-NC14
5	4	30.0	-13.0	Comb	0.00	0.09	0.74	10.0	21.57	0.50	21.72	15	Cir	0.012	0.50	25.42	NC-8 - NC-13
6	5	20.0	0.0	Comb	0.00	0.10	0.70	5.0	21.72	0.50	21.82	15	Cir	0.012	0.70	25.42	NC15-NC-8
7	6	124.0	-10.0	Comb	0.00	0.21	0.49	10.0	21.82	0.50	22.44	15	Cir	0.012	0.50	25.84	NC-2 - NC-15
8	7	18.0	5.0	Comb	0.00	0.09	0.85	5.0	22.44	0.50	22.53	12	Cir	0.012	0.70	25.84	NC-1 - NC-2
9	8	88.0	30.0	Grate	0.00	0.58	0.76	10.0	22.53	1.00	23.41	12	Cir	0.012	1.00	27.50	NC7-NC1
10	6	40.0	30.0	Comb	0.00	0.07	0.71	5.0	21.82	2.00	22.62	12	Cir	0.012	1.10	27.40	NC-6 - NC15
11	10	59.0	-40.0	Comb	0.00	0.21	0.71	10.0	22.62	2.02	23.81	12	Cir	0.012	1.00	27.40	NC-3 - NC-6

Project File: 1746-NC1.stm

IDF File: ctdot2000.IDF

Total number of lines: 11

Date: 11-19-2003

Hydraflow Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	Dns line No.
1	NC-10 - OUT	8.17	18 c	100.0	20.00	20.50	0.500	22.50*	23.02*	0.23	End
2	NC-9 - NC-10	6.93	18 c	77.0	20.50	21.00	0.649	23.25*	23.53*	0.12	1
3	NC14-NC9	5.00	15 c	30.0	21.00	21.24	0.800	23.65*	23.81*	0.13	2
4	NC13-NC14	4.58	15 c	66.0	21.24	21.57	0.500	23.94*	24.22*	0.15	3
5	NC-8 - NC-13	4.31	15 c	30.0	21.57	21.72	0.500	24.37*	24.49*	0.10	4
6	NC15-NC-8	4.02	15 c	20.0	21.72	21.82	0.500	24.58*	24.65*	0.12	5
7	NC-2 - NC-15	2.91	15 c	124.0	21.82	22.44	0.500	24.76*	24.98*	0.04	6
8	NC-1 - NC-2	2.43	12 c	18.0	22.44	22.53	0.500	25.02*	25.09*	0.10	7
9	NC7-NC1	2.12	12 c	88.0	22.53	23.41	1.000	25.20*	25.46*	0.11	8
10	NC-6 - NC15	0.92	12 c	40.0	21.82	22.62	2.000	24.76*	24.79*	0.02	6
11	NC-3 - NC-6	0.72	12 c	59.0	22.62	23.81	2.017	24.81*	24.83*	0.01	10

Project File: 1746-NC1.stm | IDF File: ctdot2000.IDF | Total No. Lines: 11 | Run Date: 11-19-2003

NOTES: c = circular; e = elliptical; b = box; Return period = 10 Yrs.; * Indicates surcharge condition.

Hydraflow Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	
1	End	100.0	0.43	2.58	0.70	0.30	1.87	10.0	12.6	4.4	8.17	8.04	4.62	18	0.50	20.50	20.00	23.02	22.50	24.83	0.00	NC-10 - OUT
2	1	77.0	0.58	2.15	0.76	0.44	1.57	10.0	12.3	4.4	6.93	9.17	3.92	18	0.65	21.00	20.50	23.53	23.25	24.83	24.83	NC-9 - NC-10
3	2	30.0	0.13	1.57	0.81	0.11	1.13	5.0	12.2	4.4	5.00	6.26	4.08	15	0.80	21.24	21.00	23.81	23.65	25.92	24.83	NC14-NC9
4	3	66.0	0.09	1.44	0.74	0.07	1.02	5.0	11.9	4.5	4.58	4.95	3.74	15	0.50	21.57	21.24	24.22	23.94	25.92	25.92	NC13-NC14
5	4	30.0	0.09	1.35	0.74	0.07	0.96	10.0	11.7	4.5	4.31	4.95	3.51	15	0.50	21.72	21.57	24.49	24.37	25.42	25.92	NC-8 - NC-13
6	5	20.0	0.10	1.26	0.70	0.07	0.89	5.0	11.6	4.5	4.02	4.95	3.28	15	0.50	21.82	21.72	24.65	24.58	25.42	25.42	NC15-NC-8
7	6	124.0	0.21	0.88	0.49	0.10	0.62	10.0	10.6	4.7	2.91	4.95	2.37	15	0.50	22.44	21.82	24.98	24.76	25.84	25.42	NC-2 - NC-15
8	7	18.0	0.09	0.67	0.85	0.08	0.52	5.0	10.5	4.7	2.43	2.73	3.10	12	0.50	22.53	22.44	25.09	25.02	25.84	25.84	NC-1 - NC-2
9	8	88.0	0.58	0.58	0.76	0.44	0.44	10.0	10.0	4.8	2.12	3.86	2.70	12	1.00	23.41	22.53	25.46	25.20	27.50	25.84	NC7-NC1
10	6	40.0	0.07	0.28	0.71	0.05	0.20	5.0	11.1	4.6	0.92	5.46	1.17	12	2.00	22.62	21.82	24.79	24.76	27.40	25.42	NC-6 - NC15
11	10	59.0	0.21	0.21	0.71	0.15	0.15	10.0	10.0	4.8	0.72	5.48	0.91	12	2.02	23.81	22.62	24.83	24.81	27.40	27.40	NC-3 - NC-6

Project File: 1746-NC1.stm

IDF File: ctdot2000.IDF

Total number of lines: 11

Run Date: 11-19-2003

NOTES: Intensity = 54.74 / (Inlet time + 10.80) ^ 0.80; Return period = 10 Yrs. ; Initial tailwater elevation = 22.50 (ft)

Hydraflow Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp line No
							Ht (in)	L (ft)	area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	depth (ft)	spread (ft)	depth (ft)	spread (ft)	Dep (in)	
1	NC-10	1.45	0.00	1.45	0.00	Comb	3.0	3.00	0.00	3.00	1.66	0.020	12.00	0.020	0.020	0.013	0.14	7.00	0.14	6.75	0.0	Off
2	NC-9	2.12	0.00	2.12	0.00	Comb	3.0	3.00	0.00	3.00	1.66	0.020	12.00	0.020	0.020	0.013	0.16	8.00	0.16	7.80	0.0	Off
3	NC-14	0.63	0.00	0.63	0.00	Comb	3.0	3.00	3.98	3.00	1.66	Sag	12.00	0.030	0.030	0.000	0.11	3.67	0.11	3.67	0.0	Off
4	NC-13	0.40	0.00	0.40	0.00	Comb	3.0	3.00	3.98	3.00	1.66	Sag	12.00	0.030	0.030	0.000	0.08	2.67	0.08	2.67	0.0	Off
5	NC-8	0.32	0.00	0.32	0.00	Comb	3.0	3.00	0.00	3.00	1.66	0.040	12.00	0.020	0.020	0.013	0.07	3.50	0.07	3.40	0.0	Off
6	NC15	0.42	0.00	0.42	0.00	Comb	3.0	3.00	0.00	3.00	1.66	0.040	12.00	0.020	0.020	0.013	0.08	4.00	0.07	3.75	0.0	Off
7	NC-2	0.49	0.00	0.49	0.00	Comb	3.0	3.00	0.00	3.00	1.66	0.020	12.00	0.020	0.020	0.013	0.10	5.00	0.09	4.55	0.0	Off
8	NC-1	0.46	0.00	0.46	0.00	Comb	3.0	3.00	0.00	3.00	1.66	0.020	12.00	0.020	0.020	0.013	0.09	4.50	0.09	4.40	0.0	Off
9	NC-7	2.12	0.00	2.12	0.00	Grate	0.0	0.00	3.98	3.00	1.66	Sag	12.00	0.020	0.020	0.000	0.23	11.59	0.23	11.59	0.0	Off
10	NC-6	0.30	0.00	0.30	0.00	Comb	3.0	3.00	3.98	3.00	1.66	Sag	12.00	0.020	0.020	0.000	0.07	3.50	0.07	3.50	0.0	Off
11	NC-3	0.72	0.00	0.72	0.00	Comb	3.0	3.00	3.98	3.00	1.66	Sag	2.00	0.020	0.020	0.000	0.12	6.00	0.12	6.00	0.0	Off

Project File: 1746-NC1.stm | I-D-F File: ctdot2000.IDF | Total number of lines: 11 | Run Date: 11-19-2003

NOTES: Inlet N-Values = 0.012 ; Intensity = 54.74 / (Inlet time + 10.80) ^ 0.80; Return period = 10 Yrs. ; * Indicates Known Q added

Hydraflow FL-DOT Report

Line No	To Line	Type of struc	n - value	Len	Drainage Area C1 = 0.25 C2 = 0.35 C3 = 0.85			Time of conc	Time of flow in sect	Inten (I)	Total CA	Add Q / Total flow	Inlet elev	Elev of HGL / Elev of Crown / Elev of Invert			Rise Span	HGL Pipe	Actual Full Flow		Date: 11-19-2003 / Frequency: 10 yrs / Project: 1746-NC1.stm
					Increment (ac)	Sub-total (ac)	Sum CA					Q		Up	Down	Fall	Size	Slope	Vel	Cap	
				(ft)				(min)	(min)	(in/hr)		(cfs)	(ft)	(ft)	(ft)	(ft)	(in)	(%)	(ft/s)	(cfs)	Line description
1	End	Comb	0.012	100.0	0.00 0.13 0.30	0.00 0.58 1.72	0.00 0.20 1.46	12.61	0.36	4.4	1.87	0.00 8.17	24.83	23.02 22.00 20.50	22.50 21.50 20.00	0.52 0.50	18 18 Cir	0.52 0.50	4.62 4.55	8.17 8.04	NC-10 - OUT
2	1	Comb	0.012	77.0	0.00 0.11 0.47	0.00 0.45 1.42	0.00 0.16 1.21	12.29	0.32	4.4	1.57	0.00 6.93	24.83	23.53 22.50 21.00	23.25 22.00 20.50	0.29 0.50	18 18 Cir	0.37 0.65	3.92 5.19	6.93 9.17	NC-9 - NC-10
3	2	Comb	0.012	30.0	0.00 0.01 0.12	0.00 0.34 0.95	0.00 0.12 0.81	12.17	0.12	4.4	1.13	0.00 5.00	25.92	23.81 22.49 21.24	23.65 22.25 21.00	0.15 0.24	15 15 Cir	0.51 0.80	4.08 5.10	5.00 6.26	NC14-NC9
4	3	Comb	0.012	66.0	0.00 0.02 0.07	0.00 0.33 0.83	0.00 0.12 0.71	11.87	0.29	4.5	1.02	0.00 4.58	25.92	24.22 22.82 21.57	23.94 22.49 21.24	0.28 0.33	15 15 Cir	0.43 0.50	3.74 4.03	4.58 4.95	NC13-NC14
5	4	Comb	0.012	30.0	0.00 0.02 0.07	0.00 0.31 0.76	0.00 0.11 0.65	11.73	0.14	4.5	0.96	0.00 4.31	25.42	24.49 22.97 21.72	24.37 22.82 21.57	0.11 0.15	15 15 Cir	0.38 0.50	3.51 4.03	4.31 4.95	NC-8 - NC-13
6	5	Comb	0.012	20.0	0.00 0.03 0.07	0.00 0.29 0.69	0.00 0.10 0.59	11.63	0.10	4.5	0.89	0.00 4.02	25.42	24.65 23.07 21.82	24.58 22.97 21.72	0.07 0.10	15 15 Cir	0.33 0.50	3.28 4.03	4.02 4.95	NC15-NC-8
7	6	Comb	0.012	124.0	0.00 0.15 0.06	0.00 0.26 0.62	0.00 0.09 0.53	10.64	0.87	4.7	0.62	0.00 2.91	25.84	24.98 23.69 22.44	24.76 23.07 21.82	0.21 0.62	15 15 Cir	0.17 0.50	2.37 4.03	2.91 4.95	NC-2 - NC-15
8	7	Comb	0.012	18.0	0.00 0.00 0.09	0.00 0.11 0.56	0.00 0.04 0.48	10.54	0.10	4.7	0.52	0.00 2.43	25.84	25.09 23.53 22.53	25.02 23.44 22.44	0.07 0.09	12 12 Cir	0.40 0.50	3.10 3.47	2.43 2.73	NC-1 - NC-2
9	8	Grate	0.012	88.0	0.00 0.11 0.47	0.00 0.11 0.47	0.00 0.04 0.40	10.00	0.54	4.8	0.44	0.00 2.12	27.50	25.46 24.41 23.41	25.20 23.53 22.53	0.27 0.88	12 12 Cir	0.30 1.00	2.70 4.91	2.12 3.86	NC7-NC1
10	6	Comb	0.012	40.0	0.00 0.00 0.00	0.00 0.00 0.00	0.00 0.00 0.00	11.08	0.56	4.6	0.20	0.00 0.92	27.40	24.79 23.62 22.62	24.76 22.82 21.82	0.02 0.80	12 12 Cir	0.06 2.00	1.17 6.95	0.92 5.46	NC-6 - NC15

NOTES: Intensity = 54.74 / (Inlet time + 10.80) ^ 0.80 (in/hr) ; Time of flow in section is based on full flow.; Initial tailwater elevation = 22.50 (ft)

Hydraflow FL-DOT Report

Line No	To Line	Type of struc	n - value	Len	Drainage Area C1 = 0.25 C2 = 0.35 C3 = 0.85			Time of conc	Time of flow in sect	Inten (I)	Total CA	Add Q / Total flow	Inlet elev	Elev of HGL / Elev of Crown / Elev of Invert			Rise / Span	HGL / Pipe	Actual / Full Flow		Date: 11-19-2003 / Frequency: 10 yrs / Project: 1746-NC1.stm
					Increment (ac)	Sub-total (ac)	Sum CA					Q		Up	Down	Fall	Size	Slope	Vel	Cap	
				(ft)				(min)	(min)	(in/hr)		(cfs)	(ft)	(ft)	(ft)	(ft)	(in)	(%)	(ft/s)	(cfs)	Line description
11	10	Comb	0.012	59.0	0.00 0.00 0.00	0.00 0.00 0.00	0.00 0.00 0.00	10.00	1.08	4.8	0.15	0.00 0.72	27.40	24.83 24.81 23.81	24.81 23.62 22.62	0.02 1.19	12 12 Cir	0.03 2.02	0.91 6.98	0.72 5.48	NC-3 - NC-6

NOTES: Intensity = 54.74 / (Inlet time + 10.80) ^ 0.80 (in/hr) ; Time of flow in section is based on full flow.; Initial tailwater elevation = 22.50 (ft)

Hydraflow Hydraulic Grade Line Computations

Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
			Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf		Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf	Ave Sf	Enrgy loss		
	(in)	(cfs)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(ft)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(%)	(ft)	(K)	(ft)
1	18	8.17	20.00	22.50	1.50	1.77	4.62	0.33	22.83	0.516	100	20.50	23.02	1.50	1.77	4.62	0.33	23.35	0.516	0.516	0.516	0.70	0.23
2	18	6.93	20.50	23.25	1.50	1.77	3.92	0.24	23.49	0.371	77.0	21.00	23.53	1.50	1.77	3.92	0.24	23.77	0.371	0.371	0.286	0.50	0.12
3	15	5.00	21.00	23.65	1.25	1.23	4.08	0.26	23.91	0.512	30.0	21.24	23.81	1.25	1.23	4.08	0.26	24.07	0.512	0.512	0.154	0.50	0.13
4	15	4.58	21.24	23.94	1.25	1.23	3.74	0.22	24.15	0.429	66.0	21.57	24.22	1.25	1.23	3.74	0.22	24.44	0.429	0.429	0.283	0.70	0.15
5	15	4.31	21.57	24.37	1.25	1.23	3.51	0.19	24.56	0.379	30.0	21.72	24.49	1.25	1.23	3.51	0.19	24.68	0.379	0.379	0.114	0.50	0.10
6	15	4.02	21.72	24.58	1.25	1.23	3.28	0.17	24.75	0.330	20.0	21.82	24.65	1.25	1.23	3.28	0.17	24.81	0.330	0.330	0.066	0.70	0.12
7	15	2.91	21.82	24.76	1.25	1.23	2.37	0.09	24.85	0.173	124	22.44	24.98	1.25	1.23	2.37	0.09	25.07	0.173	0.173	0.214	0.50	0.04
8	12	2.43	22.44	25.02	1.00	0.79	3.10	0.15	25.17	0.398	18.0	22.53	25.09	1.00	0.79	3.10	0.15	25.24	0.398	0.398	0.072	0.70	0.10
9	12	2.12	22.53	25.20	1.00	0.79	2.70	0.11	25.31	0.302	88.0	23.41	25.46	1.00	0.79	2.70	0.11	25.58	0.301	0.301	0.265	1.00	0.11
10	12	0.92	21.82	24.76	1.00	0.79	1.17	0.02	24.79	0.057	40.0	22.62	24.79	1.00	0.79	1.17	0.02	24.81	0.057	0.057	0.023	1.10	0.02
11	12	0.72	22.62	24.81	1.00	0.79	0.91	0.01	24.82	0.035	59.0	23.81	24.83	1.00	0.79	0.91	0.01	24.84	0.034	0.034	0.020	1.00	0.01

Project File: 1746-NC1.stm | IDF File: ctdot2000.IDF | Total number of lines: 11 | Run Date: 11-19-2003

NOTES: Initial tailwater elevation = 22.5 (ft) , * Critical depth assumed., ** Critical depth assumed.

SUBJECT MIDDLETOWN HIGH SCHOOL
MIDDLETOWN, CT
JOB NO. 1746

CONSULTING ENGINEERS

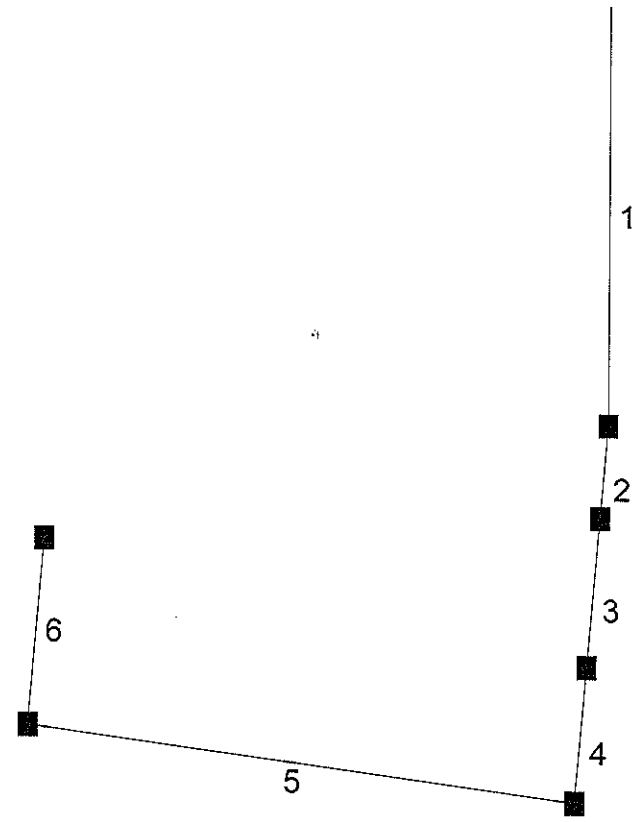
SHEET NO. 1 OF
COMPUTED BY J.A.V. DATE 11/7/03
CHECKED BY DATE

DATA SHEET FOR RATIONAL METHOD STORM DRAINAGE DESIGN

Q = CIA

NODE		AREA	RUNOFF COEFFICIENT C			TIME OF CONCENTRATION					
INLET I.D.	CROSS SLOPE	ACRES	DESCRIPTION	C VALUE	TOTAL AC	ELEV. DIFF. FT	LENGTH FT	SLOPE %	COVER	TIME MIN.	COMMENTS
NC-4		0.070	WALK	0.85	0.06					10	
SAG		0.040	FIELD	0.35	0.01						
		0.110			0.07						
NC-5		0.090	PAVEMENT	0.85	0.08						
SAG		0.020	GRASS	0.35	0.01					10	
		0.110			0.08						
NC-11		0.030	PAVEMENT	0.85	0.03						
SAG		0.130	GRASS	0.35	0.05					10	
COURTYD		0.160			0.07						
NC-12		0.050	PAVEMENT	0.85	0.04						
SAG		0.110	GRASS	0.35	0.04					10	
COURTYD		0.160			0.08						
NC-16		0.070	PAVEMENT	0.85	0.06						
SAG		0.020	GRASS	0.35	0.01					10	
		0.090			0.07						
NC-17		0.080	PAVEMENT	0.85	0.07						
SAG		0.020	GRASS	0.35	0.01					10	
		0.100			0.08						

Hydraflow Plan View



Project file: 1746-NC2.stm	IDF file: ctdot2000.IDF	No. Lines: 6	11-19-2003

Hydraflow Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr line No.	Line length (ft)	Defl angle (deg)	Junc type	Known Q (cfs)	Drng area (ac)	Runoff coeff (C)	Inlet time (min)	Invert El Dn (ft)	Line slope (%)	Invert El Up (ft)	Line size (in)	Line type	N value (n)	J-loss coeff (K)	Inlet/ Rim El (ft)	
1	End	180.0	90.0	Comb	0.00	0.10	0.75	10.0	20.00	1.50	22.70	15	Cir	0.012	0.50	27.92	NC17-out
2	1	40.0	6.0	Comb	0.00	0.09	0.74	10.0	22.70	1.00	23.10	12	Cir	0.012	0.50	27.92	NC16-NC17
3	2	64.0	0.0	Comb	0.00	0.11	0.76	10.0	23.10	0.94	23.70	12	Cir	0.012	0.50	28.46	NC5-NC16
4	3	58.0	0.0	Comb	0.00	0.11	0.67	10.0	23.70	0.86	24.20	12	Cir	0.012	1.50	28.46	NC4 -NC5
5	4	292.0	90.0	Grate	0.00	0.16	0.44	10.0	24.20	0.75	26.40	12	Cir	0.012	1.50	30.00	NC11- NC4
6	5	80.0	90.0	Grate	0.00	0.16	0.51	10.0	26.40	0.50	26.80	12	Cir	0.013	1.00	30.00	NC12- NC11

Project File: 1746-NC2.stm | IDF File: ctdot2000.IDF | Total number of lines: 6 | Date: 11-19-2003

Hydraflow Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	Dns line No.
1	NC17-out	1.59	15 c	180.0	20.00	22.70	1.500	24.00*	24.09*	0.01	End
2	NC16-NC17	1.34	12 c	40.0	22.70	23.10	1.000	24.11*	24.16*	0.02	1
3	NC5-NC16	1.12	12 c	64.0	23.10	23.70	0.938	24.18	24.22	0.06	2
4	NC4 -NC5	0.84	12 c	58.0	23.70	24.20	0.862	24.27	24.59	0.21	3
5	NC11- NC4	0.66	12 c	292.0	24.20	26.40	0.753	24.79	26.75	0.18	4
6	NC12- NC11	0.39	12 c	80.0	26.40	26.80	0.500	26.92	27.07	0.08	5

Project File: 1746-NC2.stm	IDF File: ctdot2000.IDF	Total No. Lines: 6	Run Date: 11-19-2003

NOTES: c = circular; e = elliptical; b = box; Return period = 10 Yrs.; * Indicates surcharge condition.

Hydraflow Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	
1	End	180.0	0.10	0.73	0.75	0.08	0.45	10.0	19.7	3.5	1.59	8.57	1.30	15	1.50	22.70	20.00	24.09	24.00	27.92	25.00	NC17-out
2	1	40.0	0.09	0.63	0.74	0.07	0.38	10.0	19.4	3.6	1.34	3.86	1.71	12	1.00	23.10	22.70	24.16	24.11	27.92	27.92	NC16-NC17
3	2	64.0	0.11	0.54	0.76	0.08	0.31	10.0	18.7	3.6	1.12	3.74	2.08	12	0.94	23.70	23.10	24.22	24.18	28.46	27.92	NC5-NC16
4	3	58.0	0.11	0.43	0.67	0.07	0.23	10.0	18.0	3.7	0.84	3.58	2.38	12	0.86	24.20	23.70	24.59	24.27	28.46	28.46	NC4 -NC5
5	4	292.0	0.16	0.32	0.44	0.07	0.15	10.0	12.7	4.4	0.66	3.35	2.06	12	0.75	26.40	24.20	26.75	24.79	30.00	28.46	NC11- NC4
6	5	80.0	0.16	0.16	0.51	0.08	0.08	10.0	10.0	4.8	0.39	2.52	1.63	12	0.50	26.80	26.40	27.07	26.92	30.00	30.00	NC12- NC11

Project File: 1746-NC2.stm | IDF File: ctdot2000.IDF | Total number of lines: 6 | Run Date: 11-19-2003

NOTES: Intensity = 54.74 / (Inlet time + 10.80) ^ 0.80; Return period = 10 Yrs. ; Initial tailwater elevation = 24.00 (ft)

Hydraflow Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp line No
							Ht (in)	L (ft)	area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	depth (ft)	spread (ft)	depth (ft)	spread (ft)	Dep (in)	
1	NC17	0.36	0.00	0.36	0.00	Comb	3.0	3.00	3.98	3.00	1.66	Sag	12.00	0.030	0.030	0.000	0.08	2.67	0.08	2.67	0.0	Off
2	NC16	0.32	0.00	0.32	0.00	Comb	3.0	3.00	3.98	3.00	1.66	Sag	12.00	0.030	0.030	0.000	0.07	2.33	0.07	2.33	0.0	Off
3	NC5	0.40	0.00	0.40	0.00	Comb	3.0	3.00	3.98	3.00	1.66	Sag	12.00	0.030	0.030	0.000	0.08	2.67	0.08	2.67	0.0	Off
4	NC4	0.35	0.00	0.35	0.00	Comb	3.0	3.00	3.98	3.00	1.66	Sag	12.00	0.030	0.030	0.000	0.08	2.67	0.08	2.67	0.0	Off
5	NC11	0.34	0.00	0.34	0.00	Grate	0.0	0.00	0.50	1.00	1.00	Sag	12.00	0.100	0.030	0.000	0.79	7.85	0.11	2.55	2.00	Off
6	NC12	0.39	0.00	0.39	0.00	Grate	0.0	0.00	0.10	1.00	1.00	Sag	12.00	0.100	0.030	0.000	1.17	11.73	0.50	11.39	2.00	Off

Project File: 1746-NC2.stm | I-D-F File: ctdot2000.IDF | Total number of lines: 6 | Run Date: 11-19-2003

NOTES: Inlet N-Values = 0.012 ; Intensity = 54.74 / (Inlet time + 10.80) ^ 0.80; Return period = 10 Yrs. ; * Indicates Known Q added

Hydraflow FL-DOT Report

Line No	To Line	Type of struc	n - value	Len (ft)	Drainage Area C1 = 0.25 C2 = 0.35 C3 = 0.85 Increment (ac)	Drainage Area Sub-total (ac)	Drainage Area Sum CA	Time of conc (min)	Time of flow in sect (min)	Inten (I) (in/hr)	Total CA	Add Q / Total flow Q (cfs)	Inlet elev (ft)	Elev of HGL / Elev of Crown / Elev of Invert Up (ft)	Down (ft)	Fall (ft)	Rise / Span Size (in)	HGL / Pipe Slope (%)	Actual / Full Flow Vel (ft/s)	Cap (cfs)	Date: 11-19-2003 / Frequency: 10 yrs / Project: 1746-NC2.stm Line description
1	End	Comb	0.012	180.0	0.00 0.02 0.08	0.00 0.34 0.39	0.00 0.12 0.33	19.68	1.89	3.5	0.45	0.00 1.59	27.92	24.09 23.95 22.70	24.00 21.25 20.00	0.09 2.70	15 15 Cir	0.05 1.50	1.30 6.98	1.59 8.57	NC17-out
2	1	Comb	0.012	40.0	0.00 0.02 0.07	0.00 0.32 0.31	0.00 0.11 0.26	19.36	0.32	3.6	0.38	0.00 1.34	27.92	24.16 24.10 23.10	24.11 23.70 22.70	0.05 0.40	12 12 Cir	0.12 1.00	1.71 4.91	1.34 3.86	NC16-NC17
3	2	Comb	0.012	64.0	0.00 0.02 0.09	0.00 0.30 0.24	0.00 0.11 0.20	18.75	0.62	3.6	0.31	0.00 1.12	28.46	24.22 24.70 23.70	24.18 24.10 23.10	0.04 0.60	12 12 Cir	0.06 0.94	2.08 4.76	1.12 3.74	NC5-NC16
4	3	Comb	0.012	58.0	0.00 0.04 0.07	0.00 0.28 0.15	0.00 0.10 0.13	17.99	0.76	3.7	0.23	0.00 0.84	28.46	24.59 25.20 24.20	24.27 24.70 23.70	0.31 0.50	12 12 Cir	0.54 0.86	2.38 4.56	0.84 3.58	NC4 -NC5
5	4	Grate	0.012	292.0	0.00 0.13 0.03	0.00 0.24 0.08	0.00 0.08 0.07	12.67	5.32	4.4	0.15	0.00 0.66	30.00	26.75 27.40 26.40	24.79 25.20 24.20	1.95 2.20	12 12 Cir	0.67 0.75	2.06 4.26	0.66 3.35	NC11- NC4
6	5	Grate	0.013	80.0	0.00 0.11 0.05	0.00 0.11 0.05	0.00 0.04 0.04	10.00	2.67	4.8	0.08	0.00 0.39	30.00	27.07 27.80 26.80	26.92 27.40 26.40	0.15 0.40	12 12 Cir	0.18 0.50	1.63 3.21	0.39 2.52	NC12- NC11

NOTES: Intensity = 54.74 / (Inlet time + 10.80) ^ 0.80 (in/hr) ; Time of flow in section is based on full flow.; Initial tailwater elevation = 24.00 (ft)

Hydraflow Hydraulic Grade Line Computations

Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
			Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf		Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf	Ave Sf	Enrgy loss		
	(in)	(cfs)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(ft)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(%)	(ft)	(K)	(ft)
1	15	1.59	20.00	24.00	1.25	1.23	1.30	0.03	24.03	0.052	180	22.70	24.09	1.25	1.23	1.30	0.03	24.12	0.052	0.052	0.094	0.50	0.01
2	12	1.34	22.70	24.11	1.00	0.79	1.71	0.05	24.15	0.121	40.0	23.10	24.16	1.00	0.79	1.71	0.05	24.20	0.121	0.121	0.048	0.50	0.02
3	12	1.12	23.10	24.18	1.00	0.79	1.43	0.03	24.21	0.085	64.0	23.70	24.22	0.52	0.41	2.74	0.12	24.33	0.303	0.194	0.124	0.50	0.06
4	12	0.84	23.70	24.27	0.57	0.47	1.79	0.05	24.32	0.119	58.0	24.20	24.59	0.39**	0.28	2.97	0.14	24.72	0.463	0.291	N/A	1.50	0.21
5	12	0.66	24.20	24.79	0.59	0.49	1.37	0.03	24.82	0.068	292	26.40	26.75	0.35**	0.24	2.76	0.12	26.86	0.449	0.259	N/A	1.50	0.18
6	12	0.39	26.40	26.92	0.52	0.42	0.94	0.01	26.94	0.042	80.0	26.80	27.07	0.27	0.17	2.32	0.08	27.15	0.493	0.267	0.214	1.00	0.08

Project File: 1746-NC2.stm | IDF File: ctdot2000.IDF | Total number of lines: 6 | Run Date: 11-19-2003

NCTES: Initial tailwater elevation = 24 (ft) , * Critical depth assumed., ** Critical depth assumed.

SUBJECT MIDDLETOWN HIGH SCHOOL
MIDDLETOWN, CT
JOB NO. 1746

CONSULTING ENGINEERS

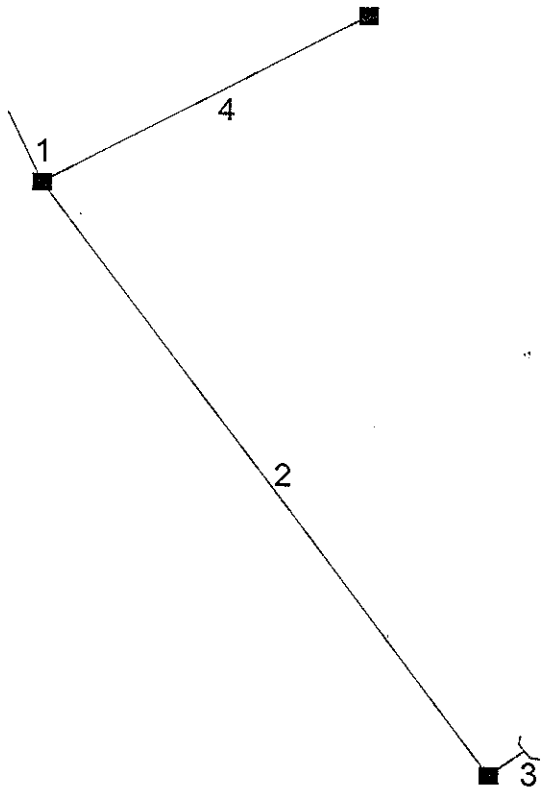
SHEET NO. 1 OF
COMPUTED BY J.A.V. DATE 11/7/2003
CHECKED BY DATE

DATA SHEET FOR RATIONAL METHOD STORM DRAINAGE DESIGN

Q = CIA

NODE		AREA	RUNOFF COEFFICIENT C			TIME OF CONCENTRATION					
INLET I.D.	CROSS SLOPE	ACRES	DESCRIPTION	C VALUE	TOTAL AC	ELEV. DIFF. FT	LENGTH FT	SLOPE %	COVER	TIME MIN.	COMMENTS
ND-3										10	
SAG		0.590	PAVEMENT	0.85	0.50						
		0.590			0.50						
ND-4		0.400	PAVEMENT	0.85	0.34					10	
SAG		0.110	GRASS	0.35	0.04						
		0.510			0.38						
ND-5		0.420	PAVEMENT	0.85	0.36						
SAG		0.090	GRASS	0.35	0.03					10	
		0.510			0.39						
ND-8											
		3.140	ROOF	0.85	2.67					5	
		3.140			2.67						

Hydraflow Plan View



Project file: 1746-ND.stm	IDF file: ctdot2000.IDF	No. Lines: 4	11-17-2003

Hydraflow Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr line No.	Line length (ft)	Defl angle (deg)	Junc type	Known Q (cfs)	Drng area (ac)	Runoff coeff (C)	Inlet time (min)	Invert El Dn (ft)	Line slope (%)	Invert El Up (ft)	Line size (in)	Line type	N value (n)	J-loss coeff (K)	Inlet/ Rim El (ft)	
1	End	37.0	66.0	Comb	0.00	0.51	0.75	10.0	24.00	1.89	24.70	24	Cir	0.012	1.50	26.72	ND4 - OUT
2	1	346.0	-11.0	Grate	0.00	0.59	0.85	5.0	24.70	0.90	27.80	24	Cir	0.012	1.50	32.40	ND-3 - ND-4
3	2	20.0	-92.0	Hdwl	0.00	3.14	0.85	10.0	27.80	1.50	28.10	24	Cir	0.012	1.00	32.50	ND8 - ND-3
4	1	166.0	-96.0	Comb	0.00	0.51	0.76	10.0	24.90	0.54	25.80	12	Cir	0.012	1.00	0.00	ND-5 - ND-4

Project File: 1746-ND.stm | IDF File: ctdot2000.IDF | Total number of lines: 4 | Date: 11-17-2003

Hydraflow Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	Dns line No.
1	ND4 - OUT	18.12	24 c	37.0	24.00	24.70	1.892	25.51	26.21	1.19	End
2	ND-3 - ND-4	15.19	24 c	346.0	24.70	27.80	0.896	27.39	29.18	1.01	1
3	ND8 - ND-3	12.82	24 c	20.0	27.80	28.10	1.500	30.19*	30.24*	0.26	2
4	ND-5 - ND-4	1.86	12 c	166.0	24.90	25.80	0.542	27.39*	27.78*	0.09	1

Project File: 1746-ND.stm	IDF File: ctdot2000.IDF	Total No. Lines: 4	Run Date: 11-17-2003

NOTES: c = circular; e = elliptical; b = box; Return period = 10 Yrs.; * Indicates surcharge condition.

Hydraflow Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	
1	End	37.0	0.51	4.75	0.75	0.38	3.94	10.0	11.2	4.6	18.12	33.70	7.13	24	1.89	24.70	24.00	26.21	25.51	26.72	0.00	ND4 - OUT
2	1	346.0	0.59	3.73	0.85	0.50	3.17	5.0	10.1	4.8	15.19	23.19	5.70	24	0.90	27.80	24.70	29.18	27.39	32.40	26.72	ND-3 - ND-4
3	2	20.0	3.14	3.14	0.85	2.67	2.67	10.0	10.0	4.8	12.82	30.01	4.08	24	1.50	28.10	27.80	30.24	30.19	32.50	32.40	ND8 - ND-3
4	1	166.0	0.51	0.51	0.76	0.39	0.39	10.0	10.0	4.8	1.86	2.84	2.37	12	0.54	25.80	24.90	27.78	27.39	0.00	26.72	ND-5 - ND-4

Project File: 1746-ND.stm | IDF File: ctdot2000.IDF | Total number of lines: 4 | Run Date: 11-17-2003

NOTES: Intensity = 54.74 / (Inlet time + 10.80) ^ 0.80; Return period = 10 Yrs. ; Initial tailwater elevation = 25.51 (ft)

Hydraflow Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp line No
							Ht (in)	L (ft)	area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	depth (ft)	spread (ft)	depth (ft)	spread (ft)	Dep (in)	
1	ND-4	1.84	0.00	1.84	0.00	Comb	3.0	1.66	3.98	3.00	1.66	Sag	2.00	0.020	0.020	0.000	0.22	11.00	0.22	11.00	0.0	Off
2	ND-3	3.00	0.00	3.00	0.00	Grate	0.0	0.00	4.98	3.00	1.66	Sag	2.00	0.020	0.020	0.000	0.29	14.63	0.29	14.63	0.0	Off
3	ND-8	12.82	0.00	12.82	0.00	Hdwl	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
4	ND-5	1.86	0.00	1.86	0.00	Comb	3.0	1.66	3.98	3.00	1.66	Sag	2.00	0.020	0.020	0.000	0.22	11.00	0.22	11.00	0.0	Off

Project File: 1746-ND.stm | I-D-F File: ctdot2000.IDF | Total number of lines: 4 | Run Date: 11-17-2003

NOTES: Inlet N-Values = 0.012 ; Intensity = 54.74 / (Inlet time + 10.80) ^ 0.80; Return period = 10 Yrs. ; * Indicates Known Q added

Hydraflow Hydraulic Grade Line Computations

Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
			Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf		Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf	Ave Sf	Enrgy loss		
	(in)	(cfs)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(ft)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(%)	(ft)	(K)	(ft)
1	24	18.12	24.00	25.51	1.51	2.54	7.12	0.79	26.30	0.648	37.0	24.70	26.21	1.51**	2.54	7.13	0.79	27.00	0.650	0.649	N/A	1.50	1.19
2	24	15.19	24.70	27.39	2.00	3.14	4.84	0.36	27.76	0.384	346	27.80	29.18	1.38**	2.31	6.57	0.67	29.85	0.569	0.477	N/A	1.50	1.01
3	24	12.82	27.80	30.19	2.00	3.14	4.08	0.26	30.45	0.274	20.0	28.10	30.24	2.00	3.14	4.08	0.26	30.50	0.274	0.274	0.055	1.00	0.26
4	12	1.86	24.90	27.39	1.00	0.79	2.37	0.09	27.48	0.233	166	25.80	27.78	1.00	0.79	2.37	0.09	27.87	0.233	0.233	0.387	1.00	0.09

Project File: 1746-ND.stm | IDF File: ctdot2000.IDF | Total number of lines: 4 | Run Date: 11-17-2003

NOTES: Initial tailwater elevation = 25.51 (ft) , * Critical depth assumed., ** Critical depth assumed.

CONSULTING ENGINEERS

SUBJECT Middletown High

JOB NO. 1746

Sheet No. 1 of 1

Computed By JAV Date 11-17-03

Checked By _____ Date _____

Outlet Protection For Area ND

Outlet Pipe 24" RCP

$Q_{10} = 18.12$ cfs

Use E&S Guidelines

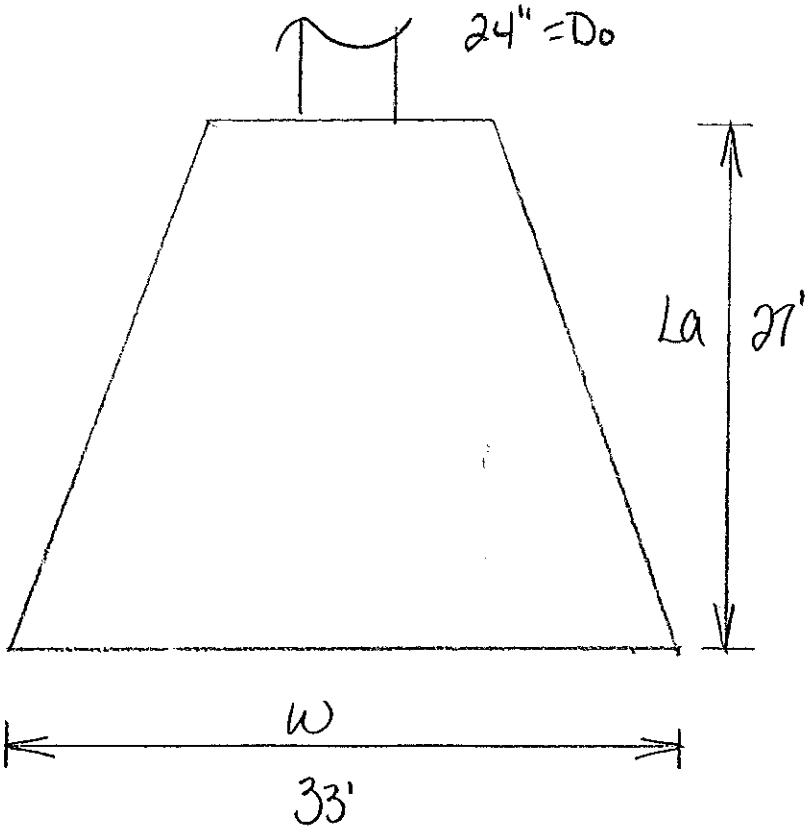
$$La = \frac{1.7\,Q}{Do^{3/2}} + 8Do = \frac{1.7(18.12)}{2^{3/2}} + 8(2)$$

$$= 10.89 + 16 = 26.9 \rightarrow 27'$$

$$W = 3Do + La = 3(2) + 27 = 33'$$

$$d50 = \left(\frac{0.02}{TW}\right)\left(\frac{Q}{Do}\right)^{4/3} = \left(\frac{0.02}{1.3}\right)\left(\frac{18.12}{2}\right)^{4/3} = 0.29'$$

$d50 = 0.29' < d_{max}\ 0.42$ ∴ Use Modified Rip Rap



SUBJECT MIDDLETOWN HIGH SCHOOL
MIDDLETOWN, CT
JOB NO. 1743

CONSULTING ENGINEERS

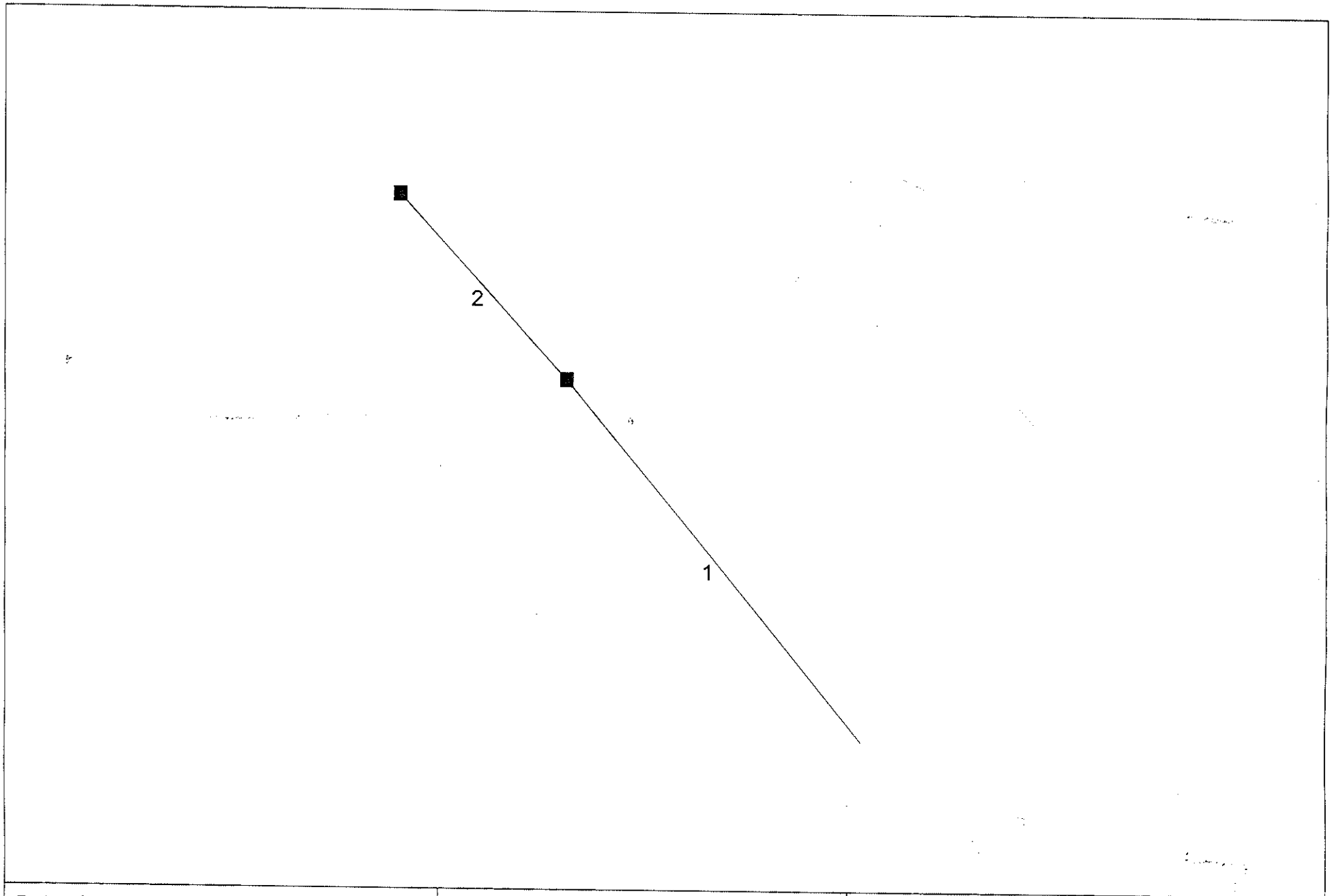
SHEET NO. 1 OF
COMPUTED BY J.A.V. DATE 11/7/2003
CHECKED BY DATE

DATA SHEET FOR RATIONAL METHOD STORM DRAINAGE DESIGN

Q = CIA

NODE		AREA	RUNOFF COEFFICIENT C			TIME OF CONCENTRATION					
INLET I.D.	CROSS SLOPE	ACRES	DESCRIPTION	C VALUE	TOTAL AC	ELEV. DIFF. FT	LENGTH FT	SLOPE %	COVER	TIME MIN.	COMMENTS
NE-6		0.140	PAVEMENT	0.85	0.12						
		0.050	GRASS	0.2	0.01					10	
		0.190			0.13						
NE-7		0.090	PAVEMENT	0.85	0.08						
		0.040	GRASS	0.35	0.01					10	
		0.130			0.09						

Hydraflow Plan View



Project file: 1746-NE.stm	IDF file: ctdot2000.IDF	No. Lines: 2	11-18-2003

Hydraflow Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr line No.	Line length (ft)	Defl angle (deg)	Junc type	Known Q (cfs)	Drng area (ac)	Runoff coeff (C)	Inlet time (min)	Invert El Dn (ft)	Line slope (%)	Invert El Up (ft)	Line size (in)	Line type	N value (n)	J-loss coeff (K)	Inlet/ Rim El (ft)	
1	End	39.0	-133.0	Comb	0.00	0.19	0.68	10.0	21.10	1.03	21.50	12	Cir	0.012	0.50	24.87	NE-6 - OUT
2	1	21.0	-3.0	Comb	0.00	0.13	0.70	10.0	21.50	1.43	21.80	12	Cir	0.012	1.00	25.00	NE-7 - NE-6

Project File: 1746-NE.stm | IDF File: ctdot2000.IDF | Total number of lines: 2 | Date: 11-17-2003

Hydraflow Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	Dns line No.
1	NE-6 - OUT	1.03	12 c	39.0	21.10	21.50	1.026	22.64*	22.67*	0.01	End
2	NE-7 - NE-6	0.44	12 c	21.0	21.50	21.80	1.429	22.68	22.68	0.01	1

Project File: 1746-NE.stm	IDF File: ctdot2000.IDF	Total No. Lines: 2	Run Date: 11-17-2003

NOTES: c = circular; e = elliptical; b = box; Return period = 10 Yrs.; * Indicates surcharge condition.

Hydraflow Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	
1	End	39.0	0.19	0.32	0.68	0.13	0.22	10.0	10.6	4.7	1.03	3.91	1.32	12	1.03	21.50	21.10	22.67	22.64	24.87	0.00	NE-6 - OUT
2	1	21.0	0.13	0.13	0.70	0.09	0.09	10.0	10.0	4.8	0.44	4.61	0.58	12	1.43	21.80	21.50	22.68	22.68	25.00	24.87	NE-7 - NE-6

Project File: 1746-NE.stm

IDF File: ctdot2000.IDF

Total number of lines: 2

Run Date: 11-17-2003

NOTES: Intensity = 54.74 / (Inlet time + 10.80) ^ 0.80; Return period = 10 Yrs. ; Initial tailwater elevation = 22.64 (ft)

Hydraflow Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp line No
							Ht (in)	L (ft)	area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	depth (ft)	spread (ft)	depth (ft)	spread (ft)	Dep (in)	
1	NE-6	0.62	0.00	0.51	0.11	Comb	3.0	3.00	0.00	3.00	1.66	0.020	2.00	0.020	0.020	0.013	0.10	5.00	0.10	4.95	0.0	Off
2	NE-7	0.44	0.00	0.38	0.05	Comb	3.0	3.00	0.00	3.00	1.66	0.020	2.00	0.020	0.020	0.013	0.09	4.50	0.09	4.35	0.0	Off

Project File: 1746-NE.stm | I-D-F File: ctdot2000.IDF | Total number of lines: 2 | Run Date: 11-17-2003

NOTES: Inlet N-Values = 0.012 ; Intensity = 54.74 / (Inlet time + 10.80) ^ 0.80; Return period = 10 Yrs. ; * Indicates Known Q added

Hydraflow Hydraulic Grade Line Computations

Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
			Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf		Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf	Ave Sf	Enrgy loss		
	(in)	(cfs)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(ft)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(%)	(ft)	(K)	(ft)
1	12	1.03	21.10	22.64	1.00	0.79	1.32	0.03	22.67	0.072	39.0	21.50	22.67	1.00	0.79	1.32	0.03	22.69	0.072	0.072	0.028	0.50	0.01
2	12	0.44	21.50	22.68	1.00	0.79	0.56	0.00	22.69	0.013	21.0	21.80	22.68	0.88	0.73	0.60	0.01	22.69	0.012	0.012	0.003	1.00	0.01

Project File: 1746-NE.stm | IDF File: ctdot2000.IDF | Total number of lines: 2 | Run Date: 11-17-2003

NOTES: Initial tailwater elevation = 22.64 (ft) , * Critical depth assumed., ** Critical depth assumed.

SUBJECT MIDDLETOWN HIGH SCHOOL
MIDDLETOWN, CT
JOB NO. 1746

CONSULTING ENGINEERS

SHEET NO. 1 OF
COMPUTED BY J.A.V. DATE 11/7/2003
CHECKED BY DATE

DATA SHEET FOR RATIONAL METHOD STORM DRAINAGE DESIGN

Q = CIA

NODE		AREA	RUNOFF COEFFICIENT C			TIME OF CONCENTRATION					
INLET I.D.	CROSS SLOPE	ACRES	DESCRIPTION	C VALUE	TOTAL AC	ELEV. DIFF. FT	LENGTH FT	SLOPE %	COVER	TIME MIN.	COMMENTS
SA-1		0.420	PAVEMENT	0.85	0.36					10	
SAG		0.190	GRASS	0.35	0.07						
		0.610			0.42						
SA-2		0.130	WALK	0.85	0.11					10	
SAG		0.330	FIELD	0.35	0.12						
		1.310	STEEP SLOPE	0.25	0.33						
		1.770			0.55						
SA-3		0.290	PAVEMENT	0.85	0.25						
SAG		0.030	GRASS	0.35	0.01					10	
		0.430	STEEP SLOPE	0.25	0.11						
		0.750			0.36						
SA-4		0.040	PAVEMENT	0.85	0.03					5	
		0.000	GRASS	0.35	0.00						
		0.040			0.03						
SA-5		0.910	PAVEMENT	0.85	0.77						
SAG		0.160	GRASS	0.35	0.06						
		0.300	STEEP SLOPE	0.2	0.06					10	
		1.370			0.89						
SA-6		0.540	PAVEMENT	0.85	0.46						
SAG		0.040	GRASS	0.35	0.01					10	
		0.580			0.47						
SA-7		0.540	PAVEMENT	0.85	0.46						
SAG		0.360	GRASS	0.35	0.13					10	
		0.900			0.59						
SA-8		0.120	PAVEMENT	0.85	0.10						
SAG		0.080	GRASS	0.35	0.03					10	
		0.200			0.13						
SA-9		0.090	PAVEMENT	0.85	0.08						
SAG		0.040	GRASS	0.35	0.01					10	
		0.130			0.09						
SA-10		0.000	PAVEMENT	0.85	0.00						
SAG		0.090	GRASS	0.35	0.03					10	
COURTYD		0.090			0.03						
SA-11		0.010	PAVEMENT	0.85	0.01						
		0.030	GRASS	0.35	0.01					10	
		0.040			0.02						
SA-12 RL		1.300	ROOF	0.85	1.11					5	

SUBJECT MIDDLETOWN HIGH SCHOOL
MIDDLETOWN, CT
JOB NO. 1746

CONSULTING ENGINEERS

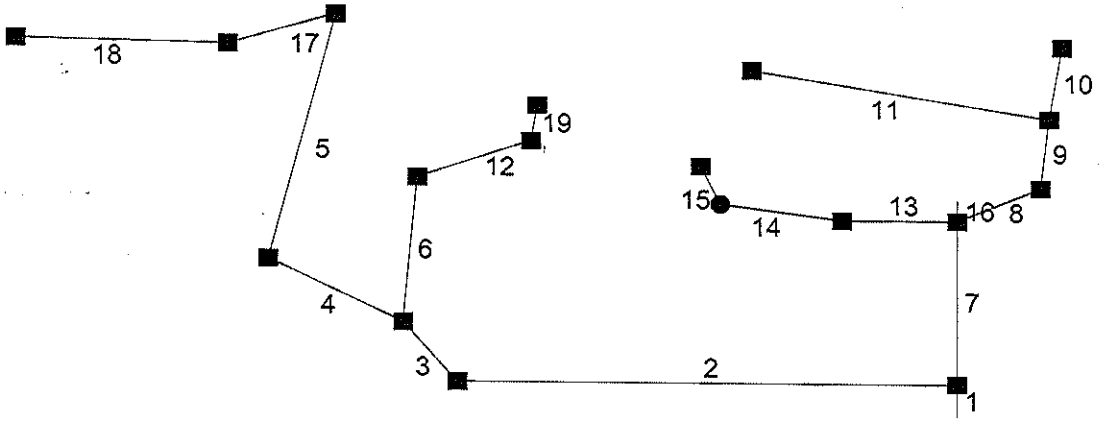
SHEET NO. 1 OF
COMPUTED BY J.A.V. DATE 11/7/2003
CHECKED BY DATE

DATA SHEET FOR RATIONAL METHOD STORM DRAINAGE DESIGN

Q = CIA

NODE		AREA	RUNOFF COEFFICIENT C			TIME OF CONCENTRATION					
INLET I.D.	CROSS SLOPE	ACRES	DESCRIPTION	C VALUE	TOTAL AC	ELEV. DIFF. FT	LENGTH FT	SLOPE %	COVER	TIME MIN.	COMMENTS
SA-13		0.160	PAVEMENT	0.85	0.14						
TD		0.030	GRASS	0.35	0.01					10	
		0.190			0.15						
SA-14		0.000	WALK	0.85	0.00						
MH		0.000	FIELD	0.35	0.00						
		0.000			0.00						
SA-15		0.240	TRACK	0.85	0.20						
'C-L'		0.590	FIELD	0.35	0.21					10	
SAG		0.830			0.41						
SA-16		0.230	TRACK	0.85	0.20						
'C-L'		0.580	FIELD	0.35	0.20					10	
SAG		0.810			0.40						
SA-17		0.330	PAVEMENT	0.85	0.28						
'C'		0.210	GRASS	0.35	0.07					10	
		0.540			0.35						
SA-18		0.240	PAVEMENT	0.85	0.20						
'C'		0.070	GRASS	0.35	0.02					10	
		0.310			0.23						
SA-19		0.010	PAVEMENT	0.85	0.01						
YD		0.060	GRASS	0.35	0.02					10	
		0.070			0.03						

Hydraflow Plan View



Project file: 1746-SA.stm	IDF file: ctdot2000.IDF	No. Lines: 19	11-17-2003

Hydraflow Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr line No.	Line length (ft)	Defl angle (deg)	Junc type	Known Q (cfs)	Drng area (ac)	Runoff coeff (C)	Inlet time (min)	Invert El Dn (ft)	Line slope (%)	Invert El Up (ft)	Line size (in)	Line type	N value (n)	J-loss coeff (K)	Inlet/ Rim El (ft)	
1	End	31.7	-90.0	Comb	0.00	0.58	0.82	10.0	21.30	1.26	21.70	24	Cir	0.012	1.50	26.75	SA-6 - OUT
2	1	451.0	-90.0	Comb	0.00	1.37	0.65	10.0	21.70	0.69	24.80	24	Cir	0.012	1.10	29.50	SA-5 - SA-6
3	2	76.0	50.0	Comb	0.00	0.75	0.48	10.0	24.80	0.66	25.30	24	Cir	0.012	1.10	29.60	SA-3 - SA-5
4	3	137.0	-23.0	Grate	0.00	1.77	0.31	10.0	25.80	0.73	26.80	18	Cir	0.012	1.50	31.00	SA-2 - SA-3
5	4	252.0	77.0	Grate	0.00	0.61	0.69	10.0	26.80	0.52	28.10	18	Cir	0.012	1.50	32.40	SA-1 - SA-2
6	3	145.0	45.0	Comb	0.00	0.04	0.75	10.0	26.60	0.83	27.80	12	Cir	0.012	1.25	32.80	SA-4 - SA-3
7	1	162.0	0.0	Comb	0.00	0.90	0.65	15.0	21.70	0.49	22.50	24	Cir	0.012	1.50	26.75	SA-7 - SA-6
8	7	82.0	66.0	Comb	0.00	0.54	0.69	10.0	23.50	1.22	24.50	12	Cir	0.012	1.25	27.71	SA-17 - SA-7
9	8	70.0	-60.0	Comb	0.00	0.20	0.65	10.0	24.50	3.57	27.00	12	Cir	0.012	1.50	30.60	SA-8 - SA-17
10	9	73.0	3.0	Comb	0.00	0.13	0.69	10.0	27.00	0.55	27.40	12	Cir	0.012	1.00	30.60	SA-9 - SA 8
11	9	272.0	-86.0	Grate	0.00	0.09	0.35	10.0	27.00	0.66	28.80	12	Cir	0.012	1.00	31.00	SA-10 - SA-8
12	6	109.0	65.0	Grate	0.00	0.04	0.47	10.0	27.80	0.83	28.70	12	Cir	0.012	1.25	32.20	SA-11 - SA-4
13	7	104.0	-90.0	Comb	0.00	0.31	0.74	10.0	23.50	1.44	25.00	12	Cir	0.012	0.50	28.27	SA-18 - SA-7
14	13	111.0	8.0	MH	0.00	0.00	0.00	0.0	25.00	0.90	26.00	12	Cir	0.012	0.85	30.50	SA-14 - SA-18
15	14	42.0	57.0	Grate	0.00	0.19	0.77	10.0	26.00	0.95	26.40	8	Cir	0.012	1.00	27.90	SA-13 - SA 14
16	7	20.0	0.0	None	0.00	1.30	0.85	5.0	23.60	1.50	23.90	15	Cir	0.012	1.00	30.00	SA-12 - SA-14
17	5	102.0	-121.0	Grate	0.00	0.81	0.49	10.0	28.10	0.49	28.60	15	Cir	0.012	0.70	32.80	SA-16 - SA-7
18	17	192.0	18.0	Grate	0.00	0.83	0.49	10.0	28.60	0.52	29.60	12	Cir	0.012	1.00	32.80	SA-15 - SA-16
19	12	36.0	-61.0	Grate	0.00	0.07	0.42	10.0	28.70	0.83	29.00	12	Cir	0.012	1.00	32.20	SA-19 - SA-11

Project File: 1746-SA.stm | IDF File: ctdot2000.IDF | Total number of lines: 19 | Date: 11-17-2003

Hydraflow Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	Dns line No.
1	SA-6 - OUT	24.47	24 c	31.7	21.30	21.70	1.262	23.68*	24.00*	1.42	End
2	SA-5 - SA-6	13.03	24 c	451.0	21.70	24.80	0.687	25.41	26.58	0.33	1
3	SA-3 - SA-5	9.41	24 c	76.0	24.80	25.30	0.658	26.91	26.99	0.19	2
4	SA-2 - SA-3	7.66	18 c	137.0	25.80	26.80	0.730	27.18	27.86	0.77	3
5	SA-1 - SA-2	5.51	18 c	252.0	26.80	28.10	0.516	28.63*	29.21	0.36	4
6	SA-4 - SA-3	0.35	12 c	145.0	26.60	27.80	0.828	27.18	28.05	0.10	3
7	SA-7 - SA-6	10.76	24 c	162.0	21.70	22.50	0.494	25.41*	25.72*	0.27	1
8	SA-17 - SA-7	2.53	12 c	82.0	23.50	24.50	1.220	26.00*	26.35*	0.20	7
9	SA-8 - SA-17	1.03	12 c	70.0	24.50	27.00	3.571	26.55	27.43	0.24	8
10	SA-9 - SA 8	0.43	12 c	73.0	27.00	27.40	0.548	27.67	27.72	0.06	9
11	SA-10 - SA-8	0.15	12 c	272.0	27.00	28.80	0.662	27.67	28.97	0.05	9
12	SA-11 - SA-4	0.23	12 c	109.0	27.80	28.70	0.826	28.15	28.90	0.08	6
13	SA-18 - SA-7	1.72	12 c	104.0	23.50	25.00	1.442	26.00*	26.20*	0.04	7
14	SA-14 - SA-18	0.70	12 c	111.0	25.00	26.00	0.901	26.24	26.37	0.09	13
15	SA-13 - SA 14	0.70	8 c	42.0	26.00	26.40	0.952	26.46	26.80	0.17	14
16	SA-12 - SA-14	6.62	15 c	20.0	23.60	23.90	1.500	26.00*	26.18*	0.45	7
17	SA-16 - SA-1	3.69	15 c	102.0	28.10	28.60	0.490	29.57	29.85	0.10	5
18	SA-15 - SA-16	1.95	12 c	192.0	28.60	29.60	0.521	29.95	30.41	0.13	17
19	SA-19 - SA-11	0.14	12 c	36.0	28.70	29.00	0.833	28.98	29.16	0.05	12

Project File: 1746-SA.stm	IDF File: ctdot2000.IDF	Total No. Lines: 19	Run Date: 11-17-2003

NOTES: c = circular; e = elliptical; b = box; Return period = 10 Yrs.; * Indicates surcharge condition.

Hydraflow Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	
1	End	31.7	0.58	10.53	0.82	0.48	6.27	10.0	16.1	3.9	24.47	27.52	7.79	24	1.26	21.70	21.30	24.00	23.68	26.75	0.00	SA-6 - OUT
2	1	451.0	1.37	6.29	0.65	0.89	3.10	10.0	13.8	4.2	13.03	20.31	4.28	24	0.69	24.80	21.70	26.58	25.41	29.50	26.75	SA-5 - SA-6
3	2	76.0	0.75	4.92	0.48	0.36	2.21	10.0	13.4	4.3	9.41	19.87	3.16	24	0.66	25.30	24.80	26.99	26.91	29.60	29.50	SA-3 - SA-5
4	3	137.0	1.77	4.02	0.31	0.55	1.77	10.0	12.9	4.3	7.66	9.72	5.13	18	0.73	26.80	25.80	27.86	27.18	31.00	29.60	SA-2 - SA-3
5	4	252.0	0.61	2.25	0.69	0.42	1.22	10.0	11.8	4.5	5.51	8.17	3.53	18	0.52	28.10	26.80	29.21	28.63	32.40	31.00	SA-1 - SA-2
6	3	145.0	0.04	0.15	0.75	0.03	0.08	10.0	11.7	4.5	0.35	3.51	1.51	12	0.83	27.80	26.60	28.05	27.18	32.80	29.60	SA-4 - SA-3
7	1	162.0	0.90	3.66	0.65	0.58	2.69	15.0	15.4	4.0	10.76	17.22	3.42	24	0.49	22.50	21.70	25.72	25.41	26.75	26.75	SA-7 - SA-6
8	7	82.0	0.54	0.96	0.69	0.37	0.62	10.0	14.9	4.1	2.53	4.26	3.22	12	1.22	24.50	23.50	26.35	26.00	27.71	26.75	SA-17 - SA-7
9	8	70.0	0.20	0.42	0.65	0.13	0.25	10.0	14.4	4.1	1.03	7.29	2.25	12	3.57	27.00	24.50	27.43	26.55	30.60	27.71	SA-8 - SA-17
10	9	73.0	0.13	0.13	0.69	0.09	0.09	10.0	10.0	4.8	0.43	2.86	1.39	12	0.55	27.40	27.00	27.72	27.67	30.60	30.60	SA-9 - SA 8
11	9	272.0	0.09	0.09	0.35	0.03	0.03	10.0	10.0	4.8	0.15	3.14	1.03	12	0.66	28.80	27.00	28.97	27.67	31.00	30.60	SA-10 - SA-8
12	6	109.0	0.04	0.11	0.47	0.02	0.05	10.0	10.5	4.7	0.23	3.51	1.46	12	0.83	28.70	27.80	28.90	28.15	32.20	32.80	SA-11 - SA-4
13	7	104.0	0.31	0.50	0.74	0.23	0.38	10.0	11.3	4.6	1.72	4.63	2.19	12	1.44	25.00	23.50	26.20	26.00	28.27	26.75	SA-18 - SA-7
14	13	111.0	0.00	0.19	0.00	0.00	0.15	0.0	10.2	4.8	0.70	3.66	1.75	12	0.90	26.00	25.00	26.37	26.24	30.50	28.27	SA-14 - SA-18
15	14	42.0	0.19	0.19	0.77	0.15	0.15	10.0	10.0	4.8	0.70	1.28	2.99	8	0.95	26.40	26.00	26.80	26.46	27.90	30.50	SA-13 - SA 14
16	7	20.0	1.30	1.30	0.85	1.11	1.11	5.0	5.0	6.0	6.62	8.57	5.39	15	1.50	23.90	23.60	26.18	26.00	30.00	26.75	SA-12 - SA-14
17	5	102.0	0.81	1.64	0.49	0.40	0.80	10.0	11.2	4.6	3.69	4.90	3.01	15	0.49	28.60	28.10	29.85	29.57	32.80	32.40	SA-16 - SA-1
18	17	192.0	0.83	0.83	0.49	0.41	0.41	10.0	10.0	4.8	1.95	2.78	2.68	12	0.52	29.60	28.60	30.41	29.95	32.80	32.80	SA-15 - SA-16
19	12	36.0	0.07	0.07	0.42	0.03	0.03	10.0	10.0	4.8	0.14	3.52	1.27	12	0.83	29.00	28.70	29.16	28.98	32.20	32.20	SA-19 - SA-11

Project File: 1746-SA.stm | IDF File: ctdot2000.IDF | Total number of lines: 19 | Run Date: 11-17-2003

NOTES: Intensity = 54.74 / (Inlet time + 10.80) ^ 0.80; Return period = 10 Yrs. ; Initial tailwater elevation = 23.68 (ft)

Hydraflow Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp line No
							Ht (in)	L (ft)	area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	depth (ft)	spread (ft)	depth (ft)	spread (ft)	Dep (in)	
1	SA-6 'C' TYPE II	2.29	0.00	2.29	0.00	Comb	3.0	3.00	9.96	6.00	1.66	Sag	2.00	0.020	0.020	0.000	0.19	9.50	0.19	9.50	0.0	Off
2	SA-5 'C' TYPE II	4.28	0.00	4.28	0.00	Comb	3.0	3.00	9.96	6.00	1.66	Sag	2.00	0.020	0.020	0.000	0.29	14.50	0.29	14.50	0.0	Off
3	SA-3 'C'	1.73	0.00	1.73	0.00	Comb	3.0	3.00	4.98	3.00	1.66	Sag	2.00	0.020	0.020	0.000	0.21	10.50	0.21	10.50	0.0	Off
4	SA-2 'C-L'	2.64	0.00	2.64	0.00	Grate	0.0	0.00	2.49	3.00	1.66	Sag	2.00	0.040	0.020	0.000	0.14	5.08	0.27	5.08	2.00	Off
5	SA-1 'C-L'	2.02	0.00	2.02	0.00	Grate	0.0	0.00	3.98	3.00	1.66	Sag	2.00	0.020	0.020	0.000	0.22	11.24	0.22	11.24	0.0	Off
6	SA-4 'C'	0.14	0.00	0.14	0.00	Comb	3.0	3.00	0.00	3.00	1.66	0.020	2.00	0.020	0.020	0.013	0.06	3.00	0.06	2.85	0.0	3
7	SA-7 'C' TYPE II	2.37	5.08	7.44	0.00	Comb	3.0	6.00	9.96	6.00	1.66	Sag	2.00	0.020	0.020	0.000	0.42	21.00	0.42	21.00	0.0	Off
8	SA-17 'C'	1.79	0.00	1.14	0.65	Comb	3.0	3.00	0.00	3.00	1.66	0.011	2.00	0.020	0.020	0.013	0.17	8.50	0.16	8.20	0.0	7
9	SA-8 'C'	0.62	0.00	0.62	0.00	Comb	3.0	3.00	4.98	3.00	1.66	Sag	2.00	0.020	0.020	0.000	0.11	5.50	0.11	5.50	0.0	Off
10	SA-9 'C'	0.43	0.00	0.43	0.00	Comb	3.0	3.00	4.98	3.00	1.66	Sag	2.00	0.020	0.020	0.000	0.09	4.50	0.09	4.50	0.0	Off
11	SA-10 YD	0.15	0.00	0.15	0.00	Grate	0.0	0.00	0.50	1.00	1.00	Sag	2.00	0.020	0.020	0.000	0.07	3.28	0.07	3.28	0.0	Off
12	SA-11 YD	0.09	0.00	0.09	0.00	Grate	0.0	0.00	0.50	1.00	1.00	Sag	2.00	0.020	0.020	0.000	0.05	2.32	0.05	2.32	0.0	Off
13	SA-18 'C'	1.10	6.62	3.29	4.43	Comb	3.0	3.00	0.00	3.00	3.32	0.020	2.00	0.020	0.020	0.013	0.26	13.00	0.25	12.65	0.0	7
14	SA-14 MH	0.00	6.62	0.00	6.62	MH	0.0	0.00	0.00	0.00	0.00	0.000	0.00	0.000	0.000	0.013	0.00	0.00	0.00	0.00	0.0	13
15	SA-13 TD	0.70	0.00	0.70	0.00	Grate	0.0	0.00	10.00	40.00	0.50	Sag	2.00	0.010	0.030	0.000	-0.17	-17.48	0.03	0.28	2.00	14
16	SA-12 RL	6.62	0.00	0.00	6.62	None	0.0	0.00	0.00	0.00	0.00	0.000	0.00	0.000	0.000	0.013	0.00	0.00	0.00	0.00	0.0	14
17	SA-16 'C-L'	1.91	0.00	1.91	0.00	Grate	0.0	0.00	2.49	3.00	1.66	Sag	2.00	0.020	0.020	0.000	0.22	10.81	0.22	10.81	0.0	Off
18	SA-15 'C-L'	1.95	0.00	1.95	0.00	Grate	0.0	0.00	2.49	3.00	1.66	Sag	2.00	0.020	0.020	0.000	0.22	10.98	0.22	10.98	0.0	Off
19	SA-19 YD	0.14	0.00	0.14	0.00	Grate	0.0	0.00	0.50	1.00	1.00	Sag	2.00	0.020	0.020	0.000	0.06	3.13	0.06	3.13	0.0	Off

Project File: 1746-SA.stm | I-D-F File: ctdot2000.IDF | Total number of lines: 19 | Run Date: 11-17-2003

NOTES: Inlet N-Values = 0.012 ; Intensity = 54.74 / (Inlet time + 10.80) ^ 0.80; Return period = 10 Yrs. ; * Indicates Known Q added

Hydraflow Hydraulic Grade Line Computations

Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
			Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf		Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf	Ave Sf	Enrgy loss		
	(in)	(cfs)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(ft)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(%)	(ft)	(K)	(ft)
1	24	24.47	21.30	23.68	2.00	3.14	7.79	0.94	24.62	0.998	31.7	21.70	24.00	2.00	3.14	7.79	0.94	24.94	0.998	0.998	0.316	1.50	1.42
2	24	13.03	21.70	25.41	2.00	3.14	4.15	0.27	25.68	0.283	451	24.80	26.58	1.78	2.96	4.41	0.30	26.88	0.251	0.267	1.205	1.10	0.33
3	24	9.41	24.80	26.91	2.00	3.14	3.00	0.14	27.05	0.148	76.0	25.30	26.99	1.69	2.83	3.32	0.17	27.16	0.140	0.144	0.109	1.10	0.19
4	18	7.66	25.80	27.18	1.38	1.70	4.51	0.32	27.49	0.394	137	26.80	27.86	1.06	1.33	5.76	0.52	28.37	0.637	0.515	0.706	1.50	0.77
5	18	5.51	26.80	28.63	1.50	1.77	3.12	0.15	28.78	0.235	252	28.10	29.21	1.11	1.40	3.94	0.24	29.45	0.293	0.264	0.666	1.50	0.36
6	12	0.35	26.60	27.18	0.58	0.47	0.75	0.01	27.19	0.021	145	27.80	28.05	0.25**	0.16	2.27	0.08	28.13	0.433	0.227	N/A	1.25	0.10
7	24	10.76	21.70	25.41	2.00	3.14	3.42	0.18	25.59	0.193	162	22.50	25.72	2.00	3.14	3.42	0.18	25.91	0.193	0.193	0.312	1.50	0.27
8	12	2.53	23.50	26.00	1.00	0.79	3.22	0.16	26.16	0.429	82.0	24.50	26.35	1.00	0.79	3.22	0.16	26.51	0.429	0.429	0.352	1.25	0.20
9	12	1.03	24.50	26.55	1.00	0.79	1.32	0.03	26.58	0.072	70.0	27.00	27.43	0.43**	0.32	3.19	0.16	27.59	0.482	0.277	N/A	1.50	0.24
10	12	0.43	27.00	27.67	0.67	0.56	0.77	0.01	27.68	0.020	73.0	27.40	27.72	0.32	0.21	2.01	0.06	27.78	0.262	0.141	0.103	1.00	0.06
11	12	0.15	27.00	27.67	0.67	0.56	0.27	0.00	27.67	0.002	272	28.80	28.97	0.17**	0.08	1.78	0.05	29.01	0.440	0.221	N/A	1.00	0.05
12	12	0.23	27.80	28.15	0.35	0.25	0.92	0.01	28.17	0.049	109	28.70	28.90	0.20**	0.11	2.00	0.06	28.96	0.433	0.241	N/A	1.25	0.08
13	12	1.72	23.50	26.00	1.00	0.79	2.19	0.07	26.07	0.199	104	25.00	26.20	1.00	0.79	2.19	0.07	26.28	0.199	0.199	0.207	0.50	0.04
14	12	0.70	25.00	26.24	1.00	0.79	0.89	0.01	26.25	0.033	111	26.00	26.37	0.37	0.27	2.61	0.11	26.48	0.371	0.202	0.224	0.85	0.09
15	8	0.70	26.00	26.46	0.46	0.26	2.72	0.11	26.58	0.420	42.0	26.40	26.80	0.40**	0.22	3.26	0.17	26.96	0.664	0.542	N/A	1.00	0.17
16	15	6.62	23.60	26.00	1.25	1.23	5.39	0.45	26.45	0.896	20.0	23.90	26.18	1.25	1.23	5.39	0.45	26.63	0.895	0.895	0.179	1.00	0.45
17	15	3.69	28.10	29.57	1.25	1.23	3.01	0.14	29.71	0.279	102	28.60	29.85	1.25	1.23	3.01	0.14	29.99	0.268	0.273	0.279	0.70	0.10
18	12	1.95	28.60	29.95	1.00	0.79	2.49	0.10	30.04	0.257	192	29.60	30.41	0.81	0.68	2.86	0.13	30.54	0.261	0.259	0.497	1.00	0.13
19	12	0.14	28.70	28.98	0.28	0.18	0.78	0.01	28.99	0.046	36.0	29.00	29.16	0.16**	0.08	1.75	0.05	29.21	0.442	0.244	N/A	1.00	0.05

Project File: 1746-SA.stm | IDF File: ctdot2000.IDF | Total number of lines: 19 | Run Date: 11-17-2003

NOTES: Initial tailwater elevation = 23.68 (ft) , * Critical depth assumed., ** Critical depth assumed.

SUBJECT MIDDLETOWN HIGH SCHOOL
MIDDLETOWN, CT
JOB NO. 1746

CONSULTING ENGINEERS

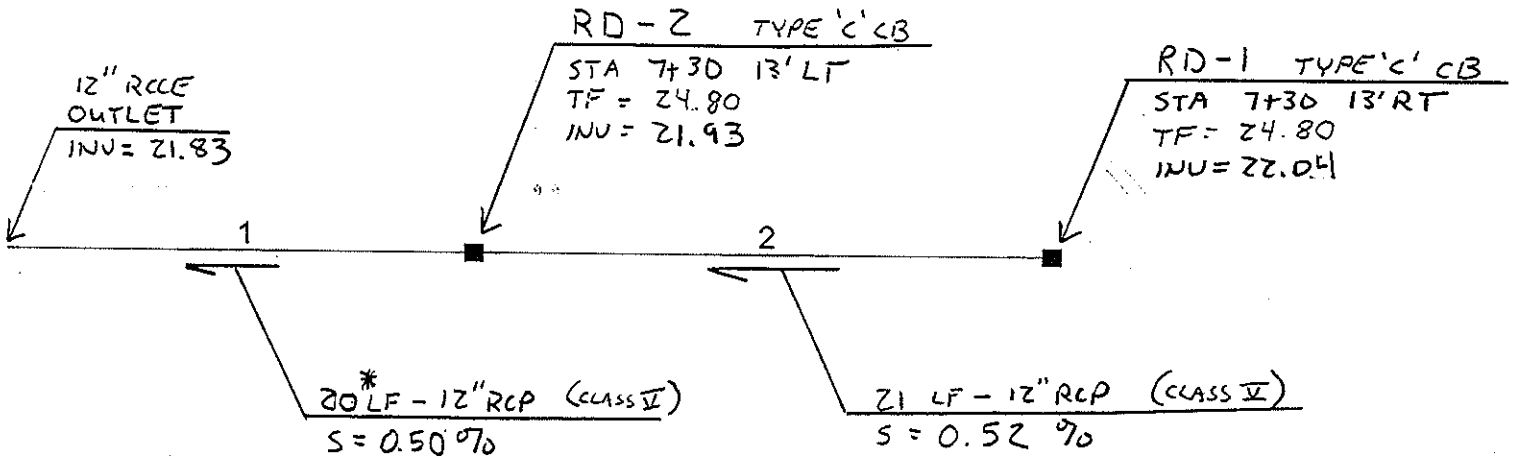
SHEET NO. 1 OF
COMPUTED BY J.A.V. DATE 11/7/2003
CHECKED BY DATE

DATA SHEET FOR RATIONAL METHOD STORM DRAINAGE DESIGN

Q = CIA

NODE		AREA	RUNOFF COEFFICIENT C			TIME OF CONCENTRATION					
INLET I.D.	CROSS SLOPE	ACRES	DESCRIPTION	C VALUE	TOTAL AC	ELEV. DIFF. FT	LENGTH FT	SLOPE %	COVER	TIME MIN.	COMMENTS
RD-1		0.070	PAVEMENT	0.85	0.060					10	
		0.040	GRASS	0.35	0.014						
		0.110			0.074						
RD-2		0.030	PAVEMENT	0.85	0.026					10	
		0.020	GRASS	0.35	0.007						
		0.050			0.033						
RD-3		0.250	PAVEMENT	0.85	0.21					10	
SAG		0.290	GRASS	0.35	0.10						
		0.540			0.31						
RD-4		0.100	PAVEMENT	0.85	0.09					10	
SAG		0.080	GRASS	0.35	0.03						
		0.180			0.11						
RD-5		0.120	PAVEMENT	0.85	0.10						
		0.040	GRASS	0.35	0.01					10	
		0.160			0.12						
RD-6		0.050	PAVEMENT	0.85	0.04						
		0.040	GRASS	0.35	0.01					10	
		0.090			0.06						
RD-7		0.070	PAVEMENT	0.85	0.06						
		0.160	GRASS	0.35	0.06					10	
		0.230			0.12						
RD-8		0.040	PAVEMENT	0.85	0.03						
		0.040	GRASS	0.35	0.01					10	
		0.080			0.05						

Hydraflow Plan View



* INCLUDES 6' LONG RCCE

Project file: RD1-RD2.stm	IDF file: CDOT2000.IDF	No. Lines: 2	11-11-2003

Hydraflow Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr line No.	Line length (ft)	Defl angle (deg)	Junc type	Known Q (cfs)	Drng area (ac)	Runoff coeff (C)	Inlet time (min)	Invert El Dn (ft)	Line slope (%)	Invert El Up (ft)	Line size (in)	Line type	N value (n)	J-loss coeff (K)	Inlet/ Rim El (ft)	
1	End	20.0	0.0	Comb	0.00	0.05	0.65	10.0	21.83	0.50	21.93	12	Cir	0.012	0.50	24.80	OUTLET-RD-2
2	1	21.0	0.0	Comb	0.00	0.11	0.67	10.0	21.93	0.52	22.04	12	Cir	0.012	1.00	24.80	RD-2 - RD-1

Project File: RD1-RD2.stm | IDF File: CDOT2000.IDF | Total number of lines: 2 | Date: 11-18-2003

Hydraflow Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	
1	End	20.0	0.05	0.16	0.65	0.03	0.11	10.0	10.8	4.7	0.50	2.73	2.50	12	0.50	21.93	21.83	22.23	22.13	24.80	22.84	OUTLET-RD-2
2	1	21.0	0.11	0.11	0.67	0.07	0.07	10.0	10.0	4.8	0.35	2.79	0.47	12	0.52	22.04	21.93	22.93	22.93	24.80	24.80	RD-2 - RD-1

Project File: RD1-RD2.stm

IDF File: CDOT2000.IDF

Total number of lines: 2

Run Date: 11-18-2003

NOTES: Intensity = 54.74 / (Inlet time + 10.80) ^ 0.80; Return period = 10 Yrs. ; Initial tailwater elevation = 22.13 (ft)

Hydraflow Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp line No
							Ht (in)	L (ft)	area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	depth (ft)	spread (ft)	depth (ft)	spread (ft)	Dep (in)	
1	RD-2	0.16	0.00	0.16	0.00	Comb	3.0	3.00	0.00	3.02	1.62	0.010	13.00	0.030	0.030	0.013	0.08	2.67	0.08	2.60	0.0	Off
2	RD-1	0.35	0.00	0.35	0.00	Comb	3.0	3.00	0.00	3.02	1.62	0.010	13.00	0.030	0.030	0.013	0.11	3.67	0.11	3.53	0.0	Off

Project File: RD1-RD2.stm | I-D-F File: CDOT2000.IDF | Total number of lines: 2 | Run Date: 11-18-2003

NOTES: Inlet N-Values = 0.012 ; Intensity = 54.74 / (Inlet time + 10.80) ^ 0.80; Return period = 10 Yrs. ; * Indicates Known Q added

Hydraflow FL-DOT Report

Line No	To Line	Type of struc	n - value	Len	Drainage Area (C1 = 0.85, C2 = 0.35, C3 = 0.9)			Time of conc	Time of flow in sect	Inten (I)	Total CA	Add Q / Total flow	Inlet elev	Elev of HGL / Elev of Crown / Elev of Invert			Rise Span	HGL Pipe	Actual Full Flow		Date: 11-18-2003 Frequency: 10 yrs Project: RD1-RD2.stm
					Increment (ac)	Sub-total (ac)	Sum CA					Q		Up	Down	Fall	Size	Slope	Vel	Cap	
				(ft)				(min)	(min)	(in/hr)		(cfs)	(ft)	(ft)	(ft)	(ft)	(in)	(%)	(ft/s)	(cfs)	Line description
1	End	Comb	0.012	20.0	0.03 0.02 0.00	0.10 0.06 0.00	0.09 0.02 0.00	10.78	0.52	4.7	0.11	0.00 0.50	24.80	22.23 22.93 21.93	22.13 22.83 21.83	0.10 0.10	12 12 Cir	0.50 0.50	2.50 3.47	0.50 2.73	OUTLET-RD-2
2	1	Comb	0.012	21.0	0.07 0.04 0.00	0.07 0.04 0.00	0.06 0.01 0.00	10.00	0.78	4.8	0.07	0.00 0.35	24.80	22.93 23.04 22.04	22.93 22.93 21.93	0.00 0.11	12 12 Cir	0.00 0.52	0.47 3.56	0.35 2.79	RD-2 - RD-1

NOTES: Intensity = 54.74 / (inlet time + 10.80) ^ 0.80 (in/hr) ; Time of flow in section is based on full flow.; Initial tailwater elevation = 22.13 (ft)

Hydraflow Hydraulic Grade Line Computations

Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
			Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf		Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf	Ave Sf	Enrgy loss		
	(in)	(cfs)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(ft)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(%)	(ft)	(K)	(ft)
1	12	0.50	21.83	22.13	0.30	0.20	2.50	0.10	22.23	0.430	20.0	21.93	22.23	0.30	0.20	2.49	0.10	22.33	0.426	0.428	0.086	0.50	0.05
2	12	0.35	21.93	22.93	1.00*	0.79	0.45	0.00	22.93	0.008	21.0	22.04	22.93	0.89	0.74	0.48	0.00	22.93	0.007	0.008	0.002	1.00	0.00

Project File: RD1-RD2.stm | IDF File: CDOT2000.IDF | Total number of lines: 2 | Run Date: 11-18-2003

NOTES: Initial tailwater elevation = 22.13 (ft) , * Crown depth assumed., ** Critical depth assumed.

CONSULTING ENGINEERS

SUBJECT MIDDLETOWN H.S. OUTLET PROTECTION

JOB NO. 1746

Sheet No. _____ of _____

Computed By JSP Date 11/11/03

Checked By _____ Date _____

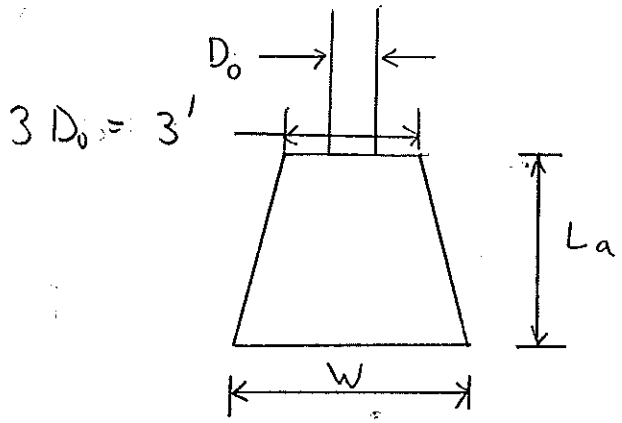
SYSTEM RD1 TO RD2

$Q = 0.5$ CFS

$D_o = 1$ FT

$TW = 0.3$ FT $\quad TW < 0.5\, D_o$

USING E+S CONTROL GUIDELINES, FIG. LS-4



$$L_a = \frac{1.7Q}{D_o^{3/2}} + 8D_o = \frac{1.7(0.5)}{(1)^{3/2}} + 8(1$$

$L_a = 8.85$ SAY 9 FT

$$W = 3D_o + 0.4L_a = 3(1) + 0.4(9)$$

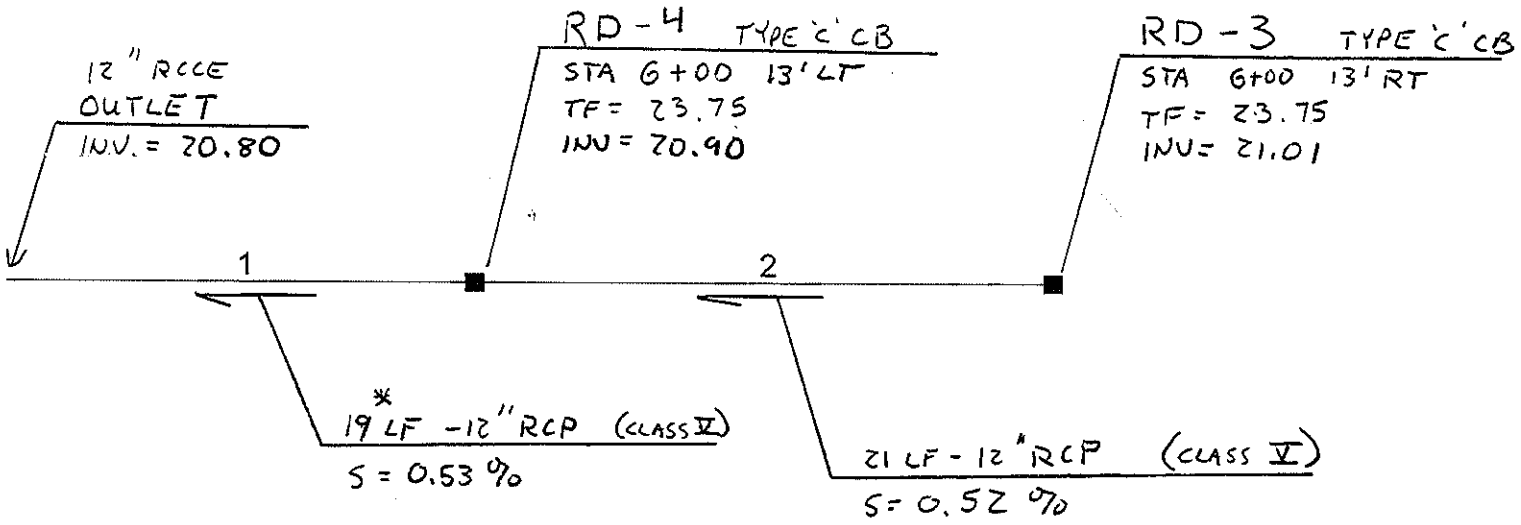
$W = 6.6$ SAY 7 FT

MEDIAN STONE DIAM.:

$$d_{50} = \left[\frac{0.02}{TW}\right]\left[\frac{Q}{D_o}\right]^{4/3} = \left[\frac{0.02}{0.3}\right]\left[\frac{0.5}{1}\right]^{4/3} = 0.03 \text{ FT}$$

USE MODIFIED RIPRAP $d_{50\,MAX} = 0.42$ FT

Hydraflow Plan View



* INCLUDES 6' LONG RCCE

Project file: RD3-RD4.stm	IDF file: CDOT2000.IDF	No. Lines: 2	11-11-2003

Hydraflow Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr line No.	Line length (ft)	Defl angle (deg)	Junc type	Known Q (cfs)	Drng area (ac)	Runoff coeff (C)	Inlet time (min)	Invert El Dn (ft)	Line slope (%)	Invert El Up (ft)	Line size (in)	Line type	N value (n)	J-loss coeff (K)	Inlet/ Rim El (ft)	
1	End	19.0	0.0	Comb	0.00	0.18	0.63	10.0	20.80	0.53	20.90	12	Cir	0.012	0.50	23.75	OUTLET-RD-4
2	1	21.0	0.0	Comb	0.00	0.54	0.58	10.0	20.90	0.52	21.01	12	Cir	0.012	1.00	23.75	RD-4 - RD-3

Project File: RD3-RD4.stm | IDF File: CDOT2000.IDF | Total number of lines: 2 | Date: 11-18-2003

Hydraflow Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	Dns line No.
1	OUTLET-RD-4	2.04	12 c	19.0	20.80	20.90	0.526	21.41	21.55	0.11	End
2	RD-4 - RD-3	1.50	12 c	21.0	20.90	21.01	0.524	21.90	21.93	0.06	1

Project File: RD3-RD4.stm	IDF File: CDOT2000.IDF	Total No. Lines: 2	Run Date: 11-18-2003

NOTES: c = circular; e = elliptical; b = box; Return period = 10 Yrs.; * Indicates surcharge condition.

Hydraflow Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	
1	End	19.0	0.18	0.72	0.63	0.11	0.43	10.0	10.2	4.8	2.04	2.80	3.94	12	0.53	20.90	20.80	21.55	21.41	23.75	21.80	OUTLET-RD-4
2	1	21.0	0.54	0.54	0.58	0.31	0.31	10.0	10.0	4.8	1.50	2.79	1.96	12	0.52	21.01	20.90	21.93	21.90	23.75	23.75	RD-4 - RD-3

Project File: RD3-RD4.stm | IDF File: CDOT2000.IDF | Total number of lines: 2 | Run Date: 11-18-2003

NOTES: Intensity = 54.74 / (Inlet time + 10.80) ^ 0.80; Return period = 10 Yrs. ; Initial tailwater elevation = 21.41 (ft)

Hydraflow Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp line No
							Ht (in)	L (ft)	area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	depth (ft)	spread (ft)	depth (ft)	spread (ft)	Dep (in)	
1	RD-4	0.54	0.00	0.54	0.00	Comb	3.0	3.00	3.29	3.02	1.62	Sag	13.00	0.030	0.030	0.000	0.10	3.33	0.10	3.33	0.0	Off
2	RD-3	1.50	0.00	1.50	0.00	Comb	3.0	3.00	3.29	3.02	1.62	Sag	13.00	0.030	0.030	0.000	0.19	6.33	0.19	6.33	0.0	Off

Project File: RD3-RD4.stm | I-D-F File: CDOT2000.IDF | Total number of lines: 2 | Run Date: 11-18-2003

NOTES: Inlet N-Values = 0.012 ; Intensity = 54.74 / (Inlet time + 10.80) ^ 0.80; Return period = 10 Yrs. ; * Indicates Known Q added

Hydraflow FL-DOT Report

Line No	To Line	Type of struc	n - value	Len	Drainage Area C1 = 0.85 C2 = 0.35 C3 = 0.9			Time of conc	Time of flow in sect	Inten (I)	Total CA	Add Q / Total flow	Inlet elev	Elev of HGL / Elev of Crown / Elev of Invert			Rise Span	HGL Pipe	Actual Full Flow		Date: 11-18-2003 / Frequency: 10 yrs / Project: RD3-RD4.stm
					Increment (ac)	Sub-total (ac)	Sum CA					Q		Up	Down	Fall	Size	Slope	Vel	Cap	
				(ft)				(min)	(min)	(in/hr)		(cfs)	(ft)	(ft)	(ft)	(ft)	(in)	(%)	(ft/s)	(cfs)	Line description
1	End	Comb	0.012	19.0	0.10 0.08 0.00	0.35 0.37 0.00	0.30 0.13 0.00	10.18	0.12	4.8	0.43	0.00 2.04	23.75	21.55 21.90 20.90	21.41 21.80 20.80	0.14 0.10	12 12 Cir	0.74 0.53	3.94 3.56	2.04 2.80	OUTLET-RD-4
2	1	Comb	0.012	21.0	0.25 0.29 0.00	0.25 0.29 0.00	0.21 0.10 0.00	10.00	0.18	4.8	0.31	0.00 1.50	23.75	21.93 22.01 21.01	21.90 21.90 20.90	0.03 0.11	12 12 Cir	0.12 0.52	1.96 3.56	1.50 2.79	RD-4 - RD-3

NOTES: Intensity = 54.74 / (Inlet time + 10.80) ^ 0.80 (in/hr) ; Time of flow in section is based on full flow.; Initial tailwater elevation = 21.41 (ft)

Hydraflow Hydraulic Grade Line Computations

Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
			Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf		Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf	Ave Sf	Enrgy loss		
	(in)	(cfs)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(ft)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(%)	(ft)	(K)	(ft)
1	12	2.04	20.80	21.41	0.61	0.50	4.10	0.26	21.67	0.601	19.0	20.90	21.55	0.65	0.54	3.79	0.22	21.77	0.495	0.548	0.104	0.50	0.11
2	12	1.50	20.90	21.90	1.00*	0.79	1.92	0.06	21.96	0.152	21.0	21.01	21.93	0.92	0.75	2.00	0.06	21.99	0.132	0.142	0.030	1.00	0.06

Project File: RD3-RD4.stm | IDF File: CDOT2000.IDF | Total number of lines: 2 | Run Date: 11-18-2003

NOTES: Initial tailwater elevation = 21.40511 (ft) , * Crown depth assumed., ** Critical depth assumed.

CONSULTING ENGINEERS

SUBJECT MIDDLETOWN HS. OUTLET PROTECTION

JOB NO. 1746

Sheet No. _____ of _____

Computed By JSP Date 11/11/03

Checked By _____ Date _____

SYSTEM RD 3 TO RD 4

$Q = 2.04$ CFS

$D_o = 1$ FT

$T_w = 0.61$ FT $T_W > 0.5\,D_o$

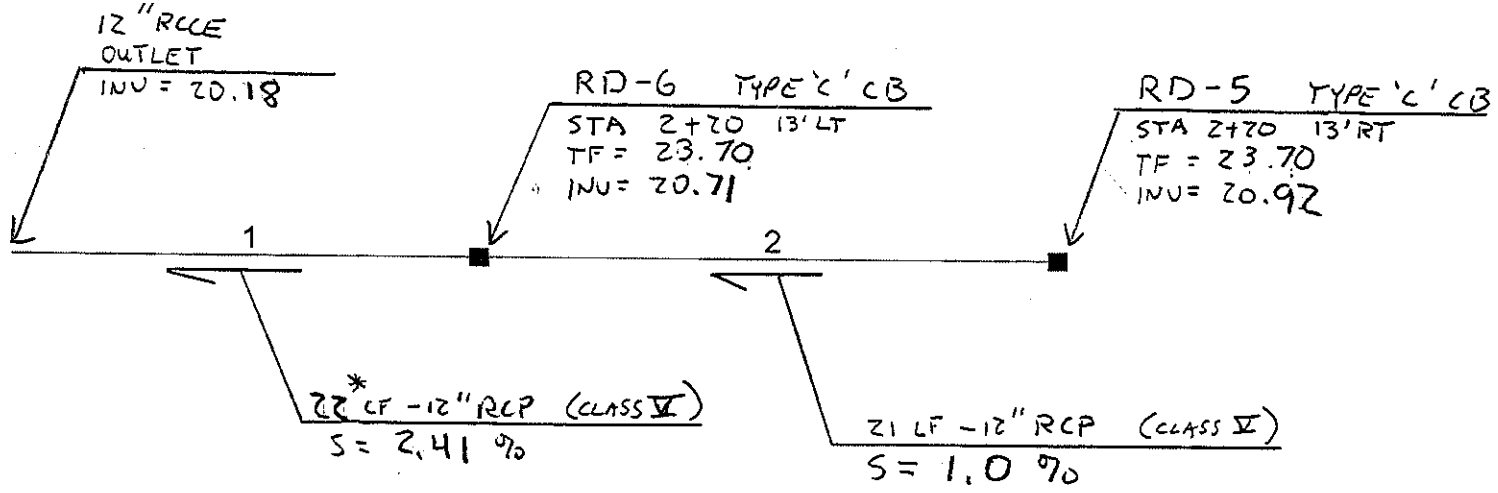
$$L_a = \frac{1.7\,Q}{D_o^{3/2}} + 8D_o = \frac{1.7(2.04)}{(1)^{3/2}} + 8(1) = 11.47 \text{ SAY } 11 \text{ F}$$

$$W = 3D_o + L_a = 3(1) + 11 = 14 \text{ FT}$$

$$d_{50} = \left[\frac{0.02}{T_w}\right]\left[\frac{Q}{D_o}\right]^{4/3} = \left[\frac{0.02}{0.61}\right]\left[\frac{2.04}{1}\right]^{4/3} = 0.08 \text{ FT}$$

USE MODIFIED RIPRAP d_{50} MAX = 0.42 FT

Hydraflow Plan View



* INCLUDES 6' LONG RCCE

Project file: RD5-RD6.stm	IDF file: CDOT2000.IDF	No. Lines: 2	11-11-2003

Hydraflow Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr line No.	Line length (ft)	Defl angle (deg)	Junc type	Known Q (cfs)	Drng area (ac)	Runoff coeff (C)	Inlet time (min)	Invert El Dn (ft)	Line slope (%)	Invert El Up (ft)	Line size (in)	Line type	N value (n)	J-loss coeff (K)	Inlet/ Rim El (ft)	
1	End	22.0	0.0	Comb	0.00	0.09	0.63	10.0	20.18	2.41	20.71	12	Cir	0.012	0.50	23.70	OUTLET-RD-6
2	1	21.0	0.0	Comb	0.00	0.16	0.73	10.0	20.71	1.00	20.92	12	Cir	0.012	1.00	23.70	RD-6 - RD-5

Project File: RD5-RD6.stm | IDF File: CDOT2000.IDF | Total number of lines: 2 | Date: 11-18-2003

Hydraflow Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	Dns line No.
1	OUTLET-RD-6	0.82	12 c	22.0	20.18	20.71	2.409	20.56	21.09	0.07	End
2	RD-6 - RD-5	0.56	12 c	21.0	20.71	20.92	1.000	21.71	21.71	0.01	1

Project File: RD5-RD6.stm	IDF File: CDOT2000.IDF	Total No. Lines: 2	Run Date: 11-18-2003

NOTES: c = circular; e = elliptical; b = box; Return period = 10 Yrs.; * Indicates surcharge condition.

Hydraflow Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	
1	End	22.0	0.09	0.25	0.63	0.06	0.17	10.0	10.5	4.7	0.82	5.99	2.95	12	2.41	20.71	20.18	21.09	20.56	23.70	21.73	OUTLET-RD-6
2	1	21.0	0.16	0.16	0.73	0.12	0.12	10.0	10.0	4.8	0.56	3.86	0.78	12	1.00	20.92	20.71	21.71	21.71	23.70	23.70	RD-6 - RD-5

Project File: RD5-RD6.stm | IDF File: CDOT2000.IDF | Total number of lines: 2 | Run Date: 11-18-2003

NOTES: Intensity = 54.74 / (Inlet time + 10.80) ^ 0.80; Return period = 10 Yrs. ; Initial tailwater elevation = 20.56 (ft)

Hydraflow Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp line No
							Ht (in)	L (ft)	area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	depth (ft)	spread (ft)	depth (ft)	spread (ft)	Dep (in)	
1	RD-6	0.27	0.00	0.27	0.00	Comb	3.0	3.00	0.00	3.02	1.62	0.010	13.00	0.030	0.030	0.013	0.10	3.33	0.10	3.20	0.0	Off
2	RD-5	0.56	0.00	0.56	0.00	Comb	3.0	3.00	0.00	3.02	1.62	0.010	13.00	0.030	0.030	0.013	0.13	4.33	0.13	4.20	0.0	Off

Project File: RD5-RD6.stm | I-D-F File: CDOT2000.IDF | Total number of lines: 2 | Run Date: 11-18-2003

NOTES: Inlet N-Values = 0.012 ; Intensity = 54.74 / (Inlet time + 10.80) ^ 0.80; Return period = 10 Yrs. ; * Indicates Known Q added

Hydraflow FL-DGT Report

Line No	To Line	Type of struc	n - value	Len (ft)	Drainage Area C1 = 0.85 C2 = 0.35 C3 = 0.9 Increment (ac)	Drainage Area Sub-total (ac)	Drainage Area Sum CA	Time of conc (min)	Time of flow in sect (min)	Inten (I) (in/hr)	Total CA	Add Q / Total flow Q (cfs)	Inlet elev (ft)	Elev of HGL / Elev of Crown / Elev of Invert Up (ft)	Down (ft)	Fall (ft)	Rise / Span Size (in)	HGL / Pipe Slope (%)	Actual / Full Flow Vel (ft/s)	Cap (cfs)	Line description
																					Date: 11-18-2003
																					Frequency: 10 yrs
																					Project: RD5-RD6.stm
1	End	Comb	0.012	22.0	0.05 0.04 0.00	0.17 0.08 0.00	0.14 0.03 0.00	10.49	0.35	4.7	0.17	0.00 0.82	23.70	21.09 21.71 20.71	20.56 21.18 20.18	0.53 0.53	12 12 Cir	2.41 2.41	2.95 7.62	0.82 5.99	OUTLET-RD-6
2	1	Comb	0.012	21.0	0.12 0.04 0.00	0.12 0.04 0.00	0.10 0.01 0.00	10.00	0.49	4.8	0.12	0.00 0.56	23.70	21.71 21.92 20.92	21.71 21.71 20.71	0.00 0.21	12 12 Cir	0.01 1.00	0.78 4.91	0.56 3.86	RD-6 - RD-5

NOTES: Intensity = 54.74 / (Inlet time + 10.80) ^ 0.80 (in/hr) ; Time of flow in section is based on full flow.; Initial tailwater elevation = 20.56 (ft)

Hydraflow Hydraulic Grade Line Computations

Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
			Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf		Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf	Ave Sf	Enrgy loss		
	(in)	(cfs)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(ft)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(%)	(ft)	(K)	(ft)
1	12	0.82	20.18	20.56	0.38	0.28	2.95	0.14	20.70	0.462	22.0	20.71	21.09	0.38**	0.28	2.95	0.14	21.23	0.462	0.462	N/A	0.50	0.07
2	12	0.56	20.71	21.71	1.00*	0.79	0.71	0.01	21.72	0.021	21.0	20.92	21.71	0.79	0.67	0.84	0.01	21.72	0.023	0.022	0.005	1.00	0.01

Project File: RD5-RD6.stm | IDF File: CDOT2000.IDF | Total number of lines: 2 | Run Date: 11-18-2003

NOTES: Initial tailwater elevation = 20.56366 (ft), * Crown depth assumed., ** Critical depth assumed.

CONSULTING ENGINEERS

SUBJECT MIDDLETOWN HS OUTLET PROTECTION

JOB NO. 1746

Sheet No. _____ of _____

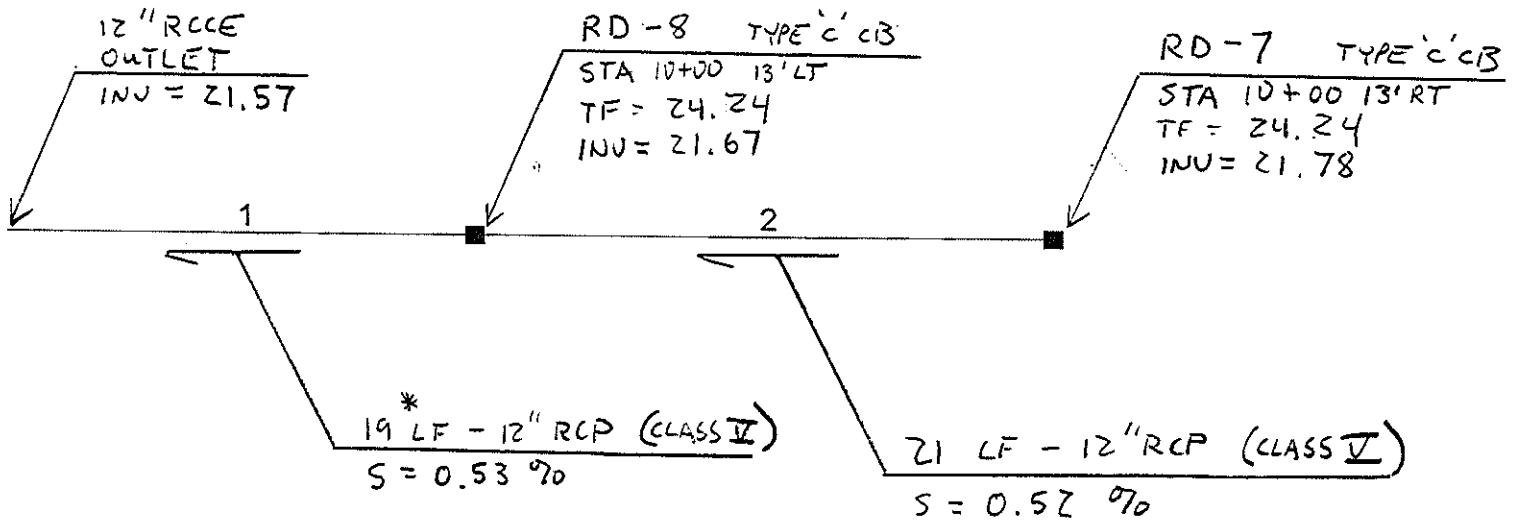
Computed By SSP Date 11/11/03

Checked By _____ Date _____

SYSTEM RD 5 TO RD 6

SPLASHPAD IS NOT NECESSARY. THIS SYSTEM OUTLETS INTO A LINED CHANNEL AT THE BOX CULVERT OUTLET.

Hydraflow Plan View



* INCLUDES 6' LONG RCCE

Project file: RD7-RD8.stm	IDF file: CDOT2000.IDF	No. Lines: 2	11-11-2003

Hydraflow Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr line No.	Line length (ft)	Defl angle (deg)	Junc type	Known Q (cfs)	Drng area (ac)	Runoff coeff (C)	Inlet time (min)	Invert El Dn (ft)	Line slope (%)	Invert El Up (ft)	Line size (in)	Line type	N value (n)	J-loss coeff (K)	Inlet/ Rim El (ft)	
1	End	19.0	0.0	Comb	0.00	0.08	0.60	10.0	21.57	0.53	21.67	12	Cir	0.012	0.50	24.24	OUTLET-RD-8
2	1	21.0	0.0	Comb	0.00	0.23	0.50	10.0	21.67	0.52	21.78	12	Cir	0.012	1.00	24.24	RD-8 - RD-7

Project File: RD7-RD8.stm | IDF File: CDOT2000.IDF | Total number of lines: 2 | Date: 11-18-2003

Hydraflow Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	Dns line No.
1	OUTLET-RD-8	0.77	12 c	19.0	21.57	21.67	0.526	21.94	22.04	0.06	End
2	RD-8 - RD-7	0.55	12 c	21.0	21.67	21.78	0.524	22.67	22.67	0.01	1

Project File: RD7-RD8.stm	IDF File: CDOT2000.IDF	Total No. Lines: 2	Run Date: 11-18-2003

NOTES: c = circular; e = elliptical; b = box; Return period = 10 Yrs.; * Indicates surcharge condition.

Hydraflow Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line		Incr	Total		Incr	Total	Inlet	Syst					Size	Slope	Up	Dn	Up	Dn	Up	Dn	
		(ft)	(ac)	(ac)	(C)			(min)	(min)	(in/hr)	(cfs)	(cfs)	(ft/s)	(in)	(%)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	
1	End	19.0	0.08	0.31	0.60	0.05	0.16	10.0	10.5	4.7	0.77	2.80	2.88	12	0.53	21.67	21.57	22.04	21.94	24.24	21.57	OUTLET-RD-8
2	1	21.0	0.23	0.23	0.50	0.12	0.12	10.0	10.0	4.8	0.55	2.79	0.72	12	0.52	21.78	21.67	22.67	22.67	24.24	24.24	RD-8 - RD-7

Project File: RD7-RD8.stm | IDF File: CDOT2000.IDF | Total number of lines: 2 | Run Date: 11-18-2003

NOTES: Intensity = 54.74 / (Inlet time + 10.80) ^ 0.80; Return period = 10 Yrs. ; Initial tailwater elevation = 21.94 (ft)

Hydraflow Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp line No
							Ht (in)	L (ft)	area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	depth (ft)	spread (ft)	depth (ft)	spread (ft)	Dep (in)	
1	RD-8	0.23	0.00	0.23	0.00	Comb	3.0	3.00	0.00	3.02	1.62	0.010	13.00	0.030	0.030	0.013	0.09	3.00	0.09	3.00	0.0	Off
2	RD-7	0.55	0.00	0.55	0.00	Comb	3.0	3.00	0.00	3.02	1.62	0.010	13.00	0.030	0.030	0.013	0.13	4.33	0.13	4.17	0.0	Off

Project File: RD7-RD8.stm | I-D-F File: CDOT2000.IDF | Total number of lines: 2 | Run Date: 11-18-2003

NOTES: Inlet N-Values = 0.012 ; Intensity = 54.74 / (Inlet time + 10.80) ^ 0.80; Return period = 10 Yrs. ; * Indicates Known Q added

Hydraflow FL-DOT Report

Line No	To Line	Type of struc	n - value	Len	Drainage Area C1 = 0.85 C2 = 0.35 C3 = 0.9			Time of conc	Time of flow in sect	Inten (I)	Total CA	Add Q / Total flow	Inlet elev	Elev of HGL / Elev of Crown / Elev of Invert			Rise Span	HGL Pipe	Actual Full Flow		Date: 11-18-2003 / Frequency: 10 yrs / Project: RD7-RD8.stm
				(ft)	Increment (ac)	Sub-total (ac)	Sum CA	(min)	(min)	(in/hr)		Q (cfs)	(ft)	Up (ft)	Down (ft)	Fall (ft)	Size (in)	Slope (%)	Vel (ft/s)	Cap (cfs)	Line description
1	End	Comb	0.012	19.0	0.04 0.04 0.00	0.11 0.20 0.00	0.09 0.07 0.00	10.50	0.32	4.7	0.16	0.00 0.77	24.24	22.04 22.67 21.67	21.94 22.57 21.57	0.10 0.10	12 12 Cir	0.54 0.53	2.88 3.56	0.77 2.80	OUTLET-RD-8
2	1	Comb	0.012	21.0	0.07 0.16 0.00	0.07 0.16 0.00	0.06 0.06 0.00	10.00	0.50	4.8	0.12	0.00 0.55	24.24	22.67 22.78 21.78	22.67 22.67 21.67	0.00 0.11	12 12 Cir	0.02 0.52	0.72 3.56	0.55 2.79	RD-8 - RD-7

NOTES: Intensity = 54.74 / (Inlet time + 10.80) ^ 0.80 (in/hr) ; Time of flow in section is based on full flow.; Initial tailwater elevation = 21.94 (ft)

Hydraflow Hydraulic Grade Line Computations

Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
			Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf		Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf	Ave Sf	Enrgy loss		
	(in)	(cfs)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(ft)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(%)	(ft)	(K)	(ft)
1	12	0.77	21.57	21.94	0.37	0.27	2.89	0.13	22.07	0.458	19.0	21.67	22.04	0.37	0.27	2.86	0.13	22.17	0.447	0.452	0.086	0.50	0.06
2	12	0.55	21.67	22.67	1.00*	0.79	0.70	0.01	22.68	0.021	21.0	21.78	22.67	0.89	0.74	0.75	0.01	22.68	0.018	0.019	0.004	1.00	0.01

Project File: RD7-RD8.stm | IDF File: CDOT2000.IDF | Total number of lines: 2 | Run Date: 11-18-2003

NOTES: Initial tailwater elevation = 21.94181 (ft), * Crown depth assumed., ** Critical depth assumed.

CONSULTING ENGINEERS

SUBJECT MIDDLETOWN HS
OUTLET PROTECTION

JOB NO. 1746

Sheet No. _____ of _____

Computed By JSP Date 11/11/03

Checked By _____ Date _____

SYSTEM RD 7 TO RD 8

$Q = 0.77$ CFS

$D_0 = 1$ FT

$TW = 0.37$ $\quad TW < 0.5\,D_0$

$$L_a = \frac{1.7(0.77)}{(1)^{3/2}} + 8(1) = 9.3 \quad \text{SAY } 9 \text{ FT}$$

$$W = 3(1) + 0.4(9) = 6.6 \quad \text{SAY } 7 \text{ FT}$$

$$d_{50} = \left[\frac{0.02}{0.37}\right]\left[\frac{0.77}{1}\right]^{4/3} = 0.04 \text{ FT}$$

USE MODIFIED RIPRAP d_{50} MAX = 0.42 FT

APPENDIX 3

SECTION 3 CROSS CULVERT CALCULATIONS

PROJECT: Middletown HS
TOWN: Middletown CT
ROUTE: Drive to Student Parking

CULVERT COMPUTATIONS

PREPARED BY: _____
CHECKED BY: EGB
DATE: 11-17-03

HYDROLOGIC AND CHANNEL INFORMATION

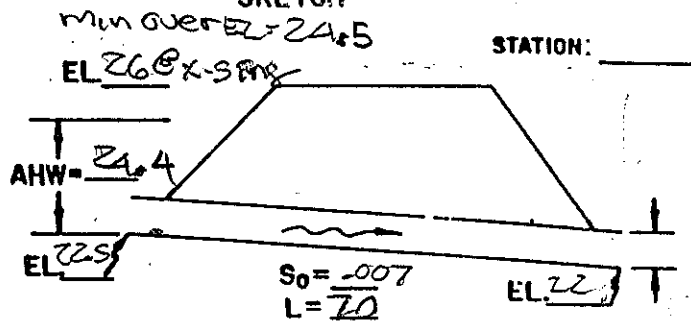
Check Capacity
Separate From WQV Pond.

check 100yr Flow Q=11.8

Q_1 = _____ TW_1 = _____
Q_2 = _____ TW_2 = _____

Q_1 = DESIGN DISCHARGE, FREQ. = _____ YR.
Q_2 = CHECK DISCHARGE, FREQ. = _____ YR.

SKETCH



MEAN STREAM VELOCITY = _____
MAX. STREAM VELOCITY = _____

CULVERT DESCRIPTION (ENTRANCE TYPE)	Q	SIZE	HEADWATER COMPUTATION: INLET CONT. HW/D	INLET CONT. HW	OUTLET CONTROL $HW = H + h_o - LS_o$: K_e	H	d_c	$\frac{d_c+D}{2}$	TW	h_o	HW	CONTROLLING HW	OUTLET VELOCITY	COST	COMMENTS
18" RCCE	11.8	24"	.95	1.08	.5	.6	1.6	1.8	—	1.08	1.69	1.69	3.8		100yr will be contained in Pond

SUMMARY & RECOMMENDATIONS:
See WQV calculations for Pond

PROJECT: 1746
TOWN: Middletown
ROUTE: Wildermans Way

CULVERT COMPUTATIONS

PREPARED BY: ECB
CHECKED BY:
DATE: 10/27/03

HYDROLOGIC AND CHANNEL INFORMATION

Small Structure
Design Q = 50yr
Check 100yr

Tw From FEMA

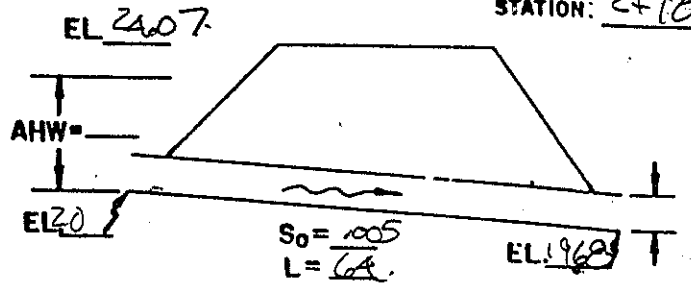
Q_{50} = 88 CFS
Q_{100} = 97 CFS

TW_1 = 21
TW_2 = 23

Q_1 = DESIGN DISCHARGE, FREQ. = 50 YR.
Q_2 = CHECK DISCHARGE, FREQ. = 100 YR.

SKETCH

STATION: 2+10.±



MEAN STREAM VELOCITY =
MAX. STREAM VELOCITY =

CULVERT DESCRIPTION (ENTRANCE TYPE)	Q	SIZE	HEADWATER COMPUTATION. INLET CONT.		OUTLET CONTROL $HW = H + h_o - LS_o$							CONTROLLING HW	OUTLET VELOCITY	COST	COMMENTS
			$\frac{HW}{D}$	HW	K_e	H	d_c	$\frac{d_c+D}{2}$	TW	h_o	HW				
24 x 16 W	88	2x10	1.05	2.1	.5	.53	1.25	1.62	1.3	1.62	1.8	2.1	4.4 FPS		Inlet Cont.
	97	2x10	1.12	2.24	.5	.65	1.4	1.70	3.3	3.3	3.6	3.6	4.9 FPS		outlet Cont

SUMMARY & RECOMMENDATIONS:

PROJECT: Middletown H.S.
TOWN: Middletown Ct
ROUTE: _____

CULVERT COMPUTATIONS

PREPARED BY: ECB
CHECKED BY: _____
DATE: 10/29/03

HYDROLOGIC AND CHANNEL INFORMATION

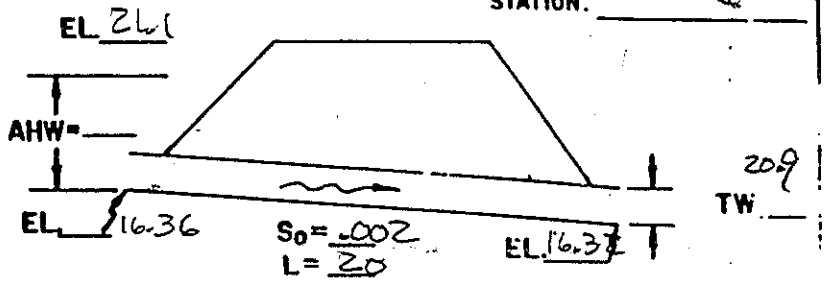
Q_1 = 270
Q_2 = _____

TW_1 = 20.9 USGS rated
TW_2 = _____ Backwater

Q_1 = DESIGN DISCHARGE, FREQ. = 100 YR.
Q_2 = CHECK DISCHARGE, FREQ. = _____ YR.

SKETCH

Access Rd to Ball Field
STATION: _____



MEAN STREAM VELOCITY = _____
MAX. STREAM VELOCITY = _____

CULVERT DESCRIPTION (ENTRANCE TYPE)	Q	SIZE	HEADWATER COMPUTATION. INLET CONT. HW/D	INLET CONT. HW	OUTLET CONTROL HW=H+h_o-LS_o K_e	H	d_c	$\frac{d_c+D}{2}$	TW	h_o	HW	CONTROLLING H.W.	OUTLET VELOCITY	COST	COMMENTS
16WX 3ft	270	12x4	1.15	3.45	.5	.76	2.0	2.5	4.58	4.58	5.3				21.66

SUMMARY & RECOMMENDATIONS: $A = 48 FT^2$ $V = 270/48 = 5.6 FPS$ $WP = 38$ $R = 1.26$

$$H = 1.5 + \frac{29(.02)^2 \times 20}{1.26^{1.33}} \times \frac{5.6^2}{64.4} = .76$$

PROJECT: Middletown Hts
TOWN: Middletown Ct
ROUTE: Temp Access Rd

CULVERT COMPUTATIONS

PREPARED BY: _____
CHECKED BY: _____
DATE: _____

HYDROLOGIC AND CHANNEL INFORMATION

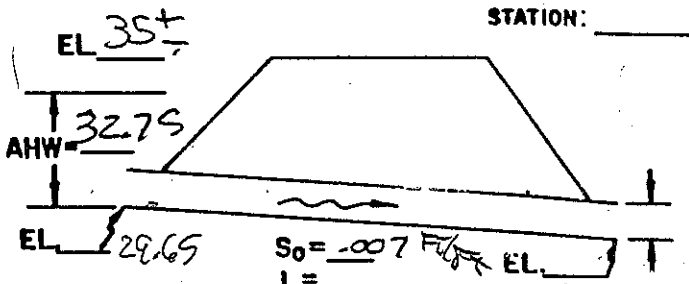
Q_1 = 31
Q_2 = _____

TW_1 = $d_c + D/2$
TW_2 = _____

Q_1 = DESIGN DISCHARGE, FREQ. = 5 YR.
Q_2 = CHECK DISCHARGE, FREQ. = _____ YR.

SKETCH

STATION: _____



MEAN STREAM VELOCITY = _____
MAX. STREAM VELOCITY = _____

CULVERT DESCRIPTION (ENTRANCE TYPE)	Q	SIZE	HEADWATER COMFUTATION. INLET CONT. $\frac{HW}{D}$	INLET CONT. HW	OUTLET CONTROL $HW = H + h_o - LS_o$ K_e	H	d_c	$\frac{d_c+D}{2}$	TW	h_o	HW	CONTROLLING HW	OUTLET VELOCITY	COST	COMMENTS
36" CCMP	31	36"	.96	2.9	.5	.75	2.2	2.6	-	2.6	3.1		4.4		
scale (3)															

SUMMARY & RECOMMENDATIONS:

CONSULTING ENGINEERS

SUBJECT Middletown H.S
Temporary Road Drain.

JOB NO. 1746

Sheet No. _____ of _____

Computed By ECR Date 10-30-03

Checked By _____ Date _____

Temporary Access Road will intercept existing DAZ S.A. 1, 2 + 3 + portions of Sub AREA A.

Sub Area 4

(Swale) Overland = 5.05 ACres C = .2

Existing School = 6.7 ACres C. 8

T_C = 17 min down Hill + Assume 3 Min in Drain System = 20 min.

Design For 5 year STORM.

Hydrograph Return Period Recap

Hyd. No.	Hydrograph type (origin)	Inflow Hyd(s)	Peak Outflow (cfs)								Hydrograph description
			1-Yr	2-Yr	3-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr	
1	Rational	-------	-------	11.85	-------	14.88	16.95	19.82	21.95	24.01	sub area 1
2	Rational	-------	-------	4.20	-------	5.30	6.12	7.20	8.02	8.84	sub area 2
3	Rational	-------	-------	12.19	-------	15.20	17.13	19.88	21.91	23.81	sub area 3
4	Rational	-------	-------	13.75	-------	17.36	20.11	23.67	26.42	29.16	sub area 4
5	Reservoir	1	-------	4.96	-------	5.77	6.16	6.58	6.88	7.25	sub div detention pond
6	Combine	2, 5	-------	9.02	-------	10.88	12.14	13.59	14.68	15.74	sub 2 and resev.a
7	Combine	3, 6	-------	17.35	-------	21.46	24.16	27.90	30.66	33.28	
8	Combine	4, 7	-------	24.81	-------	30.76	34.97	40.59	44.80	48.85	

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	Rational	14.88	1	17	15,173	----	------	------	sub area 1
2	Rational	5.30	1	23	7,320	----	------	------	sub area 2
3	Rational	15.20	1	13	11,852	----	------	------	sub area 3
4	Rational	17.36	1	25	26,045	----	------	------	sub area 4
5	Reservoir	5.77	1	27	13,653	1	103.83	9,180	sub div detention pond
6	Combine	10.88	1	23	20,973	2, 5	------	------	sub 2 and resev.a
7	Combine	21.46	1	13	32,825	3, 6	------	------	
8	Combine	30.76	1	18	58,870	4, 7	------	------	

Hydrograph Report

Hydraflow Hydrographs by Intelisolve

Hyd. No. 1

sub area 1

Hydrograph type	= Rational	Peak discharge	= 14.88 cfs
Storm frequency	= 5 yrs	Time interval	= 1 min
Drainage area	= 10.6 ac	Runoff coeff.	= 0.42
Intensity	= 3.341 in/hr	Time of conc. (Tc)	= 17 min
IDF Curve	= CDOT2000.idf	Asc/Rec limb fact	= 1/1

Hydrograph Volume = 15,173 cuft

Hydrograph Discharge Table

Time (hrs)	Outflow cfs)
0.23	12.25
0.25	13.13
0.27	14.00
0.28	14.88 <<
0.30	14.00
0.32	13.13
0.33	12.25

...End

Hydrograph Report

Hyd. No. 2

sub area 2

Hydrograph type	= Rational	Peak discharge	= 5.30 cfs
Storm frequency	= 5 yrs	Time interval	= 1 min
Drainage area	= 9.4 ac	Runoff coeff.	= 0.2
Intensity	= 2.822 in/hr	Time of conc. (Tc)	= 23 min
IDF Curve	= CDOT2000.idf	Asc/Rec limb fact	= 1/1

Hydrograph Volume = 7,320 cuft

Hydrograph Discharge Table

Time -- (hrs)	Outflow cfs)
0.32	4.38
0.33	4.61
0.35	4.84
0.37	5.07
0.38	5.30 <<
0.40	5.07
0.42	4.84
0.43	4.61
0.45	4.38

...End

Hydrograph Report

Hyd. No. 3

sub area 3

Hydrograph type	= Rational	Peak discharge	= 15.20 cfs
Storm frequency	= 5 yrs	Time interval	= 1 min
Drainage area	= 11.4 ac	Runoff coeff.	= 0.35
Intensity	= 3.825 in/hr	Time of conc. (Tc)	= 13 min
IDF Curve	= CDOT2000.idf	Asc/Rec limb fact	= 1/1

Hydrograph Volume = 11,852 cuft

Hydrograph Discharge Table

Time (hrs)	Outflow (cfs)
0.18	12.86
0.20	14.03
0.22	15.20 <<
0.23	14.03
0.25	12.86

...End

Hydrograph Report

Hyd. No. 4

sub area 4

Hydrograph type	= Rational	Peak discharge	= 17.36 cfs
Storm frequency	= 5 yrs	Time interval	= 1 min
Drainage area	= 12.2 ac	Runoff coeff.	= 0.53
Intensity	= 2.685 in/hr	Time of conc. (Tc)	= 25 min
IDF Curve	= CDOT2000.idf	Asc/Rec limb fact	= 1/1

Hydrograph Volume = 26,045 cuft

Hydrograph Discharge Table

Time (hrs)	Outflow (cfs)
0.33	13.89
0.35	14.59
0.37	15.28
0.38	15.97
0.40	16.67
0.42	17.36 <<
0.43	16.67
0.45	15.97
0.47	15.28
0.48	14.58
0.50	13.89

...End

Hydrograph Report

Hyd. No. 5

sub div detention pond

Hydrograph type	= Reservoir	Peak discharge	= 5.77 cfs
Storm frequency	= 5 yrs	Time interval	= 1 min
Inflow hyd. No.	= 1	Reservoir name	= saddle ridge det.
Max. Elevation	= 103.83 ft	Max. Storage	= 9,180 cuft

Storage Indication method used.

Outflow hydrograph volume = 13,653 cuft

Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
0.30	14.00	103.08	4.80	4.76	-----	-----	-----	-----	-----	-----	-----	4.76
0.32	13.13	103.24	5.05	4.98	-----	-----	-----	-----	-----	-----	-----	4.98
0.33	12.25	103.37	5.19	5.18	-----	-----	-----	-----	-----	-----	-----	5.18
0.35	11.38	103.49	5.36	5.33	-----	-----	-----	-----	-----	-----	-----	5.33
0.37	10.50	103.59	5.52	5.47	-----	-----	-----	-----	-----	-----	-----	5.47
0.38	9.63	103.67	5.61	5.57	-----	-----	-----	-----	-----	-----	-----	5.57
0.40	8.75	103.74	5.67	5.65	-----	-----	-----	-----	-----	-----	-----	5.65
0.42	7.88	103.78	5.72	5.71	-----	-----	-----	-----	-----	-----	-----	5.71
0.43	7.00	103.81	5.75	5.75	-----	-----	-----	-----	-----	-----	-----	5.75
0.45	6.13	103.83 <<	5.77	5.77	-----	-----	-----	-----	-----	-----	-----	5.77 <<
0.47	5.25	103.83	5.77	5.77	-----	-----	-----	-----	-----	-----	-----	5.77
0.48	4.38	103.81	5.75	5.75	-----	-----	-----	-----	-----	-----	-----	5.75
0.50	3.50	103.78	5.71	5.71	-----	-----	-----	-----	-----	-----	-----	5.71
0.52	2.63	103.73	5.66	5.65	-----	-----	-----	-----	-----	-----	-----	5.65
0.53	1.75	103.67	5.60	5.57	-----	-----	-----	-----	-----	-----	-----	5.57
0.55	0.88	103.59	5.52	5.47	-----	-----	-----	-----	-----	-----	-----	5.47
0.57	0.00	103.51	5.38	5.35	-----	-----	-----	-----	-----	-----	-----	5.35
0.58	0.00	103.41	5.23	5.23	-----	-----	-----	-----	-----	-----	-----	5.23
0.60	0.00	103.32	5.13	5.10	-----	-----	-----	-----	-----	-----	-----	5.10
0.62	0.00	103.23	5.04	4.97	-----	-----	-----	-----	-----	-----	-----	4.97
0.63	0.00	103.14	4.91	4.84	-----	-----	-----	-----	-----	-----	-----	4.84
0.65	0.00	103.06	4.75	4.71	-----	-----	-----	-----	-----	-----	-----	4.71

...End

Reservoir Report

Reservoir No. 1 - saddle ridge det. pond

Pond Data

Pond storage is based on known contour areas. Average end area method used.

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	100.00	800	0	0
2.00	102.00	2,240	3,040	3,040
4.00	104.00	4,480	6,720	9,760
6.00	106.00	7,200	11,680	21,440
8.00	108.00	10,560	17,760	39,200

Culvert / Orifice Structures

	[A]	[B]	[C]	[D]
Rise in	= 18.0	12.0	1.5	0.0
Span in	= 18.0	12.0	10.0	0.0
No. Barrels	= 1	1	1	0
Invert El. ft	= 100.00	101.00	105.00	0.00
Length ft	= 557.0	145.0	0.0	0.0
Slope %	= 7.50	0.70	0.00	0.00
N-Value	= .012	.012	.015	.000
Orif. Coeff.	= 0.60	0.60	0.60	0.00
Multi-Stage	= n/a	Yes	Yes	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len ft	= 16.00	3.14	0.00	0.00
Crest El. ft	= 106.50	105.50	0.00	0.00
Weir Coeff.	= 3.33	3.10	0.00	0.00
Weir Type	= Riser	Riser	---	---
Multi-Stage	= Yes	Yes	No	No

Exfiltration Rate = 0.00 in/hr/sqft Tailwater Elev. = 0.00 ft

Note: All outflows have been analyzed under inlet and outlet control.

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Total cfs
0.00	0	100.00	0.00	0.00	0.00	---	0.00	0.00	---	---	---	0.00
2.00	3,040	102.00	2.74	2.67	0.00	---	0.00	0.00	---	---	---	2.67
4.00	9,760	104.00	6.00	5.98	0.00	---	0.00	0.00	---	---	---	5.98
6.00	21,440	106.00	11.05	7.14	0.48	---	0.00	3.44	---	---	---	11.05
8.00	39,200	108.00	22.89	0.39	0.05	---	16.93	5.47	---	---	---	22.84

Hydrograph Report

Hydraflow Hydrographs by Intelisolve

Hyd. No. 6

sub 2 and resev.a

Hydrograph type	= Combine	Peak discharge	= 10.88 cfs
Storm frequency	= 5 yrs	Time interval	= 1 min
Inflow hyds.	= 2, 5		

Hydrograph Volume = 20,973 cuft

Hydrograph Discharge Table

Time (hrs)	Hyd. 2 + (cfs)	Hyd. 5 = (cfs)	Outflow (cfs)
0.30	4.15	4.76	8.91
0.32	4.38	4.98	9.37
0.33	4.61	5.18	9.79
0.35	4.84	5.33	10.18
0.37	5.07	5.47	10.54
0.38	5.30 <<	5.57	10.88 <<
0.40	5.07	5.65	10.73
0.42	4.84	5.71	10.56
0.43	4.61	5.75	10.36
0.45	4.38	5.77 <<	10.15
0.47	4.15	5.77	9.92
0.48	3.92	5.75	9.67
0.50	3.69	5.71	9.40
0.52	3.46	5.65	9.11
0.53	3.23	5.57	8.80

...End

Hydrograph Report

Hyd. No. 7

Hydrograph type = Combine
Storm frequency = 5 yrs
Inflow hyds. = 3, 6

Peak discharge = 21.46 cfs
Time interval = 1 min

Hydrograph Volume = 32,825 cuft

Hydrograph Discharge Table

Time (hrs)	Hyd. 3 + (cfs)	Hyd. 6 = (cfs)	Outflow (cfs)
0.18	12.86	5.06	17.92
0.20	14.03	5.71	19.73
0.22	15.20 <<	6.26	21.46 <<
0.23	14.03	6.81	20.84
0.25	12.86	7.35	20.20
0.27	11.69	7.88	19.57
0.28	10.52	8.41	18.92
0.30	9.35	8.91	18.26
0.32	8.18	9.37	17.55

...End

Hydrograph Report

Hyd. No. 8

Hydrograph type	= Combine	Peak discharge	= 30.76 cfs
Storm frequency	= 5 yrs	Time interval	= 1 min
Inflow hyds.	= 4, 7		

Hydrograph Volume = 58,870 cuft

Hydrograph Discharge Table

Time (hrs)	Hyd. 4 + (cfs)	Hyd. 7 = (cfs)	Outflow (cfs)
0.18	7.64	17.92	25.56
0.20	8.33	19.73	28.07
0.22	9.03	21.46 <<	30.49
0.23	9.72	20.84	30.56
0.25	10.42	20.20	30.62
0.27	11.11	19.57	30.68
0.28	11.81	18.92	30.73
0.30	12.50	18.26	30.76 <<
0.32	13.20	17.55	30.74
0.33	13.89	16.80	30.69
0.35	14.59	16.02	30.61
0.37	15.28	15.22	30.50
0.38	15.97	14.38	30.36
0.40	16.67	13.06	29.73
0.42	17.36 <<	11.72	29.09
0.43	16.67	10.36	27.03
0.45	15.97	10.15	26.12
0.47	15.28	9.92	25.20

...End

APPENDIX 4

SECTION 4 SWALE AND CHANNEL CALCULATIONS

TOP OF BANK SWALE COMP'S

Hydrograph Return Period Recap

Hyd. No.	Hydrograph type (origin)	Inflow Hyd(s)	Peak Outflow (cfs)								Hydrograph description
			1-Yr	2-Yr	3-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr	
1	Rational	-------	-------	11.85	-------	-------	16.95	19.82	21.95	24.01	sub area 1
2	Rational	-------	-------	4.20	-------	-------	6.12	7.20	8.02	8.84	sub area 2
3	Rational	-------	-------	19.43	-------	-------	28.51	33.58	37.56	41.52	sub area 3
4	Rational	-------	-------	20.36	-------	-------	29.76	35.04	39.12	43.16	sub area 4
5	Rational	-------	-------	20.45	-------	-------	28.18	32.39	35.55	38.44	sub area 5
6	Reservoir	1	-------	4.96	-------	-------	6.16	6.58	6.88	7.25	sub div detention pond
7	Combine	2, 6	-------	9.02	-------	-------	12.14	13.59	14.68	15.74	sub 2 and resev.a
8	Combine	3, 7	-------	27.86	-------	-------	39.72	46.10	51.05	56.02	
9	Combine	4, 8	-------	47.11	-------	-------	67.86	79.21	88.01	96.73	
10	Combine	5, 9	-------	47.11	-------	-------	67.86	79.21	88.01	96.73	
11	Rational	-------	-------	5.81	-------	-------	8.32	9.72	10.77	11.78	S.A.2 OVERLAND AREA

FOR FLOWS TO TOP OF BANK SWALES

10 yr

S = 1.0 %

****** HYCHL ****** (Version 6.1) ****** Date 10-23-2003

Commands Read From File: C:\HYCHL\1746SWAL.CHL

```
      JOB 1746SWALE
      UNI 0
** UNITS PARAMETER = 0 (ENGLISH)
      CHL .01    4.2
      TRP 5 3 3
** LEFT SIDE SLOPE    3.0 AND RIGHT SIDE SLOPE    3.0
** THE BASE WIDTH OF THE TRAPEZOID (ft)    5.00
      END
***************END OF COMMAND FILE************
```

1746SWALE

INPUT REVIEW

DESIGN PARAMETERS:

DESIGN DISCHARGE (ft^3/s):	4.20
CHANNEL SHAPE:	TRAPEZOIDAL
CHANNEL SLOPE (ft/ft):	.010

RESULTS

Lining Type	SHEAR STRESS(psf) Permiss	Bottom	Len of Super Protect (ft)	Elev (ft)	Remark	Stab. Factor	Max Q (cfs)	---DESIGN-- Depth (ft)	Mann n
TEMPORARY (FLEXIBLE)									
WOVEN PAPER NET	.15	.13	.00	0.	STABLE	1.13	5.2	.21	.014
JUTE NET	.45	.20	.00	0.	STABLE	2.28	21.6	.32	.028
FIBERGLASS SINGLE	.60	.19	.00	0.	STABLE	3.09	39.4	.31	.027
FIBERGLASS DOUBLE	.85	.20	.00	0.	STABLE	4.18	76.3	.33	.029
STRAW WITH NET	1.45	.28	.00	0.	STABLE	5.27	170.8	.44	.050
CURLED WOOD MAT	1.55	.28	.00	0.	STABLE	5.55	186.5	.45	.051
SYNTHETIC MAT	2.00	.22	.00	0.	STABLE	9.05	463.1	.35	.034
PERMANENT (FLEXIBLE)									
*** WARNING: DEPTH DID NOT CONVERGE. PROGRAM WILL CONTINUE WITH MOST RECENT VALUE									
VEGETATIVE A	3.70	1.12	.00	0.	STABLE	3.30	498.1	1.80	.722
VEGETATIVE B	2.10	.68	.00	0.	STABLE	3.10	157.8	1.09	.263
VEGETATIVE C	1.00	.46	.00	0.	STABLE	2.15	34.9	.74	.129
VEGETATIVE D	.60	.39	.00	0.	STABLE	1.55	13.0	.62	.092
VEGETATIVE E	.35	.35	.00	0.	STABLE	1.01	4.3	.55	.075
RIGID									

CONCRETE	*******	.14	.00	0.	STABLE	******	.0	.22	.015
GROUTED RIPRAP	*******	.24	.00	0.	STABLE	******	.0	.39	.040
STONE MASONRY	*******	.25	.00	0.	STABLE	******	.0	.40	.042
SOIL CEMENT	*******	.19	.00	0.	STABLE	******	.0	.30	.025
ASPHALT	*******	.15	.00	0.	STABLE	******	.0	.25	.018

SOME RIPRAP AND GABION LININGS MAY ALSO BE STABLE
*** NORMAL END OF HYCHL ***

100 yr
S = 1%

****** HYCHL ****** (Version 6.1) ****** Date 11-17-2003

Commands Read From File: C:\HYCHL\1746SWAL.CHL

```
      JOB 1746SWALE
      UNI 0
** UNITS PARAMETER = 0 (ENGLISH)
      CHL .010   5.9
      TRP 5 3 3
** LEFT SIDE SLOPE    3.0 AND RIGHT SIDE SLOPE    3.0
** THE BASE WIDTH OF THE TRAPEZOID (ft)    5.00
      END
***************END OF COMMAND FILE************
```

1746SWALE

INPUT REVIEW

DESIGN PARAMETERS:

DESIGN DISCHARGE (ft^3/s):	5.90
CHANNEL SHAPE:	TRAPEZOIDAL
CHANNEL SLOPE (ft/ft):	.010

RESULTS

Lining Type	SHEAR STRESS(psf) Permiss	Bottom	Len of Protect (ft)	Super Elev (ft)	Remark	Stab. Factor	Max Q (cfs)	---DESIGN-- Depth (ft)	Mann n
TEMPORARY (FLEXIBLE)									
WOVEN PAPER NET	.15	.16	.00	0.	UNSTAB	.93	5.2	.26	.014
JUTE NET	.45	.23	.00	0.	STABLE	1.92	21.6	.38	.027
FIBERGLASS SINGLE	.60	.23	.00	0.	STABLE	2.60	39.4	.37	.026
FIBERGLASS DOUBLE	.85	.24	.00	0.	STABLE	3.53	76.3	.39	.028
STRAW WITH NET	1.45	.32	.00	0.	STABLE	4.54	170.8	.51	.046
CURLED WOOD MAT	1.55	.33	.00	0.	STABLE	4.76	186.5	.52	.048
SYNTHETIC MAT	2.00	.26	.00	0.	STABLE	7.68	463.1	.42	.032
PERMANENT (FLEXIBLE)									
*** WARNING: DEPTH DID NOT CONVERGE. PROGRAM WILL CONTINUE WITH MOST RECENT VALUE									
VEGETATIVE A	3.70	1.12	.00	0.	STABLE	3.30	498.1	1.80	.515
*** WARNING: DEPTH DID NOT CONVERGE. PROGRAM WILL CONTINUE WITH MOST RECENT VALUE									
VEGETATIVE B	2.10	.73	.00	0.	STABLE	2.86	157.8	1.18	.219
VEGETATIVE C	1.00	.52	.00	0.	STABLE	1.92	34.9	.83	.113
VEGETATIVE D	.60	.44	.00	0.	STABLE	1.36	13.0	.70	.083

VEGETATIVE	E	.35	.40	.00	0.	UNSTAB	.88	4.3	.64 .068
RIGID									
CONCRETE	*******	.17	.00	0.	STABLE	******	.0	.27	.015
GROUTED RIPRAP	*******	.29	.00	0.	STABLE	******	.0	.47	.040
STONE MASONRY	*******	.30	.00	0.	STABLE	******	.0	.49	.042
SOIL CEMENT	*******	.23	.00	0.	STABLE	******	.0	.36	.025
ASPHALT	*******	.19	.00	0.	STABLE	******	.0	.30	.018

SOME RIPRAP AND GABION LININGS MAY ALSO BE STABLE
*** NORMAL END OF HYCHL ***

100yr
S=1.7

****** HYCHL ****** (Version 6.1) ****** Date 11-17-2003

Commands Read From File: C:\HYCHL\1746SWAL.CHL

```
      JOB 1746SWALE
      UNI 0
** UNITS PARAMETER = 0 (ENGLISH)
      CHL .017   5.9
      TRP 5 3 3
** LEFT SIDE SLOPE    3.0 AND RIGHT SIDE SLOPE    3.0
** THE BASE WIDTH OF THE TRAPEZOID (ft)    5.00
      END
***************END OF COMMAND FILE************
```

1746SWALE

INPUT REVIEW

DESIGN PARAMETERS:

DESIGN DISCHARGE (ft^3/s):	5.90
CHANNEL SHAPE:	TRAPEZOIDAL
CHANNEL SLOPE (ft/ft):	.017

RESULTS

Lining Type	SHEAR STRESS(psf) Permiss	Bottom	Len of Protect (ft)	Super Elev (ft)	Remark	Stab. Factor	Max Q (cfs)	---DESIGN-- Depth (ft)	Mann n
TEMPORARY (FLEXIBLE)									
WOVEN PAPER NET	.15	.24	.00	0.	UNSTAB	.64	2.6	.22	.014
JUTE NET	.45	.35	.00	0.	STABLE	1.29	9.8	.33	.028
FIBERGLASS SINGLE	.60	.34	.00	0.	STABLE	1.75	17.8	.32	.027
FIBERGLASS DOUBLE	.85	.36	.00	0.	STABLE	2.37	33.3	.34	.029
STRAW WITH NET	1.45	.48	.00	0.	STABLE	3.00	66.9	.46	.049
CURLED WOOD MAT	1.55	.49	.00	0.	STABLE	3.16	73.1	.46	.050
SYNTHETIC MAT	2.00	.39	.00	0.	STABLE	5.13	181.7	.37	.033
PERMANENT (FLEXIBLE)									
*** WARNING: DEPTH DID NOT CONVERGE. PROGRAM WILL CONTINUE WITH MOST RECENT VALUE									
VEGETATIVE A	3.70	1.67	.00	0.	STABLE	2.22	148.8	1.57	.514
*** WARNING: DEPTH DID NOT CONVERGE. PROGRAM WILL CONTINUE WITH MOST RECENT VALUE									
VEGETATIVE B	2.10	1.07	.00	0.	STABLE	1.96	53.4	1.01	.213
VEGETATIVE C	1.00	.75	.00	0.	STABLE	1.34	13.2	.70	.108
VEGETATIVE D	.60	.63	.00	0.	UNSTAB	.95	5.1	.60	.080

VEGETATIVE E	.35	.57	.00	0.	UNSTAB	.61	1.6	.54 .066
RIGID								
CONCRETE	*******	.25	.00	0.	STABLE	******	.0	.23 .015
GROUTED RIPRAP	*******	.43	.00	0.	STABLE	******	.0	.41 .040
STONE MASONRY	*******	.44	.00	0.	STABLE	******	.0	.42 .042
SOIL CEMENT	*******	.33	.00	0.	STABLE	******	.0	.31 .025
ASPHALT	*******	.27	.00	0.	STABLE	******	.0	.26 .018

SOME RIPRAP AND GABION LININGS MAY ALSO BE STABLE
*** NORMAL END OF HYCHL ***

10 year Q = 8.3

assume 4.2 CFS in each Direction

S = 1.7%

****** HYCHL ****** (Version 6.1) ****** Date 10-23-2003

Commands Read From File: C:\HYCHL\1746SWALE.CHL

```
      JOB 1746SWALE
      UNI 0
** UNITS PARAMETER = 0 (ENGLISH)
      CHL .017   4.2
      TRP 5      3       3
** LEFT SIDE SLOPE    3.0 AND RIGHT SIDE SLOPE    3.0
** THE BASE WIDTH OF THE TRAPEZOID (ft)    5.00
      END
***************END OF COMMAND FILE************
```

1746SWALE

INPUT REVIEW

DESIGN PARAMETERS:

DESIGN DISCHARGE (ft^3/s):	4.20
CHANNEL SHAPE:	TRAPEZOIDAL
CHANNEL SLOPE (ft/ft):	.017

RESULTS

Lining Type	SHEAR STRESS(psf) Permiss	Bottom	Len of Super Protect (ft)	Elev (ft)	Remark	Stab. Factor	Max Q (cfs)	---DESIGN-- Depth (ft)	Mann n
TEMPORARY (FLEXIBLE)									
WOVEN PAPER NET	.15	.20	.00	0.	UNSTAB	.77	2.6	.18	.014
JUTE NET	.45	.29	.00	0.	STABLE	1.53	9.8	.28	.029
FIBERGLASS SINGLE	.60	.29	.00	0.	STABLE	2.07	17.8	.27	.028
FIBERGLASS DOUBLE	.85	.30	.00	0.	STABLE	2.81	33.3	.29	.030
STRAW WITH NET	1.45	.42	.00	0.	STABLE	3.48	66.9	.39	.053
CURLED WOOD MAT	1.55	.42	.00	0.	STABLE	3.67	73.1	.40	.054
SYNTHETIC MAT	2.00	.33	.00	0.	STABLE	6.03	181.7	.31	.035
PERMANENT (FLEXIBLE)									

*** WARNING: DEPTH DID NOT CONVERGE. PROGRAM WILL CONTINUE WITH MOST RECENT VALUE

VEGETATIVE	A	3.70	1.62	.00	0.	STABLE	2.29	148.8	1.52	.670
VEGETATIVE	B	2.10	.97	.00	0.	STABLE	2.16	53.4	.91	.247
VEGETATIVE	C	1.00	.67	.00	0.	STABLE	1.50	13.2	.63	.123
VEGETATIVE	D	.60	.56	.00	0.	STABLE	1.08	5.1	.53	.089
VEGETATIVE	E	.35	.50	.00	0.	UNSTAB	.70	1.6	.47	.072
RIGID										

CONCRETE	*******	.20	.00	0.	STABLE	******	.0	.19	.015
GROUTED RIPRAP	*******	.36	.00	0.	STABLE	******	.0	.34	.040
STONE MASONRY	*******	.37	.00	0.	STABLE	******	.0	.34	.042
SOIL CEMENT	*******	.27	.00	0.	STABLE	******	.0	.26	.025
ASPHALT	*******	.22	.00	0.	STABLE	******	.0	.21	.018

SOME RIPRAP AND GABION LININGS MAY ALSO BE STABLE
*** NORMAL END OF HYCHL ***

****** HYCHL ****** (Version 6.1) ****** Date 10-29-2003

Commands Read From File: C:\HYCHL\1746CHAN.CHL

```
      JOB 1746CHANNEL
      UNI 0
** UNITS PARAMETER = 0 (ENGLISH)
      BEN 250
      CHL .012    88
      TRP 10      3       3
** LEFT SIDE SLOPE    3.0 AND RIGHT SIDE SLOPE    3.0
** THE BASE WIDTH OF THE TRAPEZOID (ft)   10.00
      END
***************END OF COMMAND FILE************
```

1746CHANNEL

INPUT REVIEW

DESIGN PARAMETERS:

DESIGN DISCHARGE (ft^3/s):	88.00
CHANNEL SHAPE:	TRAPEZOIDAL
CHANNEL SLOPE (ft/ft):	.012
RADIUS OF CURV. FOR BEND (ft):	250.0

RESULTS

Lining Type	SHEAR STRESS(psf) Permiss	Bottom	Len of Protect (ft)	Super Elev (ft)	Remark	Stab. Factor	Max Q (cfs)	---DESIGN-- Depth (ft)	Mann n
TEMPORARY (FLEXIBLE)									
WOVEN PAPER NET	.15	.58	.00	0.	UNSTAB	.26	8.1	.78	.013
JUTE NET	.45	.78	.00	0.	UNSTAB	.58	31.1	1.04	.022
FIBERGLASS SINGLE	.60	.77	.00	0.	UNSTAB	.78	54.9	1.03	.022
FIBERGLASS DOUBLE	.85	.79	21.39	0.	STABLE	1.07	100.6	1.06	.023
STRAW WITH NET	1.45	.97	18.02	0.	STABLE	1.49	201.3	1.30	.033
CURLED WOOD MAT	1.55	1.00	17.56	0.	STABLE	1.55	216.5	1.34	.035
SYNTHETIC MAT	2.00	.84	20.45	0.	STABLE	2.39	506.8	1.12	.025

Channel Design
D/S outlet of Proposed 3x10 Box
under Wilderman's Way

PERMANENT (FLEXIBLE)

VEGETATIVE	A	3.70	2.07	8.77	0.	STABLE	1.79	472.8	2.76 .140
VEGETATIVE	B	2.10	1.60	11.33	0.	STABLE	1.31	174.5	2.14 .085
VEGETATIVE	C	1.00	1.32	.00	0.	UNSTAB	.76	46.0	1.76 .059
VEGETATIVE	D	.60	1.19	.00	0.	UNSTAB	.50	18.6	1.60 .049
VEGETATIVE	E	.35	1.12	.00	0.	UNSTAB	.31	6.4	1.50 .043

RIGID

CONCRETE	*******	.58	27.50	0.	STABLE	******	.0	.77 .013
GROUTED RIPRAP	*******	.92	18.88	0.	STABLE	******	.0	1.23 .030
STONE MASONRY	*******	.95	18.32	0.	STABLE	******	.0	1.27 .032
SOIL CEMENT	*******	.78	21.78	0.	STABLE	******	.0	1.04 .022
ASPHALT	*******	.65	25.13	0.	STABLE	******	.0	.87 .016

SOME RIPRAP AND GABION LININGS MAY ALSO BE STABLE
*** NORMAL END OF HYCHL ***

APPENDIX 5

SECTION 5 WATER QUALITY CALCULATIONS

CONSULTING ENGINEERS

SUBJECT Middletown HS Stormwater Pond Design

JOB NO.

Sheet No. ____ of ____

Computed By EGB Date 11-7-03

Checked By ____ Date ____

DRAINAGE AREA S_A -
Compute water Quality Flow to be Treated using CDEP's - Connecticut Storm Water Quality MANUAL

Water Quality Volume

Total AREA = 9.79 Acres
Area of IMPERVIOUS Cover = 6.8AC
% IMPERVIOUS = 69%

Volumetric Runoff Coefficient = R
$R = 0.05 + 0.009(69) = .67$

Water Quality Volume. WQV
$WQV = (1")(R)(A)/12 = 1'(.67)(9.79)/12 = .54 AC\text{-}FT$

Water Quality Flow

$$Q = \frac{\text{Runoff Depth} = WQV\,(AC\text{-}FT) \times 12\,in./FT}{D.A.\,(AC)}$$

$$Q = \frac{.54 \times 12}{9.79\,Ac} = .66 \text{ inches}$$

$$CN = \frac{1000}{[10 + 5P + 10Q - 10(Q^2 + 1.25QP)^{1/2}}$$

$$CN = \frac{1000}{[10 + 5(1") + 10(.66) - 10(.66^2 + 1.25(.66)(1"))^{1/2}} = 96$$

Ia (Table 4-1 Chpt 4 TR-55) = .083 $I_{a/P} = .083$
q_u (Exhibit 4-11 Chpt 4 TR-55)
T_c = 18.2m - From Hydro Flow Comp's = .3hrs
q_u = 550

$$WQF = (q_u)(A^*)(Q)\ (*\ A \text{ in } mi^2)$$
$$(550)(.015)(.66) = 5.4\ CFS$$

Pond will Have Forebay to Treat 5.4CFS


1
2

Hydrograph Return Period Recap

Hyd. No.	Hydrograph type (origin)	Inflow Hyd(s)	Peak Outflow (cfs)								Hydrograph description
			1-Yr	2-Yr	3-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr	
1	Rational	-------	-------	5.37	-------	-------	-------	-------	-------	-------	WQF
2	Reservoir	1	-------	0.00	-------	-------	-------	-------	-------	-------	FOREBAY

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	Rational	5.37	1	5	1,611	----	------	------	WQF
2	Reservoir	0.00	1	0	0	1	23.36	1,611	FOREBAY

Hydrograph Report

Hyd. No. 1

WQF

Hydrograph type	= Rational	Peak discharge	= 5.37 cfs
Storm frequency	= 2 yrs	Time interval	= 1 min
Drainage area	= 1.3 ac	Runoff coeff.	= 0.9
Intensity	= 4.590 in/hr	Time of conc. (Tc)	= 5 min
IDF Curve	= CDOT2000.idf	Asc/Rec limb fact	= 1/1

Hydrograph Volume = 1,611 cuft

Hydrograph Discharge Table

Time (hrs)	Outflow cfs)
0.08	5.37 <<

...End

Hydrograph Report

Hyd. No. 2

FOREBAY

Hydrograph type	= Reservoir	Peak discharge	= 0.00 cfs
Storm frequency	= 2 yrs	Time interval	= 1 min
Inflow hyd. No.	= 1	Reservoir name	= Area Sa forbay
Max. Elevation	= 23.36 ft	Max. Storage	= 1,611 cuft

Storage Indication method used.

Outflow hydrograph volume = 0 cuft

...End

Reservoir Report

Reservoir No. 1 - Area Sa forbay

Pond Data

Pond storage is based on known contour areas. Average end area method used.

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	22.00	724	0	0
2.00	24.00	1,638	2,362	2,362

Culvert / Orifice Structures

	[A]	[B]	[C]	[D]
Rise in	= 0.0	0.0	0.0	0.0
Span in	= 0.0	0.0	0.0	0.0
No. Barrels	= 0	0	0	0
Invert El. ft	= 0.00	0.00	0.00	0.00
Length ft	= 0.0	0.0	0.0	0.0
Slope %	= 0.00	0.00	0.00	0.00
N-Value	= .000	.000	.000	.000
Orif. Coeff.	= 0.00	0.00	0.00	0.00
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len ft	= 10.00	0.00	0.00	0.00
Crest El. ft	= 24.00	0.00	0.00	0.00
Weir Coeff.	= 2.60	0.00	0.00	0.00
Weir Type	= Broad	---	---	---
Multi-Stage	= No	No	No	No

Exfiltration Rate = 0.00 in/hr/sqft Tailwater Elev. = 0.00 ft

Note: All outflows have been analyzed under inlet and outlet control.

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Total cfs
0.00	0	22.00	---	---	---	---	0.00	---	---	---	---	0.00
0.20	236	22.20	---	---	---	---	0.00	---	---	---	---	0.00
0.40	472	22.40	---	---	---	---	0.00	---	---	---	---	0.00
0.60	709	22.60	---	---	---	---	0.00	---	---	---	---	0.00
0.80	945	22.80	---	---	---	---	0.00	---	---	---	---	0.00
1.00	1,181	23.00	---	---	---	---	0.00	---	---	---	---	0.00
1.20	1,417	23.20	---	---	---	---	0.00	---	---	---	---	0.00
1.40	1,653	23.40	---	---	---	---	0.00	---	---	---	---	0.00
1.60	1,890	23.60	---	---	---	---	0.00	---	---	---	---	0.00
1.80	2,126	23.80	---	---	---	---	0.00	---	---	---	---	0.00
2.00	2,362	24.00	---	---	---	---	0.00	---	---	---	---	0.00

Hydraflow Hydrographs Diagram	Project: Area Sa wetpond.gpw	11-17-2003

Hydrograph Return Period Recap

Hyd. No.	Hydrograph type (origin)	Inflow Hyd(s)	Peak Outflow (cfs)							Hydrograph description
			1-Yr	2-Yr	3-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr	
1	Rational	------	-------	18.52	-------	23.28	26.60	-------	-------	-------	Na out
2	Reservoir	1	-------	17.97	-------	22.60	25.82	-------	-------	-------	FOREBAY
3	Reservoir	2	-------	0.00	-------	2.08	0.00	-------	-------	-------	wet pond

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	Rational	18.52	1	18	20,003	----	------	------	Na out
2	Reservoir	17.97	1	19	18,427	1	24.28	2,751	FOREBAY
3	Reservoir	0.00	1	0	0	2	23.52	18,427	wet pond

Hydrograph Report

Hydraflow Hydrographs by Intelisolve

Hyd. No. 1

Na out

Hydrograph type	= Rational	Peak discharge	= 18.52 cfs
Storm frequency	= 2 yrs	Time interval	= 1 min
Drainage area	= 11.6 ac	Runoff coeff.	= 0.62
Intensity	= 2.578 in/hr	Time of conc. (Tc)	= 18 min
IDF Curve	= CDOT2000.idf	Asc/Rec limb fact	= 1/1

Hydrograph Volume = 20,003 cuft

Hydrograph Discharge Table

Time (hrs)	Outflow (cfs)
0.27	16.46
0.28	17.49
0.30	18.52 <<
0.32	17.49
0.33	16.46

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve

Hyd. No. 2

FOREBAY

Hydrograph type	= Reservoir	Peak discharge	= 17.97 cfs
Storm frequency	= 2 yrs	Time interval	= 1 min
Inflow hyd. No.	= 1	Reservoir name	= Area Sa forbay
Max. Elevation	= 24.28 ft	Max. Storage	= 2,751 cuft

Storage Indication method used.

Outflow hydrograph volume = 18,427 cuft

Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
0.27	16.46	24.21	-----	-----	-----	-----	15.62	-----	-----	-----	-----	15.62
0.28	17.49	24.24	-----	-----	-----	-----	16.65	-----	-----	-----	-----	16.65
0.30	18.52 <<	24.27	-----	-----	-----	-----	17.77	-----	-----	-----	-----	17.77
0.32	17.49	24.28 <<	-----	-----	-----	-----	17.97	-----	-----	-----	-----	17.97 <<
0.33	16.46	24.26	-----	-----	-----	-----	17.14	-----	-----	-----	-----	17.14
0.35	15.43	24.23	-----	-----	-----	-----	16.21	-----	-----	-----	-----	16.21

...End

Reservoir Report

Hydraflow Hydrographs by Intelisolve

Reservoir No. 1 - Area Sa forbay

Pond Data

Pond storage is based on known contour areas. Average end area method used.

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	22.00	724	0	0
1.50	23.50	1,377	1,576	1,576
4.00	24.00	1,638	3,769	5,345

Culvert / Orifice Structures

	[A]	[B]	[C]	[D]
Rise in	= 0.0	0.0	0.0	0.0
Span in	= 0.0	0.0	0.0	0.0
No. Barrels	= 0	0	0	0
Invert El. ft	= 0.00	0.00	0.00	0.00
Length ft	= 0.0	0.0	0.0	0.0
Slope %	= 0.00	0.00	0.00	0.00
N-Value	= .013	.000	.000	.000
Orif. Coeff.	= 0.60	0.00	0.00	0.00
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len ft	= 10.00	0.00	0.00	0.00
Crest El. ft	= 23.50	0.00	0.00	0.00
Weir Coeff.	= 2.60	0.00	0.00	0.00
Weir Type	= Broad	---	---	---
Multi-Stage	= No	No	No	No

Exfiltration Rate = 0.00 in/hr/sqft Tailwater Elev. = 0.00 ft

Note: All outflows have been analyzed under inlet and outlet control.

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Total cfs
0.00	0	22.00	---	---	---	---	0.00	---	---	---	---	0.00
0.15	158	22.15	---	---	---	---	0.00	---	---	---	---	0.00
0.30	315	22.30	---	---	---	---	0.00	---	---	---	---	0.00
0.45	473	22.45	---	---	---	---	0.00	---	---	---	---	0.00
0.60	630	22.60	---	---	---	---	0.00	---	---	---	---	0.00
0.75	788	22.75	---	---	---	---	0.00	---	---	---	---	0.00
0.90	945	22.90	---	---	---	---	0.00	---	---	---	---	0.00
1.05	1,103	23.05	---	---	---	---	0.00	---	---	---	---	0.00
1.20	1,261	23.20	---	---	---	---	0.00	---	---	---	---	0.00
1.35	1,418	23.35	---	---	---	---	0.00	---	---	---	---	0.00
1.50	1,576	23.50	---	---	---	---	0.00	---	---	---	---	0.00
1.75	1,953	23.75	---	---	---	---	3.25	---	---	---	---	3.25
2.00	2,330	24.00	---	---	---	---	9.19	---	---	---	---	9.19
2.25	2,706	24.25	---	---	---	---	16.89	---	---	---	---	16.89
2.50	3,083	24.50	---	---	---	---	26.00	---	---	---	---	26.00
2.75	3,460	24.75	---	---	---	---	36.34	---	---	---	---	36.34
3.00	3,837	25.00	---	---	---	---	47.77	---	---	---	---	47.77
3.25	4,214	25.25	---	---	---	---	60.19	---	---	---	---	60.19

Continues on next page...

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Total cfs
3.50	4,591	25.50	---	---	---	---	73.54	---	---	---	---	73.54
3.75	4,968	25.75	---	---	---	---	87.75	---	---	---	---	87.75
4.00	5,345	24.00	---	---	---	---	9.19	---	---	---	---	9.19

...End

Hydrograph Report

Hyd. No. 3

wet pond

Hydrograph type	= Reservoir	Peak discharge	= 0.00 cfs
Storm frequency	= 2 yrs	Time interval	= 1 min
Inflow hyd. No.	= 2	Reservoir name	= wetpond
Max. Elevation	= 23.52 ft	Max. Storage	= 18,427 cuft

Storage Indication method used.

Outflow hydrograph volume = 0 cuft

...End

Reservoir Report

Reservoir No. 2 - wetpond

Pond Data

Pond storage is based on known contour areas. Average end area method used.

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	22.00	10,099	0	0
2.00	24.00	14,174	24,273	24,273

Culvert / Orifice Structures

	[A]	[B]	[C]	[D]
Rise in	= 0.0	0.0	0.0	0.0
Span in	= 0.0	0.0	0.0	0.0
No. Barrels	= 0	0	0	0
Invert El. ft	= 0.00	0.00	0.00	0.00
Length ft	= 0.0	0.0	0.0	0.0
Slope %	= 0.00	0.00	0.00	0.00
N-Value	= .013	.000	.000	.000
Orif. Coeff.	= 0.60	0.00	0.00	0.00
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len ft	= 10.00	0.00	0.00	0.00
Crest El. ft	= 23.70	0.00	0.00	0.00
Weir Coeff.	= 2.60	0.00	0.00	0.00
Weir Type	= Broad	---	---	---
Multi-Stage	= No	No	No	No

Exfiltration Rate = 0.00 in/hr/sqft Tailwater Elev. = 0.00 ft

Note: All outflows have been analyzed under inlet and outlet control.

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Total cfs
0.00	0	22.00	---	---	---	---	0.00	---	---	---	---	0.00
0.20	2,427	22.20	---	---	---	---	0.00	---	---	---	---	0.00
0.40	4,855	22.40	---	---	---	---	0.00	---	---	---	---	0.00
0.60	7,282	22.60	---	---	---	---	0.00	---	---	---	---	0.00
0.80	9,709	22.80	---	---	---	---	0.00	---	---	---	---	0.00
1.00	12,137	23.00	---	---	---	---	0.00	---	---	---	---	0.00
1.20	14,564	23.20	---	---	---	---	0.00	---	---	---	---	0.00
1.40	16,991	23.40	---	---	---	---	0.00	---	---	---	---	0.00
1.60	19,418	23.60	---	---	---	---	0.00	---	---	---	---	0.00
1.80	21,846	23.80	---	---	---	---	0.82	---	---	---	---	0.82
2.00	24,273	24.00	---	---	---	---	4.27	---	---	---	---	4.27

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	Rational	23.28	1	18	25,147	----	------	------	Na out
2	Reservoir	22.60	1	19	23,572	1	24.41	2,943	FOREBAY
3	Reservoir	2.08	1	36	4,154	2	23.87	22,728	wet pond

Hydrograph Report

Hydraflow Hydrographs by Intelisolve

Hyd. No. 1

Na out

Hydrograph type	= Rational	Peak discharge	= 23.28 cfs
Storm frequency	= 5 yrs	Time interval	= 1 min
Drainage area	= 11.6 ac	Runoff coeff.	= 0.62
Intensity	= 3.240 in/hr	Time of conc. (Tc)	= 18 min
IDF Curve	= CDOT2000.idf	Asc/Rec limb fact	= 1/1

Hydrograph Volume = 25,147 cuft

Hydrograph Discharge Table

Time (hrs)	Outflow (cfs)	
0.27	20.70	
0.28	21.99	
0.30	23.28	<<
0.32	21.99	
0.33	20.70	

...End

Hydrograph Report

Hyd. No. 2

FOREBAY

Hydrograph type	= Reservoir	Peak discharge	= 22.60 cfs
Storm frequency	= 5 yrs	Time interval	= 1 min
Inflow hyd. No.	= 1	Reservoir name	= Area Sa forbay
Max. Elevation	= 24.41 ft	Max. Storage	= 2,943 cuft

Storage Indication method used.

Outflow hydrograph volume = 23,572 cuft

Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
0.27	20.70	24.33	-----	-----	-----	-----	19.80	-----	-----	-----	-----	19.80
0.28	21.99	24.37	-----	-----	-----	-----	21.10	-----	-----	-----	-----	21.10
0.30	23.28 <<	24.40	-----	-----	-----	-----	22.39	-----	-----	-----	-----	22.39
0.32	21.99	24.41 <<	-----	-----	-----	-----	22.60	-----	-----	-----	-----	22.60 <<
0.33	20.70	24.38	-----	-----	-----	-----	21.54	-----	-----	-----	-----	21.54
0.35	19.40	24.34	-----	-----	-----	-----	20.29	-----	-----	-----	-----	20.29

...End

Reservoir Report

Reservoir No. 1 - Area Sa forbay

Pond Data

Pond storage is based on known contour areas. Average end area method used.

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	22.00	724	0	0
1.50	23.50	1,377	1,576	1,576
4.00	24.00	1,638	3,769	5,345

Culvert / Orifice Structures

	[A]	[B]	[C]	[D]
Rise in	= 0.0	0.0	0.0	0.0
Span in	= 0.0	0.0	0.0	0.0
No. Barrels	= 0	0	0	0
Invert El. ft	= 0.00	0.00	0.00	0.00
Length ft	= 0.0	0.0	0.0	0.0
Slope %	= 0.00	0.00	0.00	0.00
N-Value	= .013	.000	.000	.000
Orif. Coeff.	= 0.60	0.00	0.00	0.00
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len ft	= 10.00	0.00	0.00	0.00
Crest El. ft	= 23.50	0.00	0.00	0.00
Weir Coeff.	= 2.60	0.00	0.00	0.00
Weir Type	= Broad	---	---	---
Multi-Stage	= No	No	No	No

Exfiltration Rate = 0.00 in/hr/sqft Tailwater Elev. = 0.00 ft

Note: All outflows have been analyzed under inlet and outlet control.

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Total cfs
0.00	0	22.00	---	---	---	---	0.00	---	---	---	---	0.00
0.15	158	22.15	---	---	---	---	0.00	---	---	---	---	0.00
0.30	315	22.30	---	---	---	---	0.00	---	---	---	---	0.00
0.45	473	22.45	---	---	---	---	0.00	---	---	---	---	0.00
0.60	630	22.60	---	---	---	---	0.00	---	---	---	---	0.00
0.75	788	22.75	---	---	---	---	0.00	---	---	---	---	0.00
0.90	945	22.90	---	---	---	---	0.00	---	---	---	---	0.00
1.05	1,103	23.05	---	---	---	---	0.00	---	---	---	---	0.00
1.20	1,261	23.20	---	---	---	---	0.00	---	---	---	---	0.00
1.35	1,418	23.35	---	---	---	---	0.00	---	---	---	---	0.00
1.50	1,576	23.50	---	---	---	---	0.00	---	---	---	---	0.00
1.75	1,953	23.75	---	---	---	---	3.25	---	---	---	---	3.25
2.00	2,330	24.00	---	---	---	---	9.19	---	---	---	---	9.19
2.25	2,706	24.25	---	---	---	---	16.89	---	---	---	---	16.89
2.50	3,083	24.50	---	---	---	---	26.00	---	---	---	---	26.00
2.75	3,460	24.75	---	---	---	---	36.34	---	---	---	---	36.34
3.00	3,837	25.00	---	---	---	---	47.77	---	---	---	---	47.77
3.25	4,214	25.25	---	---	---	---	60.19	---	---	---	---	60.19

Continues on next page...

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Total cfs
3.50	4,591	25.50	---	---	---	---	73.54	---	---	---	---	73.54
3.75	4,968	25.75	---	---	---	---	87.75	---	---	---	---	87.75
4.00	5,345	24.00	---	---	---	---	9.19	---	---	---	---	9.19

...End

Hydrograph Report

Hyd. No. 3

wet pond

Hydrograph type	= Reservoir	Peak discharge	= 2.08 cfs
Storm frequency	= 5 yrs	Time interval	= 1 min
Inflow hyd. No.	= 2	Reservoir name	= wetpond
Max. Elevation	= 23.87 ft	Max. Storage	= 22,728 cuft

Storage Indication method used.

Outflow hydrograph volume = 4,154 cuft

Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
0.57	3.95	23.86	-----	-----	-----	-----	1.93	-----	-----	-----	-----	1.93
0.58	2.87	23.87	-----	-----	-----	-----	2.05	-----	-----	-----	-----	2.05
0.60	1.96	23.87 <<	-----	-----	-----	-----	2.08	-----	-----	-----	-----	2.08 <<
0.62	1.15	23.87	-----	-----	-----	-----	2.03	-----	-----	-----	-----	2.03
0.63	0.68	23.86	-----	-----	-----	-----	1.94	-----	-----	-----	-----	1.94
0.65	0.40	23.86	-----	-----	-----	-----	1.83	-----	-----	-----	-----	1.83

...End

Reservoir Report

Reservoir No. 2 - wetpond

Pond Data

Pond storage is based on known contour areas. Average end area method used.

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	22.00	10,099	0	0
2.00	24.00	14,174	24,273	24,273

Culvert / Orifice Structures

	[A]	[B]	[C]	[D]
Rise in	= 0.0	0.0	0.0	0.0
Span in	= 0.0	0.0	0.0	0.0
No. Barrels	= 0	0	0	0
Invert El. ft	= 0.00	0.00	0.00	0.00
Length ft	= 0.0	0.0	0.0	0.0
Slope %	= 0.00	0.00	0.00	0.00
N-Value	= .013	.000	.000	.000
Orif. Coeff.	= 0.60	0.00	0.00	0.00
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len ft	= 10.00	0.00	0.00	0.00
Crest El. ft	= 23.70	0.00	0.00	0.00
Weir Coeff.	= 2.60	0.00	0.00	0.00
Weir Type	= Broad	---	---	---
Multi-Stage	= No	No	No	No

Exfiltration Rate = 0.00 in/hr/sqft Tailwater Elev. = 0.00 ft

Note: All outflows have been analyzed under inlet and outlet control.

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Total cfs
0.00	0	22.00	---	---	---	---	0.00	---	---	---	---	0.00
0.20	2,427	22.20	---	---	---	---	0.00	---	---	---	---	0.00
0.40	4,855	22.40	---	---	---	---	0.00	---	---	---	---	0.00
0.60	7,282	22.60	---	---	---	---	0.00	---	---	---	---	0.00
0.80	9,709	22.80	---	---	---	---	0.00	---	---	---	---	0.00
1.00	12,137	23.00	---	---	---	---	0.00	---	---	---	---	0.00
1.20	14,564	23.20	---	---	---	---	0.00	---	---	---	---	0.00
1.40	16,991	23.40	---	---	---	---	0.00	---	---	---	---	0.00
1.60	19,418	23.60	---	---	---	---	0.00	---	---	---	---	0.00
1.80	21,846	23.80	---	---	---	---	0.82	---	---	---	---	0.82
2.00	24,273	24.00	---	---	---	---	4.27	---	---	---	---	4.27

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	Rational	26.60	1	18	28,729	----	------	------	Na out
2	Reservoir	25.82	1	19	27,153	1	24.49	3,076	FOREBAY
3	Reservoir	0.00	1	0	0	2	0.00	0	wet pond

Hydrograph Report

Hydraflow Hydrographs by Intelisolve

Hyd. No. 1

Na out

Hydrograph type	= Rational	Peak discharge	= 26.60 cfs
Storm frequency	= 10 yrs	Time interval	= 1 min
Drainage area	= 11.6 ac	Runoff coeff.	= 0.62
Intensity	= 3.702 in/hr	Time of conc. (Tc)	= 18 min
IDF Curve	= CDOT2000.idf	Asc/Rec limb fact	= 1/1

Hydrograph Volume = 28,729 cuft

Hydrograph Discharge Table

Time (hrs)	Outflow (cfs)
0.27	23.65
0.28	25.12
0.30	26.60 <<
0.32	25.12
0.33	23.65

...End

Hydrograph Report

Hyd. No. 2

FOREBAY

Hydrograph type	= Reservoir	Peak discharge	= 25.82 cfs
Storm frequency	= 10 yrs	Time interval	= 1 min
Inflow hyd. No.	= 1	Reservoir name	= Area Sa forbay
Max. Elevation	= 24.49 ft	Max. Storage	= 3,076 cuft

Storage Indication method used.

Outflow hydrograph volume = 27,153 cuft

Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
0.27	23.65	24.41	-----	-----	-----	-----	22.63	-----	-----	-----	-----	22.63
0.28	25.12	24.45	-----	-----	-----	-----	24.10	-----	-----	-----	-----	24.10
0.30	26.60 <<	24.49	-----	-----	-----	-----	25.58	-----	-----	-----	-----	25.58
0.32	25.12	24.49 <<	-----	-----	-----	-----	25.82	-----	-----	-----	-----	25.82 <<
0.33	23.65	24.46	-----	-----	-----	-----	24.61	-----	-----	-----	-----	24.61
0.35	22.17	24.42	-----	-----	-----	-----	23.18	-----	-----	-----	-----	23.18

...End

Reservoir Report

Reservoir No. - Area Sa forbay

Pond Data

Pond storage is based on known contour areas. Average end area method used.

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	22.00	724	0	0
1.50	23.50	1,377	1,576	1,576
4.00	24.00	1,638	3,769	5,345

Culvert / Orifice Structures

	[A]	[B]	[C]	[D]
Rise in	= 0.0	0.0	0.0	0.0
Span in	= 0.0	0.0	0.0	0.0
No. Barrels	= 0	0	0	0
Invert El. ft	= 0.00	0.00	0.00	0.00
Length ft	= 0.0	0.0	0.0	0.0
Slope %	= 0.00	0.00	0.00	0.00
N-Value	= .013	.000	.000	.000
Orif. Coeff.	= 0.60	0.00	0.00	0.00
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len ft	= 10.00	0.00	0.00	0.00
Crest El. ft	= 23.50	0.00	0.00	0.00
Weir Coeff.	= 2.60	0.00	0.00	0.00
Weir Type	= Broad	---	---	---
Multi-Stage	= No	No	No	No

Exfiltration Rate = 0.00 in/hr/sqft Tailwater Elev. = 0.00 ft

Note: All outflows have been analyzed under inlet and outlet control.

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Total cfs
0.00	0	22.00	---	---	---	---	0.00	---	---	---	---	0.00
0.15	158	22.15	---	---	---	---	0.00	---	---	---	---	0.00
0.30	315	22.30	---	---	---	---	0.00	---	---	---	---	0.00
0.45	473	22.45	---	---	---	---	0.00	---	---	---	---	0.00
0.60	630	22.60	---	---	---	---	0.00	---	---	---	---	0.00
0.75	788	22.75	---	---	---	---	0.00	---	---	---	---	0.00
0.90	945	22.90	---	---	---	---	0.00	---	---	---	---	0.00
1.05	1,103	23.05	---	---	---	---	0.00	---	---	---	---	0.00
1.20	1,261	23.20	---	---	---	---	0.00	---	---	---	---	0.00
1.35	1,418	23.35	---	---	---	---	0.00	---	---	---	---	0.00
1.50	1,576	23.50	---	---	---	---	0.00	---	---	---	---	0.00
1.75	1,953	23.75	---	---	---	---	3.25	---	---	---	---	3.25
2.00	2,330	24.00	---	---	---	---	9.19	---	---	---	---	9.19
2.25	2,706	24.25	---	---	---	---	16.89	---	---	---	---	16.89
2.50	3,083	24.50	---	---	---	---	26.00	---	---	---	---	26.00
2.75	3,460	24.75	---	---	---	---	36.34	---	---	---	---	36.34
3.00	3,837	25.00	---	---	---	---	47.77	---	---	---	---	47.77
3.25	4,214	25.25	---	---	---	---	60.19	---	---	---	---	60.19

Continues on next page...

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Total cfs
3.50	4,591	25.50	---	---	---	---	73.54	---	---	---	---	73.54
3.75	4,968	25.75	---	---	---	---	87.75	---	---	---	---	87.75
4.00	5,345	24.00	---	---	---	---	9.19	---	---	---	---	9.19

...End

Hydrograph Report

Hyd. No. 3

wet pond

Hydrograph type	= Reservoir	Peak discharge	= 0.00 cfs
Storm frequency	= 10 yrs	Time interval	= 1 min
Inflow hyd. No.	= 2	Reservoir name	= wetpond
Max. Elevation	= 0.00 ft	Max. Storage	= 0 cuft

Storage Indication method used.

Outflow hydrograph volume = 0 cuft

...End

Reservoir Report

Reservoir No. 2 - wetpond

Pond Data

Pond storage is based on known contour areas. Average end area method used.

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	22.00	10,099	0	0
2.00	24.00	14,174	24,273	24,273

Culvert / Orifice Structures

	[A]	[B]	[C]	[D]
Rise in	= 0.0	0.0	0.0	0.0
Span in	= 0.0	0.0	0.0	0.0
No. Barrels	= 0	0	0	0
Invert El. ft	= 0.00	0.00	0.00	0.00
Length ft	= 0.0	0.0	0.0	0.0
Slope %	= 0.00	0.00	0.00	0.00
N-Value	= .013	.000	.000	.000
Orif. Coeff.	= 0.60	0.00	0.00	0.00
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len ft	= 10.00	0.00	0.00	0.00
Crest El. ft	= 23.70	0.00	0.00	0.00
Weir Coeff.	= 2.60	0.00	0.00	0.00
Weir Type	= Broad	---	---	---
Multi-Stage	= No	No	No	No

Exfiltration Rate = 0.00 in/hr/sqft Tailwater Elev. = 0.00 ft

Note: All outflows have been analyzed under inlet and outlet control.

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Total cfs
0.00	0	22.00	---	---	---	---	0.00	---	---	---	---	0.00
0.20	2,427	22.20	---	---	---	---	0.00	---	---	---	---	0.00
0.40	4,855	22.40	---	---	---	---	0.00	---	---	---	---	0.00
0.60	7,282	22.60	---	---	---	---	0.00	---	---	---	---	0.00
0.80	9,709	22.80	---	---	---	---	0.00	---	---	---	---	0.00
1.00	12,137	23.00	---	---	---	---	0.00	---	---	---	---	0.00
1.20	14,564	23.20	---	---	---	---	0.00	---	---	---	---	0.00
1.40	16,991	23.40	---	---	---	---	0.00	---	---	---	---	0.00
1.60	19,418	23.60	---	---	---	---	0.00	---	---	---	---	0.00
1.80	21,846	23.80	---	---	---	---	0.82	---	---	---	---	0.82
2.00	24,273	24.00	---	---	---	---	4.27	---	---	---	---	4.27

CONSULTING ENGINEERS

SUBJECT Middletown H.S. Storm Pond Design.

JOB NO. 1746

Sheet No. _____ of _____

Computed By _____ Date _____

Checked By _____ Date _____

Drainage Area Nc and Nd.
Compute Water Quality Volume + Flow To be Treated Using CDep's (Connecticut Storm Water Quality Manual)
Area's Nc + Ne Combine in Pond.

Water Quality Volume

TOTAL Area = 3.11 AC (Nc) + 0.32 AC (Ne) = 3.43 AC
Area Impervious Cover = 1.67 (Nc) + .23 AC (Ne = 1.9 AC
% Impervious = 55%
Volumetric Runoff Coefficient - R
R = 0.05 + .009 (55) = .54
WQV = $1'' (.54)(3.11)/12$ = .14 AC-FT = 6,100 CFT.

Water Quality FLOW

$$Q = \frac{(.14)\times(12)}{3.43} = .49 \text{ in.}$$

$$CN = \frac{1000}{[10 + 5(1'') + 10(.49) - 10(.49)^2 + 1.25(.49)(1)]^{1/2}} = 94$$

I_a = (Table 4-1 TR55) = .128
qu (Exhibit 4-II Tc-55)
Tc = 15 Min = .25 hr
qu = 506
WQF = (500)(.0054)(.49) = 1.32 CFS

Volume contained below outlet invert of 22.5 is 6745 FT^3 ∴ contains WQV

Hydraflow Hydrographs Diagram	Project: Nc--Ne forebay.gpw	11-17-2003

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	Rational	1.42	1	5	425	----	------	------	Water Quality Flow
2	Reservoir	0.00	1	0	0	1	20.21	425	forebay

Hydrograph Report

Hyd. No. 1

Water Quality Flow

Hydrograph type	= Rational	Peak discharge	= 1.42 cfs
Storm frequency	= 2 yrs	Time interval	= 1 min
Drainage area	= 3.4 ac	Runoff coeff.	= 0.09
Intensity	= 4.590 in/hr	Time of conc. (Tc)	= 5 min
IDF Curve	= CDOT2000.idf	Asc/Rec limb fact	= 1/1

Hydrograph Volume = 425 cuft

Hydrograph Discharge Table

Time (hrs)	Outflow (cfs)	
0.08	1.42	<<

...End

Hydrograph Report

Hyd. No. 2

forebay

Hydrograph type	= Reservoir	Peak discharge	= 0.00 cfs
Storm frequency	= 2 yrs	Time interval	= 1 min
Inflow hyd. No.	= 1	Reservoir name	= Forebay
Max. Elevation	= 20.21 ft	Max. Storage	= 425 cuft

Storage Indication method used.

Outflow hydrograph volume = 0 cuft

...End

Reservoir Report

Reservoir No. 1 - Forebay

Pond Data

Pond storage is based on known contour areas. Average end area method used.

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	20.00	1,370	0	0
2.00	22.00	2,694	4,064	4,064

Culvert / Orifice Structures

	[A]	[B]	[C]	[D]
Rise in	= 0.0	0.0	0.0	0.0
Span in	= 0.0	0.0	0.0	0.0
No. Barrels	= 0	0	0	0
Invert El. ft	= 0.00	0.00	0.00	0.00
Length ft	= 0.0	0.0	0.0	0.0
Slope %	= 0.00	0.00	0.00	0.00
N-Value	= .000	.000	.000	.000
Orif. Coeff.	= 0.00	0.00	0.00	0.00
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len ft	= 10.00	0.00	0.00	0.00
Crest El. ft	= 21.50	0.00	0.00	0.00
Weir Coeff.	= 2.60	0.00	0.00	0.00
Weir Type	= Broad	---	---	---
Multi-Stage	= No	No	No	No

Exfiltration Rate = 0.00 in/hr/sqft Tailwater Elev. = 0.00 ft

Note: All outflows have been analyzed under inlet and outlet control.

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Total cfs
0.00	0	20.00	---	---	---	---	0.00	---	---	---	---	0.00
0.20	406	20.20	---	---	---	---	0.00	---	---	---	---	0.00
0.40	813	20.40	---	---	---	---	0.00	---	---	---	---	0.00
0.60	1,219	20.60	---	---	---	---	0.00	---	---	---	---	0.00
0.80	1,626	20.80	---	---	---	---	0.00	---	---	---	---	0.00
1.00	2,032	21.00	---	---	---	---	0.00	---	---	---	---	0.00
1.20	2,438	21.20	---	---	---	---	0.00	---	---	---	---	0.00
1.40	2,845	21.40	---	---	---	---	0.00	---	---	---	---	0.00
1.60	3,251	21.60	---	---	---	---	0.82	---	---	---	---	0.82
1.80	3,658	21.80	---	---	---	---	4.27	---	---	---	---	4.27
2.00	4,064	22.00	---	---	---	---	9.19	---	---	---	---	9.19

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	Rational	1.85	1	5	555	----	------	------	Water Quality Flow
2	Reservoir	0.00	1	0	0	1	20.27	555	forebay

Hydrograph Report

Hyd. No. 1

Water Quality Flow

Hydrograph type	= Rational	Peak discharge	= 1.85 cfs
Storm frequency	= 10 yrs	Time interval	= 1 min
Drainage area	= 3.4 ac	Runoff coeff.	= 0.09
Intensity	= 5.990 in/hr	Time of conc. (Tc)	= 5 min
IDF Curve	= CDOT2000.idf	Asc/Rec limb fact	= 1/1

Hydrograph Volume = 555 cuft

Hydrograph Discharge Table

Time (hrs)	Outflow (cfs)
0.08	1.85 <<

...End

Hydrograph Report

Hyd. No. 2

forebay

Hydrograph type	= Reservoir	Peak discharge	= 0.00 cfs
Storm frequency	= 10 yrs	Time interval	= 1 min
Inflow hyd. No.	= 1	Reservoir name	= Forebay
Max. Elevation	= 20.27 ft	Max. Storage	= 555 cuft

Storage Indication method used.

Outflow hydrograph volume = 0 cuft

...End

Reservoir Report

Hydraflow Hydrographs by Intelisolve

Reservoir No. 1 - Forebay

Pond Data

Pond storage is based on known contour areas. Average end area method used.

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	20.00	1,370	0	0
2.00	22.00	2,694	4,064	4,064

Culvert / Orifice Structures

	[A]	[B]	[C]	[D]
Rise in	= 0.0	0.0	0.0	0.0
Span in	= 0.0	0.0	0.0	0.0
No. Barrels	= 0	0	0	0
Invert El. ft	= 0.00	0.00	0.00	0.00
Length ft	= 0.0	0.0	0.0	0.0
Slope %	= 0.00	0.00	0.00	0.00
N-Value	= .000	.000	.000	.000
Orif. Coeff.	= 0.00	0.00	0.00	0.00
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len ft	= 10.00	0.00	0.00	0.00
Crest El. ft	= 21.50	0.00	0.00	0.00
Weir Coeff.	= 2.60	0.00	0.00	0.00
Weir Type	= Broad	---	---	---
Multi-Stage	= No	No	No	No

Exfiltration Rate = 0.00 in/hr/sqft Tailwater Elev. = 0.00 ft

Note: All outflows have been analyzed under inlet and outlet control.

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Total cfs
0.00	0	20.00	---	---	---	---	0.00	---	---	---	---	0.00
0.20	406	20.20	---	---	---	---	0.00	---	---	---	---	0.00
0.40	813	20.40	---	---	---	---	0.00	---	---	---	---	0.00
0.60	1,219	20.60	---	---	---	---	0.00	---	---	---	---	0.00
0.80	1,626	20.80	---	---	---	---	0.00	---	---	---	---	0.00
1.00	2,032	21.00	---	---	---	---	0.00	---	---	---	---	0.00
1.20	2,438	21.20	---	---	---	---	0.00	---	---	---	---	0.00
1.40	2,845	21.40	---	---	---	---	0.00	---	---	---	---	0.00
1.60	3,251	21.60	---	---	---	---	0.82	---	---	---	---	0.82
1.80	3,658	21.80	---	---	---	---	4.27	---	---	---	---	4.27
2.00	4,064	22.00	---	---	---	---	9.19	---	---	---	---	9.19


1
2
3

Hydrograph Return Period Recap

Hyd. No.	Hydrograph type (origin)	Inflow Hyd(s)	Peak Outflow (cfs)								Hydrograph description
			1-Yr	2-Yr	3-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr	
1	Rational	-------	-------	5.85	-------	7.34	8.34	-------	-------	-------	Water Quality Flow
2	Reservoir	1	-------	5.67	-------	7.10	8.08	-------	-------	-------	forebay
3	Reservoir	2	-------	0.00	-------	0.02	0.26	-------	-------	-------	wetpond

Hydrograph Report

Hyd. No. 1

Water Quality Flow

Hydrograph type	= Rational	Peak discharge	= 5.85 cfs
Storm frequency	= 2 yrs	Time interval	= 1 min
Drainage area	= 3.4 ac	Runoff coeff.	= 0.62
Intensity	= 2.751 in/hr	Time of conc. (Tc)	= 16 min
IDF Curve	= CDOT2000.idf	Asc/Rec limb fact	= 1/1

Hydrograph Volume = 5,616 cuft

Hydrograph Discharge Table

Time (hrs)	Outflow (cfs)
0.22	4.75
0.23	5.12
0.25	5.48
0.27	5.85 <<
0.28	5.48
0.30	5.12
0.32	4.75

...End

Hydrograph Report

Hyd. No. 2

forebay

Hydrograph type	= Reservoir	Peak discharge	= 5.67 cfs
Storm frequency	= 2 yrs	Time interval	= 1 min
Inflow hyd. No.	= 1	Reservoir name	= Forebay
Max. Elevation	= 21.86 ft	Max. Storage	= 1,560 cuft

Storage Indication method used.

Outflow hydrograph volume = 4,440 cuft

Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
0.23	5.12	21.82	-----	-----	-----	-----	4.87	-----	-----	-----	-----	4.87
0.25	5.48	21.84	-----	-----	-----	-----	5.27	-----	-----	-----	-----	5.27
0.27	5.85 <<	21.86	-----	-----	-----	-----	5.64	-----	-----	-----	-----	5.64
0.28	5.48	21.86 <<	-----	-----	-----	-----	5.67	-----	-----	-----	-----	5.67 <<
0.30	5.12	21.84	-----	-----	-----	-----	5.33	-----	-----	-----	-----	5.33
0.32	4.75	21.83	-----	-----	-----	-----	4.96	-----	-----	-----	-----	4.96
0.33	4.39	21.81	-----	-----	-----	-----	4.60	-----	-----	-----	-----	4.60

...End

Reservoir Report

Reservoir No. 1 - Forebay

Pond Data

Pond storage is based on known contour areas. Average end area method used.

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	20.00	506	0	0
2.00	22.00	1,174	1,680	1,680

Culvert / Orifice Structures

	[A]	[B]	[C]	[D]
Rise in	= 0.0	0.0	0.0	0.0
Span in	= 0.0	0.0	0.0	0.0
No. Barrels	= 0	0	0	0
Invert El. ft	= 0.00	0.00	0.00	0.00
Length ft	= 0.0	0.0	0.0	0.0
Slope %	= 0.00	0.00	0.00	0.00
N-Value	= .000	.000	.000	.000
Orif. Coeff.	= 0.00	0.00	0.00	0.00
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len ft	= 10.00	0.00	0.00	0.00
Crest El. ft	= 21.50	0.00	0.00	0.00
Weir Coeff.	= 2.60	0.00	0.00	0.00
Weir Type	= Broad	---	---	---
Multi-Stage	= No	No	No	No

Exfiltration Rate = 0.00 in/hr/sqft Tailwater Elev. = 0.00 ft

Note: All outflows have been analyzed under inlet and outlet control.

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Total cfs
0.00	0	20.00	---	---	---	---	0.00	---	---	---	---	0.00
0.20	168	20.20	---	---	---	---	0.00	---	---	---	---	0.00
0.40	336	20.40	---	---	---	---	0.00	---	---	---	---	0.00
0.60	504	20.60	---	---	---	---	0.00	---	---	---	---	0.00
0.80	672	20.80	---	---	---	---	0.00	---	---	---	---	0.00
1.00	840	21.00	---	---	---	---	0.00	---	---	---	---	0.00
1.20	1,008	21.20	---	---	---	---	0.00	---	---	---	---	0.00
1.40	1,176	21.40	---	---	---	---	0.00	---	---	---	---	0.00
1.60	1,344	21.60	---	---	---	---	0.82	---	---	---	---	0.82
1.80	1,512	21.80	---	---	---	---	4.27	---	---	---	---	4.27
2.00	1,680	22.00	---	---	---	---	9.19	---	---	---	---	9.19

Hydrograph Report

Hyd. No. 3

wetpond

Hydrograph type	= Reservoir	Peak discharge	= 0.00 cfs
Storm frequency	= 2 yrs	Time interval	= 1 min
Inflow hyd. No.	= 2	Reservoir name	= New Pond2
Max. Elevation	= 22.17 ft	Max. Storage	= 4,440 cuft

Storage Indication method used.

Outflow hydrograph volume = 0 cuft

...End

Reservoir Report

Reservoir No. 2 - New Pond2

Pond Data

Pond storage is based on known contour areas. Average end area method used.

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	20.00	827	0	0
2.00	22.00	3,039	3,866	3,866
2.50	22.50	3,780	1,705	5,571
3.00	23.00	7,750	2,883	8,453
4.00	24.00	9,698	8,724	17,177

Culvert / Orifice Structures

	[A]	[B]	[C]	[D]
Rise in	= 24.0	0.0	0.0	0.0
Span in	= 24.0	0.0	0.0	0.0
No. Barrels	= 1	0	0	0
Invert El. ft	= 22.50	0.00	0.00	0.00
Length ft	= 70.0	0.0	0.0	0.0
Slope %	= 0.70	0.00	0.00	0.00
N-Value	= .012	.000	.000	.000
Orif. Coeff.	= 0.60	0.00	0.00	0.00
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len ft	= 0.00	0.00	0.00	0.00
Crest El. ft	= 0.00	0.00	0.00	0.00
Weir Coeff.	= 0.00	0.00	0.00	0.00
Weir Type	= ---	---	---	---
Multi-Stage	= No	No	No	No

Exfiltration Rate = 0.00 in/hr/sqft Tailwater Elev. = 0.00 ft

Note: All outflows have been analyzed under inlet and outlet control.

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Total cfs
0.00	0	20.00	0.00	---	---	---	---	---	---	---	---	0.00
0.20	387	20.20	0.00	---	---	---	---	---	---	---	---	0.00
0.40	773	20.40	0.00	---	---	---	---	---	---	---	---	0.00
0.60	1,160	20.60	0.00	---	---	---	---	---	---	---	---	0.00
0.80	1,546	20.80	0.00	---	---	---	---	---	---	---	---	0.00
1.00	1,933	21.00	0.00	---	---	---	---	---	---	---	---	0.00
1.20	2,320	21.20	0.00	---	---	---	---	---	---	---	---	0.00
1.40	2,706	21.40	0.00	---	---	---	---	---	---	---	---	0.00
1.60	3,093	21.60	0.00	---	---	---	---	---	---	---	---	0.00
1.80	3,479	21.80	0.00	---	---	---	---	---	---	---	---	0.00
2.00	3,866	22.00	0.00	---	---	---	---	---	---	---	---	0.00
2.05	4,036	22.05	0.00	---	---	---	---	---	---	---	---	0.00
2.10	4,207	22.10	0.00	---	---	---	---	---	---	---	---	0.00
2.15	4,377	22.15	0.00	---	---	---	---	---	---	---	---	0.00
2.20	4,548	22.20	0.00	---	---	---	---	---	---	---	---	0.00
2.25	4,718	22.25	0.00	---	---	---	---	---	---	---	---	0.00
2.30	4,889	22.30	0.00	---	---	---	---	---	---	---	---	0.00
2.35	5,059	22.35	0.00	---	---	---	---	---	---	---	---	0.00

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Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr / cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Total cfs
2.40	5,230	22.40	0.00	---	---	---	---	---	---	---	---	0.00
2.45	5,400	22.45	0.00	---	---	---	---	---	---	---	---	0.00
2.50	5,571	22.50	0.00	---	---	---	---	---	---	---	---	0.00
2.55	5,859	22.55	0.02	---	---	---	---	---	---	---	---	0.02
2.60	6,147	22.60	0.07	---	---	---	---	---	---	---	---	0.07
2.65	6,436	22.65	0.17	---	---	---	---	---	---	---	---	0.17
2.70	6,724	22.70	0.28	---	---	---	---	---	---	---	---	0.28
2.75	7,012	22.75	0.42	---	---	---	---	---	---	---	---	0.42
2.80	7,300	22.80	0.61	---	---	---	---	---	---	---	---	0.61
2.85	7,589	22.85	0.75	---	---	---	---	---	---	---	---	0.75
2.90	7,877	22.90	1.01	---	---	---	---	---	---	---	---	1.01
2.95	8,165	22.95	1.31	---	---	---	---	---	---	---	---	1.31
3.00	8,453	23.00	1.53	---	---	---	---	---	---	---	---	1.53
3.10	9,326	23.10	2.17	---	---	---	---	---	---	---	---	2.17
3.20	10,198	23.20	2.95	---	---	---	---	---	---	---	---	2.95
3.30	11,070	23.30	3.60	---	---	---	---	---	---	---	---	3.60
3.40	11,943	23.40	4.57	---	---	---	---	---	---	---	---	4.57
3.50	12,815	23.50	5.62	---	---	---	---	---	---	---	---	5.62
3.60	13,688	23.60	6.45	---	---	---	---	---	---	---	---	6.45
3.70	14,560	23.70	7.58	---	---	---	---	---	---	---	---	7.58
3.80	15,432	23.80	8.43	---	---	---	---	---	---	---	---	8.43
3.90	16,305	23.90	9.27	---	---	---	---	---	---	---	---	9.27
4.00	17,177	24.00	10.02	---	---	---	---	---	---	---	---	10.02

...End

Hydrograph Report

Hyd. No. 1

Water Quality Flow

Hydrograph type	= Rational	Peak discharge	= 7.34 cfs
Storm frequency	= 5 yrs	Time interval	= 1 min
Drainage area	= 3.4 ac	Runoff coeff.	= 0.62
Intensity	= 3.449 in/hr	Time of conc. (Tc)	= 16 min
IDF Curve	= CDOT2000.idf	Asc/Rec limb fact	= 1/1

Hydrograph Volume = 7,042 cuft

Hydrograph Discharge Table

Time (hrs)	Outflow cfs)
0.22	5.96
0.23	6.42
0.25	6.88
0.27	7.34 <<
0.28	6.88
0.30	6.42
0.32	5.96

...End

Hydrograph Report

Hyd. No. 2

forebay

Hydrograph type	= Reservoir	Peak discharge	= 7.10 cfs
Storm frequency	= 5 yrs	Time interval	= 1 min
Inflow hyd. No.	= 1	Reservoir name	= Forebay
Max. Elevation	= 21.92 ft	Max. Storage	= 1,609 cuft

Storage Indication method used.

Outflow hydrograph volume = 5,866 cuft

Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
0.22	5.96	21.86	-----	-----	-----	-----	5.69	-----	-----	-----	-----	5.69
0.23	6.42	21.88	-----	-----	-----	-----	6.16	-----	-----	-----	-----	6.16
0.25	6.88	21.90	-----	-----	-----	-----	6.62	-----	-----	-----	-----	6.62
0.27	7.34 <<	21.91	-----	-----	-----	-----	7.07	-----	-----	-----	-----	7.07
0.28	6.88	21.92 <<	-----	-----	-----	-----	7.10	-----	-----	-----	-----	7.10 <<
0.30	6.42	21.90	-----	-----	-----	-----	6.68	-----	-----	-----	-----	6.68
0.32	5.96	21.88	-----	-----	-----	-----	6.22	-----	-----	-----	-----	6.22
0.33	5.50	21.86	-----	-----	-----	-----	5.76	-----	-----	-----	-----	5.76

...End

Reservoir Report

Reservoir No. 1 - Forebay

Pond Data

Pond storage is based on known contour areas. Average end area method used.

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	20.00	506	0	0
2.00	22.00	1,174	1,680	1,680

Culvert / Orifice Structures

	[A]	[B]	[C]	[D]
Rise in	= 0.0	0.0	0.0	0.0
Span in	= 0.0	0.0	0.0	0.0
No. Barrels	= 0	0	0	0
Invert El. ft	= 0.00	0.00	0.00	0.00
Length ft	= 0.0	0.0	0.0	0.0
Slope %	= 0.00	0.00	0.00	0.00
N-Value	= .000	.000	.000	.000
Orif. Coeff.	= 0.00	0.00	0.00	0.00
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len ft	= 10.00	0.00	0.00	0.00
Crest El. ft	= 21.50	0.00	0.00	0.00
Weir Coeff.	= 2.60	0.00	0.00	0.00
Weir Type	= Broad	---	---	---
Multi-Stage	= No	No	No	No

Exfiltration Rate = 0.00 in/hr/sqft Tailwater Elev. = 0.00 ft

Note: All outflows have been analyzed under inlet and outlet control.

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Total cfs
0.00	0	20.00	---	---	---	---	0.00	---	---	---	---	0.00
0.20	168	20.20	---	---	---	---	0.00	---	---	---	---	0.00
0.40	336	20.40	---	---	---	---	0.00	---	---	---	---	0.00
0.60	504	20.60	---	---	---	---	0.00	---	---	---	---	0.00
0.80	672	20.80	---	---	---	---	0.00	---	---	---	---	0.00
1.00	840	21.00	---	---	---	---	0.00	---	---	---	---	0.00
1.20	1,008	21.20	---	---	---	---	0.00	---	---	---	---	0.00
1.40	1,176	21.40	---	---	---	---	0.00	---	---	---	---	0.00
1.60	1,344	21.60	---	---	---	---	0.82	---	---	---	---	0.82
1.80	1,512	21.80	---	---	---	---	4.27	---	---	---	---	4.27
2.00	1,680	22.00	---	---	---	---	9.19	---	---	---	---	9.19

Hydrograph Report

Hyd. No. 3

wetpond

Hydrograph type	= Reservoir	Peak discharge	= 0.02 cfs
Storm frequency	= 5 yrs	Time interval	= 1 min
Inflow hyd. No.	= 2	Reservoir name	= New Pond2
Max. Elevation	= 22.55 ft	Max. Storage	= 5,847 cuft

Storage Indication method used.

Outflow hydrograph volume = 294 cuft

Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
0.58	0.28	22.54	0.02	-----	-----	-----	-----	-----	-----	-----	-----	0.02
0.60	0.21	22.54	0.02	-----	-----	-----	-----	-----	-----	-----	-----	0.02
0.62	0.15	22.54	0.02	-----	-----	-----	-----	-----	-----	-----	-----	0.02
0.63	0.11	22.55	0.02	-----	-----	-----	-----	-----	-----	-----	-----	0.02
0.65	0.08	22.55	0.02	-----	-----	-----	-----	-----	-----	-----	-----	0.02
0.67	0.06	22.55	0.02	-----	-----	-----	-----	-----	-----	-----	-----	0.02
0.68	0.05	22.55	0.02	-----	-----	-----	-----	-----	-----	-----	-----	0.02
0.70	0.03	22.55	0.02	-----	-----	-----	-----	-----	-----	-----	-----	0.02
0.72	0.03	22.55	0.02	-----	-----	-----	-----	-----	-----	-----	-----	0.02
0.73	0.02	22.55 <<	0.02	-----	-----	-----	-----	-----	-----	-----	-----	0.02 <<
0.75	0.01	22.55	0.02	-----	-----	-----	-----	-----	-----	-----	-----	0.02
0.77	0.01	22.55	0.02	-----	-----	-----	-----	-----	-----	-----	-----	0.02
0.78	0.01	22.55	0.02	-----	-----	-----	-----	-----	-----	-----	-----	0.02
0.80	0.01	22.55	0.02	-----	-----	-----	-----	-----	-----	-----	-----	0.02
0.82	0.00	22.55	0.02	-----	-----	-----	-----	-----	-----	-----	-----	0.02
0.83	0.00	22.55	0.02	-----	-----	-----	-----	-----	-----	-----	-----	0.02
0.85	0.00	22.55	0.02	-----	-----	-----	-----	-----	-----	-----	-----	0.02
0.87	0.00	22.55	0.02	-----	-----	-----	-----	-----	-----	-----	-----	0.02
0.88	0.00	22.55	0.02	-----	-----	-----	-----	-----	-----	-----	-----	0.02
0.90	0.00	22.55	0.02	-----	-----	-----	-----	-----	-----	-----	-----	0.02
0.92	0.00	22.55	0.02	-----	-----	-----	-----	-----	-----	-----	-----	0.02
0.93	0.00	22.55	0.02	-----	-----	-----	-----	-----	-----	-----	-----	0.02
0.95	0.00	22.55	0.02	-----	-----	-----	-----	-----	-----	-----	-----	0.02
0.97	0.00	22.55	0.02	-----	-----	-----	-----	-----	-----	-----	-----	0.02
0.98	0.00	22.55	0.02	-----	-----	-----	-----	-----	-----	-----	-----	0.02
1.00	0.00	22.55	0.02	-----	-----	-----	-----	-----	-----	-----	-----	0.02
1.02	0.00	22.55	0.02	-----	-----	-----	-----	-----	-----	-----	-----	0.02
1.03	0.00	22.54	0.02	-----	-----	-----	-----	-----	-----	-----	-----	0.02
1.05	0.00	22.54	0.02	-----	-----	-----	-----	-----	-----	-----	-----	0.02
1.07	0.00	22.54	0.02	-----	-----	-----	-----	-----	-----	-----	-----	0.02
1.08	0.00	22.54	0.02	-----	-----	-----	-----	-----	-----	-----	-----	0.02
1.10	0.00	22.54	0.02	-----	-----	-----	-----	-----	-----	-----	-----	0.02
1.12	0.00	22.54	0.02	-----	-----	-----	-----	-----	-----	-----	-----	0.02
1.13	0.00	22.54	0.02	-----	-----	-----	-----	-----	-----	-----	-----	0.02
1.15	0.00	22.54	0.02	-----	-----	-----	-----	-----	-----	-----	-----	0.02
1.17	0.00	22.54	0.02	-----	-----	-----	-----	-----	-----	-----	-----	0.02
1.18	0.00	22.54	0.02	-----	-----	-----	-----	-----	-----	-----	-----	0.02
1.20	0.00	22.54	0.02	-----	-----	-----	-----	-----	-----	-----	-----	0.02

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Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
1.22	0.00	22.54	0.02	-----	-----	-----	-----	-----	-----	-----	-----	0.02
1.23	0.00	22.54	0.02	-----	-----	-----	-----	-----	-----	-----	-----	0.02
1.25	0.00	22.54	0.02	-----	-----	-----	-----	-----	-----	-----	-----	0.02
1.27	0.00	22.54	0.02	-----	-----	-----	-----	-----	-----	-----	-----	0.02
1.28	0.00	22.54	0.02	-----	-----	-----	-----	-----	-----	-----	-----	0.02
1.30	0.00	22.54	0.02	-----	-----	-----	-----	-----	-----	-----	-----	0.02
1.32	0.00	22.54	0.02	-----	-----	-----	-----	-----	-----	-----	-----	0.02
1.33	0.00	22.54	0.02	-----	-----	-----	-----	-----	-----	-----	-----	0.02
1.35	0.00	22.54	0.02	-----	-----	-----	-----	-----	-----	-----	-----	0.02
1.37	0.00	22.54	0.02	-----	-----	-----	-----	-----	-----	-----	-----	0.02
1.38	0.00	22.54	0.02	-----	-----	-----	-----	-----	-----	-----	-----	0.02
1.40	0.00	22.54	0.02	-----	-----	-----	-----	-----	-----	-----	-----	0.02
1.42	0.00	22.54	0.02	-----	-----	-----	-----	-----	-----	-----	-----	0.02
1.43	0.00	22.54	0.02	-----	-----	-----	-----	-----	-----	-----	-----	0.02
1.45	0.00	22.54	0.02	-----	-----	-----	-----	-----	-----	-----	-----	0.02
1.47	0.00	22.54	0.02	-----	-----	-----	-----	-----	-----	-----	-----	0.02
1.48	0.00	22.54	0.02	-----	-----	-----	-----	-----	-----	-----	-----	0.02
1.50	0.00	22.54	0.02	-----	-----	-----	-----	-----	-----	-----	-----	0.02
1.52	0.00	22.54	0.02	-----	-----	-----	-----	-----	-----	-----	-----	0.02
1.53	0.00	22.54	0.02	-----	-----	-----	-----	-----	-----	-----	-----	0.02
1.55	0.00	22.54	0.02	-----	-----	-----	-----	-----	-----	-----	-----	0.02
1.57	0.00	22.54	0.02	-----	-----	-----	-----	-----	-----	-----	-----	0.02
1.58	0.00	22.54	0.02	-----	-----	-----	-----	-----	-----	-----	-----	0.02
1.60	0.00	22.54	0.02	-----	-----	-----	-----	-----	-----	-----	-----	0.02

...End

Reservoir Report

Reservoir No. 2 - New Pond2

Pond Data

Pond storage is based on known contour areas. Average end area method used.

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	20.00	827	0	0
2.00	22.00	3,039	3,866	3,866
2.50	22.50	3,780	1,705	5,571
3.00	23.00	7,750	2,883	8,453
4.00	24.00	9,698	8,724	17,177

Culvert / Orifice Structures

	[A]	[B]	[C]	[D]
Rise in	= 24.0	0.0	0.0	0.0
Span in	= 24.0	0.0	0.0	0.0
No. Barrels	= 1	0	0	0
Invert El. ft	= 22.50	0.00	0.00	0.00
Length ft	= 70.0	0.0	0.0	0.0
Slope %	= 0.70	0.00	0.00	0.00
N-Value	= .012	.000	.000	.000
Orif. Coeff.	= 0.60	0.00	0.00	0.00
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len ft	= 0.00	0.00	0.00	0.00
Crest El. ft	= 0.00	0.00	0.00	0.00
Weir Coeff.	= 0.00	0.00	0.00	0.00
Weir Type	= ---	---	---	---
Multi-Stage	= No	No	No	No

Exfiltration Rate = 0.00 in/hr/sqft Tailwater Elev. = 0.00 ft

Note: All outflows have been analyzed under inlet and outlet control.

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Total cfs
0.00	0	20.00	0.00	---	---	---	---	---	---	---	---	0.00
0.20	387	20.20	0.00	---	---	---	---	---	---	---	---	0.00
0.40	773	20.40	0.00	---	---	---	---	---	---	---	---	0.00
0.60	1,160	20.60	0.00	---	---	---	---	---	---	---	---	0.00
0.80	1,546	20.80	0.00	---	---	---	---	---	---	---	---	0.00
1.00	1,933	21.00	0.00	---	---	---	---	---	---	---	---	0.00
1.20	2,320	21.20	0.00	---	---	---	---	---	---	---	---	0.00
1.40	2,706	21.40	0.00	---	---	---	---	---	---	---	---	0.00
1.60	3,093	21.60	0.00	---	---	---	---	---	---	---	---	0.00
1.80	3,479	21.80	0.00	---	---	---	---	---	---	---	---	0.00
2.00	3,866	22.00	0.00	---	---	---	---	---	---	---	---	0.00
2.05	4,036	22.05	0.00	---	---	---	---	---	---	---	---	0.00
2.10	4,207	22.10	0.00	---	---	---	---	---	---	---	---	0.00
2.15	4,377	22.15	0.00	---	---	---	---	---	---	---	---	0.00
2.20	4,548	22.20	0.00	---	---	---	---	---	---	---	---	0.00
2.25	4,718	22.25	0.00	---	---	---	---	---	---	---	---	0.00
2.30	4,889	22.30	0.00	---	---	---	---	---	---	---	---	0.00
2.35	5,059	22.35	0.00	---	---	---	---	---	---	---	---	0.00

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New Pond2

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Total cfs
2.40	5,230	22.40	0.00	---	---	---	---	---	---	---	---	0.00
2.45	5,400	22.45	0.00	---	---	---	---	---	---	---	---	0.00
2.50	5,571	22.50	0.00	---	---	---	---	---	---	---	---	0.00
2.55	5,859	22.55	0.02	---	---	---	---	---	---	---	---	0.02
2.60	6,147	22.60	0.07	---	---	---	---	---	---	---	---	0.07
2.65	6,436	22.65	0.17	---	---	---	---	---	---	---	---	0.17
2.70	6,724	22.70	0.28	---	---	---	---	---	---	---	---	0.28
2.75	7,012	22.75	0.42	---	---	---	---	---	---	---	---	0.42
2.80	7,300	22.80	0.61	---	---	---	---	---	---	---	---	0.61
2.85	7,589	22.85	0.75	---	---	---	---	---	---	---	---	0.75
2.90	7,877	22.90	1.01	---	---	---	---	---	---	---	---	1.01
2.95	8,165	22.95	1.31	---	---	---	---	---	---	---	---	1.31
3.00	8,453	23.00	1.53	---	---	---	---	---	---	---	---	1.53
3.10	9,326	23.10	2.17	---	---	---	---	---	---	---	---	2.17
3.20	10,198	23.20	2.95	---	---	---	---	---	---	---	---	2.95
3.30	11,070	23.30	3.60	---	---	---	---	---	---	---	---	3.60
3.40	11,943	23.40	4.57	---	---	---	---	---	---	---	---	4.57
3.50	12,815	23.50	5.62	---	---	---	---	---	---	---	---	5.62
3.60	13,688	23.60	6.45	---	---	---	---	---	---	---	---	6.45
3.70	14,560	23.70	7.58	---	---	---	---	---	---	---	---	7.58
3.80	15,432	23.80	8.43	---	---	---	---	---	---	---	---	8.43
3.90	16,305	23.90	9.27	---	---	---	---	---	---	---	---	9.27
4.00	17,177	24.00	10.02	---	---	---	---	---	---	---	---	10.02

...End

Hydrograph Report

Hyd. No. 1

Water Quality Flow

Hydrograph type	= Rational	Peak discharge	= 8.34 cfs
Storm frequency	= 10 yrs	Time interval	= 1 min
Drainage area	= 3.4 ac	Runoff coeff.	= 0.62
Intensity	= 3.922 in/hr	Time of conc. (Tc)	= 16 min
IDF Curve	= CDOT2000.idf	Asc/Rec limb fact	= 1/1

Hydrograph Volume = 8,006 cuft

Hydrograph Discharge Table

Time (hrs)	Outflow (cfs)
0.22	6.78
0.23	7.30
0.25	7.82
0.27	8.34 <<
0.28	7.82
0.30	7.30
0.32	6.78

...End

Hydrograph Report

Hyd. No. 2

forebay

Hydrograph type	= Reservoir	Peak discharge	= 8.08 cfs
Storm frequency	= 10 yrs	Time interval	= 1 min
Inflow hyd. No.	= 1	Reservoir name	= Forebay
Max. Elevation	= 21.95 ft	Max. Storage	= 1,642 cuft

Storage Indication method used.

Outflow hydrograph volume = 6,830 cuft

Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
0.22	6.78	21.89	-----	-----	-----	-----	6.48	-----	-----	-----	-----	6.48
0.23	7.30	21.91	-----	-----	-----	-----	7.00	-----	-----	-----	-----	7.00
0.25	7.82	21.93	-----	-----	-----	-----	7.52	-----	-----	-----	-----	7.52
0.27	8.34 <<	21.95	-----	-----	-----	-----	8.04	-----	-----	-----	-----	8.04
0.28	7.82	21.95 <<	-----	-----	-----	-----	8.08	-----	-----	-----	-----	8.08 <<
0.30	7.30	21.93	-----	-----	-----	-----	7.59	-----	-----	-----	-----	7.59
0.32	6.78	21.91	-----	-----	-----	-----	7.07	-----	-----	-----	-----	7.07
0.33	6.25	21.89	-----	-----	-----	-----	6.55	-----	-----	-----	-----	6.55

...End

Reservoir Report

Reservoir No. 1 - Forebay

Pond Data

Pond storage is based on known contour areas. Average end area method used.

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	20.00	506	0	0
2.00	22.00	1,174	1,680	1,680

Culvert / Orifice Structures

	[A]	[B]	[C]	[D]
Rise in	= 0.0	0.0	0.0	0.0
Span in	= 0.0	0.0	0.0	0.0
No. Barrels	= 0	0	0	0
Invert El. ft	= 0.00	0.00	0.00	0.00
Length ft	= 0.0	0.0	0.0	0.0
Slope %	= 0.00	0.00	0.00	0.00
N-Value	= .000	.000	.000	.000
Orif. Coeff.	= 0.00	0.00	0.00	0.00
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len ft	= 10.00	0.00	0.00	0.00
Crest El. ft	= 21.50	0.00	0.00	0.00
Weir Coeff.	= 2.60	0.00	0.00	0.00
Weir Type	= Broad	---	---	---
Multi-Stage	= No	No	No	No

Exfiltration Rate = 0.00 in/hr/sqft Tailwater Elev. = 0.00 ft

Stage / Storage / Discharge Table

Note: All outflows have been analyzed under inlet and outlet control.

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Total cfs
0.00	0	20.00	---	---	---	---	0.00	---	---	---	---	0.00
0.20	168	20.20	---	---	---	---	0.00	---	---	---	---	0.00
0.40	336	20.40	---	---	---	---	0.00	---	---	---	---	0.00
0.60	504	20.60	---	---	---	---	0.00	---	---	---	---	0.00
0.80	672	20.80	---	---	---	---	0.00	---	---	---	---	0.00
1.00	840	21.00	---	---	---	---	0.00	---	---	---	---	0.00
1.20	1,008	21.20	---	---	---	---	0.00	---	---	---	---	0.00
1.40	1,176	21.40	---	---	---	---	0.00	---	---	---	---	0.00
1.60	1,344	21.60	---	---	---	---	0.82	---	---	---	---	0.82
1.80	1,512	21.80	---	---	---	---	4.27	---	---	---	---	4.27
2.00	1,680	22.00	---	---	---	---	9.19	---	---	---	---	9.19

Hydrograph Report

Hydraflow Hydrographs by Intelisolve

Hyd. No. 3

wetpond

Hydrograph type	= Reservoir	Peak discharge	= 0.26 cfs
Storm frequency	= 10 yrs	Time interval	= 1 min
Inflow hyd. No.	= 2	Reservoir name	= New Pond2
Max. Elevation	= 22.69 ft	Max. Storage	= 6,668 cuft

Storage Indication method used.

Outflow hydrograph volume = 1,258 cuft

Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
0.50	1.47	22.67	0.21	-----	-----	-----	-----	-----	-----	-----	-----	0.21
0.52	0.94	22.68	0.23	-----	-----	-----	-----	-----	-----	-----	-----	0.23
0.53	0.69	22.68	0.24	-----	-----	-----	-----	-----	-----	-----	-----	0.24
0.55	0.51	22.69	0.25	-----	-----	-----	-----	-----	-----	-----	-----	0.25
0.57	0.38	22.69	0.25	-----	-----	-----	-----	-----	-----	-----	-----	0.25
0.58	0.28	22.69 <<	0.26	-----	-----	-----	-----	-----	-----	-----	-----	0.26 <<
0.60	0.21	22.69	0.26	-----	-----	-----	-----	-----	-----	-----	-----	0.26
0.62	0.16	22.69	0.25	-----	-----	-----	-----	-----	-----	-----	-----	0.25
0.63	0.12	22.69	0.25	-----	-----	-----	-----	-----	-----	-----	-----	0.25
0.65	0.09	22.69	0.25	-----	-----	-----	-----	-----	-----	-----	-----	0.25
0.67	0.06	22.69	0.24	-----	-----	-----	-----	-----	-----	-----	-----	0.24
0.68	0.05	22.68	0.24	-----	-----	-----	-----	-----	-----	-----	-----	0.24
0.70	0.04	22.68	0.24	-----	-----	-----	-----	-----	-----	-----	-----	0.24
0.72	0.03	22.68	0.23	-----	-----	-----	-----	-----	-----	-----	-----	0.23
0.73	0.02	22.68	0.23	-----	-----	-----	-----	-----	-----	-----	-----	0.23
0.75	0.01	22.67	0.22	-----	-----	-----	-----	-----	-----	-----	-----	0.22
0.77	0.01	22.67	0.22	-----	-----	-----	-----	-----	-----	-----	-----	0.22
0.78	0.01	22.67	0.21	-----	-----	-----	-----	-----	-----	-----	-----	0.21
0.80	0.01	22.67	0.21	-----	-----	-----	-----	-----	-----	-----	-----	0.21

...End

Reservoir Report

Reservoir No. 2 - New Pond2

Pond Data

Pond storage is based on known contour areas. Average end area method used.

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	20.00	827	0	0
2.00	22.00	3,039	3,866	3,866
2.50	22.50	3,780	1,705	5,571
3.00	23.00	7,750	2,883	8,453
4.00	24.00	9,698	8,724	17,177

Culvert / Orifice Structures

	[A]	[B]	[C]	[D]
Rise in	= 24.0	0.0	0.0	0.0
Span in	= 24.0	0.0	0.0	0.0
No. Barrels	= 1	0	0	0
Invert El. ft	= 22.50	0.00	0.00	0.00
Length ft	= 70.0	0.0	0.0	0.0
Slope %	= 0.70	0.00	0.00	0.00
N-Value	= .012	.000	.000	.000
Orif. Coeff.	= 0.60	0.00	0.00	0.00
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len ft	= 0.00	0.00	0.00	0.00
Crest El. ft	= 0.00	0.00	0.00	0.00
Weir Coeff.	= 0.00	0.00	0.00	0.00
Weir Type	= ---	---	---	---
Multi-Stage	= No	No	No	No

Exfiltration Rate = 0.00 in/hr/sqft Tailwater Elev. = 0.00 ft

Note: All outflows have been analyzed under inlet and outlet control.

Stage / Storage / Discharge Table

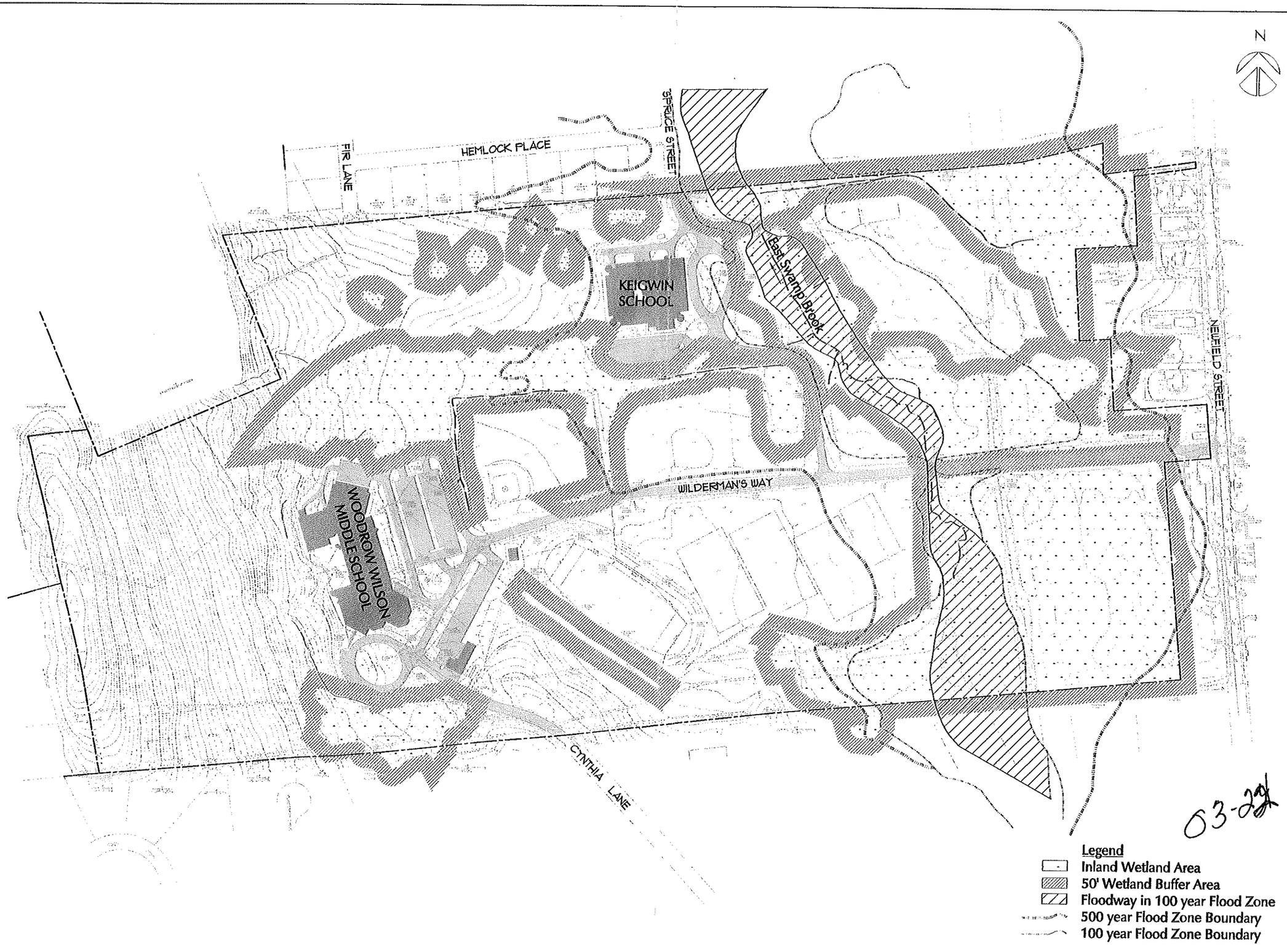
Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Total cfs
0.00	0	20.00	0.00	---	---	---	---	---	---	---	---	0.00
0.20	387	20.20	0.00	---	---	---	---	---	---	---	---	0.00
0.40	773	20.40	0.00	---	---	---	---	---	---	---	---	0.00
0.60	1,160	20.60	0.00	---	---	---	---	---	---	---	---	0.00
0.80	1,546	20.80	0.00	---	---	---	---	---	---	---	---	0.00
1.00	1,933	21.00	0.00	---	---	---	---	---	---	---	---	0.00
1.20	2,320	21.20	0.00	---	---	---	---	---	---	---	---	0.00
1.40	2,706	21.40	0.00	---	---	---	---	---	---	---	---	0.00
1.60	3,093	21.60	0.00	---	---	---	---	---	---	---	---	0.00
1.80	3,479	21.80	0.00	---	---	---	---	---	---	---	---	0.00
2.00	3,866	22.00	0.00	---	---	---	---	---	---	---	---	0.00
2.05	4,036	22.05	0.00	---	---	---	---	---	---	---	---	0.00
2.10	4,207	22.10	0.00	---	---	---	---	---	---	---	---	0.00
2.15	4,377	22.15	0.00	---	---	---	---	---	---	---	---	0.00
2.20	4,548	22.20	0.00	---	---	---	---	---	---	---	---	0.00
2.25	4,718	22.25	0.00	---	---	---	---	---	---	---	---	0.00
2.30	4,889	22.30	0.00	---	---	---	---	---	---	---	---	0.00
2.35	5,059	22.35	0.00	---	---	---	---	---	---	---	---	0.00

Continues on next page...

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Total cfs
2.40	5,230	22.40	0.00	---	---	---	---	---	---	---	---	0.00
2.45	5,400	22.45	0.00	---	---	---	---	---	---	---	---	0.00
2.50	5,571	22.50	0.00	---	---	---	---	---	---	---	---	0.00
2.55	5,859	22.55	0.02	---	---	---	---	---	---	---	---	0.02
2.60	6,147	22.60	0.07	---	---	---	---	---	---	---	---	0.07
2.65	6,436	22.65	0.17	---	---	---	---	---	---	---	---	0.17
2.70	6,724	22.70	0.28	---	---	---	---	---	---	---	---	0.28
2.75	7,012	22.75	0.42	---	---	---	---	---	---	---	---	0.42
2.80	7,300	22.80	0.61	---	---	---	---	---	---	---	---	0.61
2.85	7,589	22.85	0.75	---	---	---	---	---	---	---	---	0.75
2.90	7,877	22.90	1.01	---	---	---	---	---	---	---	---	1.01
2.95	8,165	22.95	1.31	---	---	---	---	---	---	---	---	1.31
3.00	8,453	23.00	1.53	---	---	---	---	---	---	---	---	1.53
3.10	9,326	23.10	2.17	---	---	---	---	---	---	---	---	2.17
3.20	10,198	23.20	2.95	---	---	---	---	---	---	---	---	2.95
3.30	11,070	23.30	3.60	---	---	---	---	---	---	---	---	3.60
3.40	11,943	23.40	4.57	---	---	---	---	---	---	---	---	4.57
3.50	12,815	23.50	5.62	---	---	---	---	---	---	---	---	5.62
3.60	13,688	23.60	6.45	---	---	---	---	---	---	---	---	6.45
3.70	14,560	23.70	7.58	---	---	---	---	---	---	---	---	7.58
3.80	15,432	23.80	8.43	---	---	---	---	---	---	---	---	8.43
3.90	16,305	23.90	9.27	---	---	---	---	---	---	---	---	9.27
4.00	17,177	24.00	10.02	---	---	---	---	---	---	---	---	10.02

...End



03-22

BID DOCUMENTS

NO.	DATE	REVISIONS

DESIGNED BY:
DRAWN BY:
CHECKED BY:
APPROVED BY:

CONSULTING ENGINEERS
124 White Oak Drive
Berlin, Connecticut 06037
Telephone (860) 828-2830
Fax (860) 828-2835

LAND PLANNERS
LANDSCAPE ARCHITECTS
971 HOPMEADOW STREET
SIMSBURY, CT 06070
(860) 658-1868 FAX (860) 658-0117

DeCarlo & Doll, Inc.
1952 Whitney Avenue
Hamden, CT 06517
Architects Engineers Surveyors
Planners Construction Managers
Telephone (203) 288-4087
Fax (203) 288-7378

HRP Associates, Inc.
Architects Engineers Land Surveyors
Consultants
167 New Britain Avenue
Plainville, Connecticut 06062
Telephone (860) 793-0399 Fax (860) 793-0411
www.hrpassociates.com

MIDDLETOWN HIGH SCHOOL AND VOCATIONAL AGRICULTURAL CENTER

WILDERMAN'S WAY
MIDDLETOWN, CT.

JOB NO: 8820
CADD NO:
FILE NO:

EXISTING CONDITIONS PLAN

SCALE: 1" = 200'
DATE: 8/20/03
DRAWING NO.: C-1.02