434-C-5
331 Veranda St.
Expansion
Martin's Pt.

Martin's Point

Neighborhood Meeting Notes

Date: April 3, 2006

Location: St Peter's Episcopal Church, Washington Ave, Portland

Attendees: Paul Ureneck, Boulos Co; Ann Tucker, Bruce Wagner, Martin's Point; David Webster, PDT; Dwight Anderson, DeLuca Hoffman; members of the public (see attached sign in sheet)

1. Introduction of project and team members by Paul Ureneck at 6:15 pm.
2. General overview of project by David Webster. Discussed were the historical context of the site, variations of plans over the past year up until current plans; site circulation review; presentation and discussion of several renderings showing architectural and site elements.
3. Presentation by Dwight Anderson. Included were review of existing conditions plan, demolition plan, connectivity of pathway system, traffic issues and proposed traffic light.
4. Questions and comments by the public: There was discussion on the traffic light with both praise and concern. The concern was directed at ensuring there was sufficient distance for cars to stop with consideration of the amount of traffic coming off the I 295 off ramp at the end of a typical business day. There were also questions asked that requested additional explanation of the site circulation, parking layout, storm water design, and landscaping. Timing of the project was also discussed with the public being told the Marine Hospital renovation was expected to start in June and take approximately 8 months. Phase II, the clinic and related site improvements, would occur subsequently, however, it was a minimum of one year + out. Questions were asked about the lighting and Dwight Anderson showed cuts of the lighting fixtures and explained a light level plan would be submitted to City for review and approval as part of the site plan approval process. Questions were asked regarding the exterior renovations of the Marine Hospital. David Webster described the work. A question was asked regarding the height of the parapet wall on the top parking deck. David Webster explained the detail.

The meeting was adjourned at 6:45 pm.

Paul Ureneck, The Boulos Co, took meeting notes.

SIGN IN SHEET

MARTIN'S POINT NEIGHBORHOOD MEETING
APRIL 3 2006

NAME	ADDRESS	PHONE/E-MAIL
1. Cheryl Junewicz	38 Bismarck St	~~7738896~~
2. Julia McDonough	40 Wordsworth	774-1988
3. JoAnn Innis	19 Upland St.	775-0125
4. Wendy Donahue	9 Wordsworth St.	773-1410
5. Larry Donahue	9 Wordsworth St.	773-1410
6. BRENDA DONATO	75 ARCADIA ST.	879-4082
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Neighborhood Meeting Certification

Paul Ureneck, The Boulos Co for Martins Point April 3 2006 St Peters 6:00pi

I, (applicant/consultant) hereby certify that a neighborhood meeting was held on (date) at (location) at (time).
March 20, 2006

I also certify that on (date at least seven days prior to the neighborhood meeting),
invitations were mailed to all addresses on the mailing list provided by the Planning Division, including property owners within 500 feet of the proposed development and the residents on the "interested parties" list

Signed,

Paul Ureneck

Paul Ureneck date 4/10/06

Attached to this certification are

1. Copy of the invitation sent
2. Sign-in sheet
3. Meeting minutes

City of Portland, Maine
Department of Planning and Development

Dear Neighbor:

Thank you for attending this evening's neighborhood meeting.

Applicants for major developments, zone changes, and subdivisions of more than five units/lots are required to hold a neighborhood meeting prior to the Planning Board's public hearing on the development proposal.

The purpose of these meetings is to improve communication between neighbors and applicants for development. We have found that neighbors raise questions and offer insight that often improve the design or compatibility of a proposed development.

The City code requires that property owners within 500 feet of the proposed development and residents on an "interested parties list" be invited to participate in a neighborhood meeting. A sign-in sheet will be circulated and minutes of the meeting will be taken. Both the sign-in sheet and minutes will be submitted to the Planning Board.

Should you wish to offer additional comments on this proposed development, you may send correspondence to:

Planning Division
Department of Planning and Development
Portland City Hall
389 Congress Street
Portland, ME 04101;

Or email:
sh@portlandmaine.gov;

Or call 874-8720.

Thank you for taking the time to attend tonight's meeting.

Sincerely,

Sarah Hopkins
Development Review Services Manager

SECTION 12

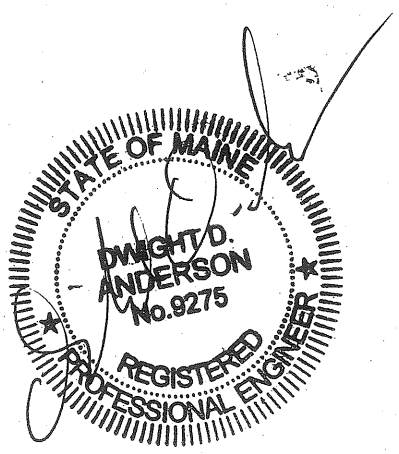
STORMWATER MANAGEMENT REPORT

Prepared for

Martin's Point
331 Veranda Street
Portland, Maine 04103

Prepared by

DeLuca-Hoffman Associates, Inc.
778 Main Street, Suite 8
South Portland, Maine 04106
(207) 775-1121



APRIL 2006

STORMWATER MANAGEMENT REPORT

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Cross References

Section 14 – Erosion and Sediment Control

From: Dennis, Jeff
Sent: Wednesday, February 15, 2006 4:37 PM
To: Viola, Ben
Subject: RE: Stormtreat System

I haven't written that part of the manual yet. They are approved as alternative filters provided:

- the discharge orifice for each Stormtreat tank is set to discharge at 0.75 gal/min (the only data we've seen from Stormtreat was with disharge rates of 0.5 gal/min/tank (we stretched it to 0.75), and that data is what we've based our approval on. I've asked them many times in the past to give us data at a higher discharge rate because I expect they'll work virtually as well at 1 gal/min, or even 2 gal/min, but I have yet to see any data)
- the required volume (1.0" for imp, 0.4 for landscaped) is stored and slowly bled through the system at the above rate of 0.75 gal/min/tank (i.e. 4 tanks would be 3.0 gal/min for the whoe system)
- the system drains within 96 hours to be ready for the next storm

If you do the math, that means you need at least 6 stormtreat tanks per acre of impervious area in order to be able to treat 1.0" of runoff in 4 days. I personally think this is overkill but need some data from Stormtreat to support raising the discharge rate above 0.75 gal/min/tank. I'm hoping we can approve them at 2 gal/min/tank with a minimum treatment time of 72 hours (we're stretcheng to let them have 96 hours), which would bring it down to 3 tanks per acre of impervious and would make them more economically viable.

Jeff

From: Viola, Ben
Sent: Wednesday, February 15, 2006 3:50 PM
To: Dennis, Jeff
Subject: Stormtreat System

In a meeting with Dwight Anderson of Deluca Hoffman the Stormtreat System was proposed as possible quality treatment. Do you have an approval letter for these units and what sizing criterion is appropriate for these units?

Ben Viola

Exhibit A-1, continued: Hydrologic soil groups for United States soils

SOONAKER	C	SPINEKOP	B	STABLER	B	STEUBER	B	STRELNA, SILTY	B
SOOSAP	C	SPINEKOP, SALINE	C	STADY	B	STEVENS	B	SUBSTRATUM	
SOPER	C	SPINEKOP,	C	STAFFORD	C	STEVENSON	B	STREVELL	B
SOQUEL	B	MODERATELY WET		STAGECOACH	B	STEWART	D	STRICKER	B
SORENSEN	B	SPINKS	A	STAHL	C	STEWYAL	D	STRICKLAND	C
SORF	C	SPINLIN	C	STAKE	C	STICKNEY	C	STRINGAM	B
SORRENTO	B	SPINNEY	B	STALEY	B	STIDHAM	B	STRINGTOWN	B
SORTER	D	SPIRES	D	STALLINGS	C	STIEN	B	STRINGTOWN, GRADED	C
SORUM	D	SPIRIT	C	STAMBAUGH	B	STIGLER	D	STROLE	C
SOSA	C	SPIRO	B	STAMFORD	D	STILES	C	STROM	C
SOSTIEN	D	SPIVEY	B	STAMP	D	STILGAR	B	STROMAL	B
SOTIN	B	SPLAWN	C	STAMPEDE	D	STILL	B	STRONGHOLD	B
SOUGHE	D	SPLENDORA	C	STAN	B	STILLMAN	B	STRONGHURST	B
SOULAJULE	C	SPLITEN	D	STANDLEY	C	STILLWATER	D	STROUPE	C
SOUTHACE	B	SPLITRO	D	STANDUP	B	STILSKIN	C	STROZI	C
SOUTHAM	D	SPLITTOP	C	STANEY	D	STILSON	B	STRYCH	B
SOUTHFORK	D	SPOFFORD	D	STANFIELD	C	STIMCA	B	STRYKER	C
SOUTHGATE	D	SPOFMORE	C	STANISLAUS	C	STIMSON	D	STUBBLEFIELD	C
SOUTHMOUNT	C	SPOKANE	C	STANISLAUS, WET	D	STINES	B	STUBBS	C
SOUTHRIDGE	B	SPOKEL	B	STANROD	C	STINGAL	B	STUCKY	B
SOUTHWICK	C	SPONSELLER	B	STAPALOOP	B	STINGDORN	D	STUDEBAKER	B
SOWCAN	B	SPOOL	D	STAPLES	B/D	STIPE	C	STUKEL	D
SOWCAN, SOMEWHAT	C	SPOONER	C/D	STAPLETON	B	STIRK	D	STUMBLE	A
POORLY DRAINED		SPOTSYLVANIA	C	STAPP	C	STIRRUP	B	STUMPP	D
SPAA	D	SPOTTSWOOD	B	STARBUCK	D	STIRUM	B/D	STUMPTOWN	B
SPACE CITY	A	SPRABAT	B	STARGO	B	STIRUM, PONDED	D	STUNNER	B
SPADE	B	SPRAY	B	STARHOPE	D	STISSING	C	STUNTZ	C
SPADRA	B	SPRECKELS	C	STARICHKOF	D	STIVERSVILLE	B	STURGEON	B
SPAGER	D	SPRIGGS	C	STARKEY	C	STOCKADE	B/D	STURGILL	D
SPALDING	D	SPRING	C	STARKS	C	STOCKBRIDGE	C	STURKIE	B
SPANA	D	SPRINGDALE	A	STARLEY	D	STOCKEL	D	STUTTGART	D
SPANAWAY	A	SPRINGDALE, STONY	B	STARMAN	D	STOCKLAND	B	STUTZMAN	C
SPANEL	D	SPRINGER	B	STARR	C	STOCKPEN	D	STUTZMAN, WET	D
SPANG	B	SPRINGERVILLE	D	STARVEOUT	B	STODA	B	STUTZVILLE	C
SPANGENBURG	C	SPRINGFIELD	D	STASER	B	STODICK	D	STYERS	D
SPANGENBURG,	D	SPRINGGULCH	B	STATE	B	STOHLMAN	D	STYX	B
PONDED		SPRINGLAKE	A	STATELINE	D	STOKES	D	SUAK	C
SPANGLER	C	SPRINGMEYER	B	STATLER	B	STOKLY	B	SUBACO	D
SPARANK	D	SPRINGSTEEN	C	STATZ	D	STOMAR	C	SUBLETTE	B
SPARHAM	D	SPRINGWATER	C	STAVELY	B	STONEBERGER	D	SUBLIGNA	B
SPARKHULE	D	SPROUL	D	STAYTON	D	STONEBURG	B	SUBWELL	B
SPARMO	B	SPRUCEDALE	D	STEARNS	D	STONEHAM	B	SUCARNOOCHEE	D
SPARR	C	SPUD	C	STECOAH	B	STONEHEAD	C	SUCCESS	A
SPARTA, SILTY CLAY	B	SPUDROCK	C	STECUM	C	STONELICK	B	SUCCOR	D
LOAM SUBSTRATUM		SPUKWUSH	B	STEED	A	STONELL	B	SUCHES	B
SPARTA, LOAMY	A	SPUR	B	STEEDMAN	D	STONER	B	SUDBURY	B
SUBSTRATUM		SPURGER	C	STEEDMAN, STONY	C	STONEVILLE	B	SUDDUTH	C
SPARTA, MAAT>50	A	SPURLOCK	B	STEEKEE	C	STONEWALL	C	SUDLEY	B
SPARTA, MAAT<50	A	SQUALICUM	B	STEELE	C	STONEWELL	A	SUDWORTH	B
SPARTA, BEDROCK	A	SQUALLY	B	STEENS	C	STONO	B/D	SUEPERT	C
SUBSTRATUM		SQUAW	B	STEEPCAN	D	STONYFORD	D	SUEY	B
SPASPREY	C	SQUAWCREEK	D	STEESE	B	STOOKMOOR	C	SUFFIELD	C
SPEAKER	C	SQUAWROCK	C	STEEVER	B	STORDEN	B	SUFFOLK	B
SPEAKS	A	SQUAWTIP	C	STEFF	C	STORLA	B	SUGAKOOL	B
SPEARFISH	D	SQUIRES	C	STEGALL	C	STORMITT	B	SUGARBOWL	B
SPEARHEAD	B	ST, ALBANS	B	STEIGER	A	STOTT	C	SUGARDEE	B
SPEARMAN	B	ST, ANTHONY	B	STEILACOOM	C	STOUGH	C	SUGARLOAF	B
SPEARVILLE	C	ST, AUGUSTINE	C	STEINAUER	B	STOUT	D	SUGLO	B
SPECIE	B	ST, AUGUSTINE,	B	STEINBECK	B	STOYMO	C	SUISUN	D
SPECK	D	ORGANIC		STEINSBURG	C	STOVE	C	SULA	B
SPECTACLE	C	SUBSTRATUM		STEIVER	C	STOVELL	D	SULLIVAN	B
SPECTER	C	ST, CHARLES	B	STELLA	C	STOY	C	SULLY	B
SPEELYAI	D	ST, CLAIR	D	STELLAR	C	STRABER	C	SULOAF	B
SPEER	B	ST, ELMO	A	STEMEER	C	STRAHAN	B	SULPHUPA	D
SPEIGLE	B	ST, GEORGE	B	STEMILT	B	STRAIGHT	C	SULSAVAR	B
SPENARD	D	ST, GEORGE, SALINE	C	STENLEY	C	STRANDLINE	B	SULTAN	C
SPENCER	B	ST, GEORGE, WET	D	STEMPLE	B	STRANDQUIST	B/D	SUMAN	B/D
SPENLO	B	ST, HELENS	B	STENDAL	C	STRAT	B	SUMAS	D
SPENS	A	ST, IGNACE	D	STEPHEN	C	STRATFORD	B	SUMATRA	B
SPERRY	C/D	ST, JOHNS	B/D	STEPHENVILLE	B	STRATTON	C	SUMINE	C
SPEXARTH	C	ST, JOHNS,	D	STEPROCK	B	STRAW	B	SUMMERFIELD	D
SPHINX	D	DEPRESSIONAL		STEPSTONE	B	STRAWN	B	SUMMERS	B
SPICER	B/D	ST, LUCIE	A	STEPTOE	B	STREATOR	B/D	SUMMERTON	B
SPICERTON	D	ST, MARTIN	D	STERLING	B	STRELNA	C	SUMMERVILLE	D
SPICEWOOD	C	ST, MARYS	B	STERLINGTON	B	STRELNA,	B	SUMMIT	C
SPIKE	B	ST, NICHOLAS	D	STERRETT	D	LACUSTRINE		SUMMITVILLE	C
SPILLCO	B	ST, ONGE	B	STETSON	B	SUBSTRATUM		SUMPF	D
SPILLVILLE	B	ST, PAUL	B	STETTER	D	STRELNA, TILL	B	SUMTER	C
SPILOCK	D	ST, THOMAS	D	STEUBEN	B	SUBSTRATUM		SUMTERVILLE	C

NOTES: TWO HYDROLOGIC SOIL GROUPS SUCH AS B/C INDICATES THE DRAINED/UNDRAINED SITUATION.
MODIFIERS SHOWN, E.G., BEDROCK SUBSTRATUM, REFER TO A SPECIFIC SOIL SERIES PHASE FOUND IN SOIL MAP LEGEND.

Reach R15: (new Reach)

Inflow Area = 0.660 ac, Inflow Depth > 3.01"
Inflow = 2.15 cfs @ 12.07 hrs, Volume= 0.165 af
Outflow = 2.13 cfs @ 12.08 hrs, Volume= 0.165 af, Atten= 1%, Lag= 0.2 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 8.2 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 3.1 fps, Avg. Travel Time= 0.2 min

Peak Depth= 0.40' @ 12.08 hrs
Capacity at bank full= 4.60 cfs
10.0" Diameter Pipe, n= 0.013
Length= 45.0' Slope= 0.0440 '/'

Reach R16: (new Reach)

Inflow Area = 0.425 ac, Inflow Depth > 3.03"
Inflow = 1.63 cfs @ 12.07 hrs, Volume= 0.107 af
Outflow = 1.61 cfs @ 12.08 hrs, Volume= 0.107 af, Atten= 1%, Lag= 0.2 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 7.5 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 2.8 fps, Avg. Travel Time= 0.2 min

Peak Depth= 0.29' @ 12.07 hrs
Capacity at bank full= 14.00 cfs
15.0" Diameter Pipe, n= 0.012
Length= 40.0' Slope= 0.0400 '/'

Reach R17: (new Reach)

Inflow Area = 0.562 ac, Inflow Depth > 3.48"
Inflow = 2.29 cfs @ 12.06 hrs, Volume= 0.163 af
Outflow = 2.29 cfs @ 12.06 hrs, Volume= 0.163 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 8.6 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 3.1 fps, Avg. Travel Time= 0.1 min

Peak Depth= 0.31' @ 12.06 hrs
Capacity at bank full= 24.14 cfs
18.0" Diameter Pipe, n= 0.012
Length= 10.0' Slope= 0.0450 '/'

Reach R1: (new Reach)

Inflow Area = 2.949 ac, Inflow Depth > 4.38"
Inflow = 15.12 cfs @ 12.06 hrs, Volume= 1.076 af
Outflow = 15.09 cfs @ 12.06 hrs, Volume= 1.076 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 10.4 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 4.2 fps, Avg. Travel Time= 0.1 min

Peak Depth= 1.15' @ 12.06 hrs
Capacity at bank full= 16.09 cfs
18.0" Diameter Pipe, n= 0.012
Length= 18.0' Slope= 0.0200 '/'

Reach R10: (new Reach)

Inflow Area = 0.041 ac, Inflow Depth > 4.87"
Inflow = 0.24 cfs @ 12.01 hrs, Volume= 0.016 af
Outflow = 0.24 cfs @ 12.01 hrs, Volume= 0.016 af, Atten= 1%, Lag= 0.2 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.7 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 1.4 fps, Avg. Travel Time= 0.4 min

Peak Depth= 0.16' @ 12.01 hrs
Capacity at bank full= 1.85 cfs
8.0" Diameter Pipe, n= 0.012
Length= 30.0' Slope= 0.0200 '/'

Reach R11: (new Reach)

Inflow Area = 0.263 ac, Inflow Depth > 4.38"
Inflow = 1.36 cfs @ 12.03 hrs, Volume= 0.096 af
Outflow = 1.35 cfs @ 12.04 hrs, Volume= 0.096 af, Atten= 1%, Lag= 0.7 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 6.4 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 2.5 fps, Avg. Travel Time= 0.8 min

Peak Depth= 0.39' @ 12.03 hrs
Capacity at bank full= 2.13 cfs
8.0" Diameter Pipe, n= 0.012
Length= 125.0' Slope= 0.0264 '/'

Peak Depth= 0.50' @ 12.06 hrs
Capacity at bank full= 24.47 cfs
15.0" Diameter Pipe, n= 0.012
Length= 45.0' Slope= 0.1222 '/'

Reach 115: (new Reach)

Inflow Area = 0.207 ac, Inflow Depth > 3.51"
Inflow = 0.97 cfs @ 12.03 hrs, Volume= 0.060 af
Outflow = 0.97 cfs @ 12.04 hrs, Volume= 0.060 af, Atten= 0%, Lag= 0.2 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.6 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 1.6 fps, Avg. Travel Time= 0.4 min

Peak Depth= 0.31' @ 12.03 hrs
Capacity at bank full= 4.61 cfs
12.0" Diameter Pipe, n= 0.012
Length= 35.0' Slope= 0.0143 '/'

Reach 116: (new Reach)

Inflow Area = 2.583 ac, Inflow Depth > 4.40"
Inflow = 13.50 cfs @ 12.05 hrs, Volume= 0.947 af
Outflow = 13.23 cfs @ 12.06 hrs, Volume= 0.947 af, Atten= 2%, Lag= 0.4 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 8.8 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 3.6 fps, Avg. Travel Time= 0.6 min

Peak Depth= 1.21' @ 12.06 hrs
Capacity at bank full= 13.65 cfs
18.0" Diameter Pipe, n= 0.012
Length= 132.0' Slope= 0.0144 '/'

Reach 117: (new Reach)

Inflow Area = 0.796 ac, Inflow Depth > 4.49"
Inflow = 4.44 cfs @ 12.04 hrs, Volume= 0.298 af
Outflow = 4.38 cfs @ 12.05 hrs, Volume= 0.298 af, Atten= 1%, Lag= 0.3 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 6.2 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 2.3 fps, Avg. Travel Time= 0.6 min

Peak Depth= 0.71' @ 12.05 hrs
Capacity at bank full= 4.21 cfs
12.0" Diameter Pipe, n= 0.012
Length= 42.0' Slope= 0.0119 '/'

Reach 109: (new Reach)

Inflow Area = 1.025 ac, Inflow Depth > 4.50"
Inflow = 5.39 cfs @ 12.05 hrs, Volume= 0.385 af
Outflow = 5.36 cfs @ 12.06 hrs, Volume= 0.385 af, Atten= 1%, Lag= 0.1 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 10.3 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 4.0 fps, Avg. Travel Time= 0.2 min

Peak Depth= 0.63' @ 12.05 hrs
Capacity at bank full= 7.38 cfs
12.0" Diameter Pipe, n= 0.012
Length= 52.0' Slope= 0.0365 '/'

Reach 110: (new Reach)

Inflow Area = 0.209 ac, Inflow Depth > 4.43"
Inflow = 1.16 cfs @ 12.02 hrs, Volume= 0.077 af
Outflow = 1.16 cfs @ 12.03 hrs, Volume= 0.077 af, Atten= 1%, Lag= 0.3 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.7 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 1.4 fps, Avg. Travel Time= 0.4 min

Peak Depth= 0.42' @ 12.03 hrs
Capacity at bank full= 3.15 cfs
12.0" Diameter Pipe, n= 0.012
Length= 30.0' Slope= 0.0067 '/'

Reach 111: (new Reach)

Inflow Area = 0.555 ac, Inflow Depth > 4.42"
Inflow = 2.93 cfs @ 12.05 hrs, Volume= 0.204 af
Outflow = 2.93 cfs @ 12.05 hrs, Volume= 0.204 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 12.2 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 4.5 fps, Avg. Travel Time= 0.1 min

Peak Depth= 0.32' @ 12.07 hrs
Capacity at bank full= 2.96 cfs
12.0" Diameter Pipe, n= 0.012
Length= 85.0' Slope= 0.0059 '/'

Reach 103: (new Reach)

Inflow Area = 0.172 ac, Inflow Depth > 4.87"
Inflow = 1.01 cfs @ 12.02 hrs, Volume= 0.070 af
Outflow = 1.00 cfs @ 12.03 hrs, Volume= 0.070 af, Atten= 1%, Lag= 0.4 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.1 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 1.6 fps, Avg. Travel Time= 0.4 min

Peak Depth= 0.35' @ 12.03 hrs
Capacity at bank full= 3.86 cfs
12.0" Diameter Pipe, n= 0.012
Length= 40.0' Slope= 0.0100 '/'

Reach 104: (new Reach)

Inflow Area = 0.233 ac, Inflow Depth > 3.26"
Inflow = 0.95 cfs @ 12.07 hrs, Volume= 0.063 af
Outflow = 0.93 cfs @ 12.07 hrs, Volume= 0.063 af, Atten= 2%, Lag= 0.4 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.9 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 1.3 fps, Avg. Travel Time= 0.6 min

Peak Depth= 0.35' @ 12.07 hrs
Capacity at bank full= 3.64 cfs
12.0" Diameter Pipe, n= 0.012
Length= 45.0' Slope= 0.0089 '/'

Reach 105: (new Reach)

Inflow Area = 0.405 ac, Inflow Depth > 3.94"
Inflow = 1.88 cfs @ 12.05 hrs, Volume= 0.133 af
Outflow = 1.83 cfs @ 12.06 hrs, Volume= 0.133 af, Atten= 2%, Lag= 0.6 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.6 fps, Min. Travel Time= 0.4 min
Avg. Velocity = 2.1 fps, Avg. Travel Time= 1.0 min

Subcatchment 11: (new Subcat)

Runoff = 0.97 cfs @ 12.03 hrs, Volume= 0.060 af, Depth> 3.51"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr Rainfall=5.50"

Area (sf)	CN	Description
3,840	98	
5,164	74	>75% Grass cover, Good, HSG C
9,004	84	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	45	0.6600	0.6		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.00"
0.5	80	0.0200	2.9		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.8	125	Total			

Subcatchment 12: (new Subcat)

Runoff = 1.99 cfs @ 12.03 hrs, Volume= 0.129 af, Depth> 4.23"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr Rainfall=5.50"

Area (sf)	CN	Description
11,043	98	
4,925	74	>75% Grass cover, Good, HSG C
15,968	91	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	40	0.5000	0.5		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.00"
0.1	55	0.2000	6.7		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
0.5	90	0.0200	2.9		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.9	185	Total			

Subcatchment 13: (new Subcat)

Runoff = 0.83 cfs @ 12.05 hrs, Volume= 0.051 af, Depth> 3.41"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr Rainfall=5.50"

Subcatchment 6: (new Subcat)

Runoff = 1.73 cfs @ 12.04 hrs, Volume= 0.114 af, Depth> 4.43"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr Rainfall=5.50"

Area (sf)	CN	Description
10,521	98	
2,992	74	>75% Grass cover, Good, HSG C
13,513	93	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.7	30	0.1500	0.3		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.00"
0.7	170	0.0400	4.1		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
2.4	200	Total			

Subcatchment 7: (new Subcat)

Runoff = 2.75 cfs @ 12.04 hrs, Volume= 0.183 af, Depth> 4.53"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr Rainfall=5.50"

Area (sf)	CN	Description
17,573	98	
3,591	74	>75% Grass cover, Good, HSG C
21,164	94	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	50	0.0200	1.2		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.00"
1.6	350	0.0340	3.7		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
2.3	400	Total			

Subcatchment 8: (new Subcat)

Runoff = 0.33 cfs @ 12.05 hrs, Volume= 0.022 af, Depth> 4.12"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr Rainfall=5.50"

Subcatchment 1: (new Subcat)

Runoff = 3.59 cfs @ 12.05 hrs, Volume= 0.252 af, Depth> 4.87"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr Rainfall=5.50"

Area (sf)	CN	Description
27,000	98	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.7	100	0.0100	1.0		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.00"
1.5	180	0.0100	2.0		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
3.2	280	Total			

Subcatchment 2: (new Subcat)

Runoff = 1.01 cfs @ 12.02 hrs, Volume= 0.070 af, Depth> 4.87"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr Rainfall=5.50"

Area (sf)	CN	Description
7,512	98	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	50	0.0100	0.9		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.00"
0.7	90	0.0100	2.0		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.6	140	Total			

Subcatchment 3: (new Subcat)

Runoff = 1.16 cfs @ 12.02 hrs, Volume= 0.077 af, Depth> 4.43"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr Rainfall=5.50"

Area (sf)	CN	Description
7,221	98	
1,863	74	>75% Grass cover, Good, HSG C
9,084	93	Weighted Average

Reach 117: (new Reach) Peak Depth=0.71' Max Vel=6.2 fps Inflow=4.44 cfs 0.298 af
D=15.0" n=0.012 L=85.0' S=0.0106 '/' Capacity=7.20 cfs Outflow=4.38 cfs 0.298 af

Reach 118: (new Reach) Peak Depth=0.49' Max Vel=11.8 fps Inflow=4.47 cfs 0.298 af
D=12.0" n=0.012 L=102.0' S=0.0588 '/' Capacity=9.36 cfs Outflow=4.44 cfs 0.298 af

Reach 119: (new Reach) Peak Depth=0.34' Max Vel=7.2 fps Inflow=1.73 cfs 0.114 af
D=12.0" n=0.012 L=32.0' S=0.0313 '/' Capacity=6.82 cfs Outflow=1.73 cfs 0.114 af

Reach 120: (new Reach) Peak Depth=0.27' Max Vel=25.5 fps Inflow=4.48 cfs 0.298 af
D=12.0" n=0.012 L=35.0' S=0.4971 '/' Capacity=27.21 cfs Outflow=4.47 cfs 0.298 af

Reach POI 1: (new Reach) Inflow=15.09 cfs 1.076 af
Outflow=15.09 cfs 1.076 af

Reach POI 10: (new Reach) Inflow=0.97 cfs 0.061 af
Outflow=0.97 cfs 0.061 af

Reach POI 11: (new Reach) Inflow=1.62 cfs 0.099 af
Outflow=1.62 cfs 0.099 af

Reach POI 12: (new Reach) Inflow=0.98 cfs 0.064 af
Outflow=0.98 cfs 0.064 af

Reach POI 3: (new Reach) Inflow=3.82 cfs 0.262 af
Outflow=3.82 cfs 0.262 af

Reach POI 4: (new Reach) Inflow=1.25 cfs 0.083 af
Outflow=1.25 cfs 0.083 af

Reach POI 5: (new Reach) Inflow=5.96 cfs 0.420 af
Outflow=5.96 cfs 0.420 af

Reach POI 6: (new Reach) Inflow=1.73 cfs 0.123 af
Outflow=1.73 cfs 0.123 af

Reach POI 7: (new Reach) Inflow=0.94 cfs 0.065 af
Outflow=0.94 cfs 0.065 af

Reach POI 8: (new Reach) Inflow=2.38 cfs 0.184 af
Outflow=2.38 cfs 0.184 af

Reach POI 9: (new Reach) Inflow=3.29 cfs 0.228 af
Outflow=3.29 cfs 0.228 af

Reach R1: (new Reach) Peak Depth=1.15' Max Vel=10.4 fps Inflow=15.12 cfs 1.076 af
D=18.0" n=0.012 L=18.0' S=0.0200 '/' Capacity=16.09 cfs Outflow=15.09 cfs 1.076 af

Peak Depth= 0.27' @ 12.04 hrs
Capacity at bank full= 27.21 cfs
12.0" Diameter Pipe, n= 0.012
Length= 35.0' Slope= 0.4971 '/'

Reach POI 1: (new Reach)

Inflow Area = 2.949 ac, Inflow Depth > 4.38"
Inflow = 15.09 cfs @ 12.06 hrs, Volume= 1.076 af
Outflow = 15.09 cfs @ 12.06 hrs, Volume= 1.076 af, Atten= 0%, Lag= 0.0 min

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

Reach POI 10: (new Reach)

Inflow Area = 0.256 ac, Inflow Depth > 2.84"
Inflow = 0.97 cfs @ 12.06 hrs, Volume= 0.061 af
Outflow = 0.97 cfs @ 12.06 hrs, Volume= 0.061 af, Atten= 0%, Lag= 0.0 min

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

Reach POI 11: (new Reach)

Inflow Area = 0.370 ac, Inflow Depth > 3.22"
Inflow = 1.62 cfs @ 12.03 hrs, Volume= 0.099 af
Outflow = 1.62 cfs @ 12.03 hrs, Volume= 0.099 af, Atten= 0%, Lag= 0.0 min

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

Reach POI 12: (new Reach)

Inflow Area = 0.181 ac, Inflow Depth > 4.23"
Inflow = 0.98 cfs @ 12.03 hrs, Volume= 0.064 af
Outflow = 0.98 cfs @ 12.03 hrs, Volume= 0.064 af, Atten= 0%, Lag= 0.0 min

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

Reach POI 3: (new Reach)

Inflow Area = 0.699 ac, Inflow Depth > 4.49"
Inflow = 3.82 cfs @ 12.04 hrs, Volume= 0.262 af
Outflow = 3.82 cfs @ 12.04 hrs, Volume= 0.262 af, Atten= 0%, Lag= 0.0 min

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

Subcatchment 15: (new Subcat) Runoff Area=10,777 sf Runoff Depth>4.02"
Flow Length=120' Tc=4.0 min CN=89 Runoff=1.25 cfs 0.083 af

Subcatchment 16: (new Subcat) Runoff Area=1,769 sf Runoff Depth>4.87"
Flow Length=75' Tc=0.9 min CN=98 Runoff=0.24 cfs 0.016 af

Subcatchment 17: Runoff Area=2,888 sf Runoff Depth>4.87"
Flow Length=100' Tc=1.4 min CN=98 Runoff=0.39 cfs 0.027 af

Subcatchment 19: (new Subcat) Runoff Area=36,506 sf Runoff Depth>3.91"
Flow Length=430' Tc=6.7 min CN=88 Runoff=3.80 cfs 0.273 af

Subcatchment 20: (new Subcat) Runoff Area=26,056 sf Runoff Depth>2.93"
Flow Length=325' Tc=4.5 min CN=78 Runoff=2.26 cfs 0.146 af

Subcatchment 21: (new Subcat) Runoff Area=8,648 sf Runoff Depth>3.92"
Flow Length=156' Tc=5.1 min CN=88 Runoff=0.94 cfs 0.065 af

Subcatchment 22: (new Subcat) Runoff Area=6,320 sf Runoff Depth>4.87"
Flow Length=190' Tc=1.8 min CN=98 Runoff=0.85 cfs 0.059 af

Subcatchment 23: (new Subcat) Runoff Area=22,420 sf Runoff Depth>2.48"
Flow Length=315' Tc=6.1 min CN=73 Runoff=1.58 cfs 0.107 af

Subcatchment 24: (new Subcat) Runoff Area=18,522 sf Runoff Depth>3.03"
Flow Length=420' Tc=4.8 min CN=79 Runoff=1.63 cfs 0.107 af

Subcatchment 25: (new Subcat) Runoff Area=7,697 sf Runoff Depth>1.25"
Flow Length=200' Tc=4.4 min CN=57 Runoff=0.26 cfs 0.018 af

Subcatchment 26: (new Subcat) Runoff Area=21,452 sf Runoff Depth>1.60"
Flow Length=385' Tc=3.9 min CN=62 Runoff=1.01 cfs 0.066 af

Subcatchment 27: (new Subcat) Runoff Area=11,136 sf Runoff Depth>2.84"
Flow Length=195' Tc=3.8 min CN=77 Runoff=0.97 cfs 0.061 af

Subcatchment 28: (new Subcat) Runoff Area=16,134 sf Runoff Depth>3.22"
Flow Length=120' Tc=1.7 min CN=81 Runoff=1.62 cfs 0.099 af

Subcatchment 29: (new Subcat) Runoff Area=7,880 sf Runoff Depth>4.23"
Flow Length=155' Tc=1.8 min CN=91 Runoff=0.98 cfs 0.064 af

Subcatchment 30: (new Subcat) Runoff Area=5,945 sf Runoff Depth>4.87"
Flow Length=260' Tc=1.1 min CN=98 Runoff=0.82 cfs 0.055 af

Reach 100: (new Reach) Peak Depth=0.54' Max Vel=5.2 fps Inflow=1.58 cfs 0.107 af
D=8.0" n=0.012 L=120.0' S=0.0150 '/' Capacity=1.60 cfs Outflow=1.55 cfs 0.107 af

Reach 119: (new Reach) Peak Depth=0.31' Max Vel=6.9 fps Inflow=1.46 cfs 0.095 af
D=12.0" n=0.012 L=32.0' S=0.0313 '/' Capacity=6.82 cfs Outflow=1.45 cfs 0.095 af

Reach 120: (new Reach) Peak Depth=0.25' Max Vel=24.3 fps Inflow=3.78 cfs 0.249 af
D=12.0" n=0.012 L=35.0' S=0.4971 '/' Capacity=27.21 cfs Outflow=3.77 cfs 0.249 af

Reach POI 1: (new Reach) Inflow=12.67 cfs 0.897 af
Outflow=12.67 cfs 0.897 af

Reach POI 10: (new Reach) Inflow=0.75 cfs 0.047 af
Outflow=0.75 cfs 0.047 af

Reach POI 11: (new Reach) Inflow=1.29 cfs 0.079 af
Outflow=1.29 cfs 0.079 af

Reach POI 12: (new Reach) Inflow=0.82 cfs 0.053 af
Outflow=0.82 cfs 0.053 af

Reach POI 3: (new Reach) Inflow=3.22 cfs 0.220 af
Outflow=3.22 cfs 0.220 af

Reach POI 4: (new Reach) Inflow=1.03 cfs 0.068 af
Outflow=1.03 cfs 0.068 af

Reach POI 5: (new Reach) Inflow=4.83 cfs 0.337 af
Outflow=4.83 cfs 0.337 af

Reach POI 6: (new Reach) Inflow=1.46 cfs 0.104 af
Outflow=1.46 cfs 0.104 af

Reach POI 7: (new Reach) Inflow=0.77 cfs 0.053 af
Outflow=0.77 cfs 0.053 af

Reach POI 8: (new Reach) Inflow=1.83 cfs 0.144 af
Outflow=1.83 cfs 0.144 af

Reach POI 9: (new Reach) Inflow=2.52 cfs 0.178 af
Outflow=2.52 cfs 0.178 af

Reach R1: (new Reach) Peak Depth=1.00' Max Vel=10.1 fps Inflow=12.70 cfs 0.897 af
D=18.0" n=0.012 L=18.0' S=0.0200 '/' Capacity=16.09 cfs Outflow=12.67 cfs 0.897 af

Reach R10: (new Reach) Peak Depth=0.15' Max Vel=3.5 fps Inflow=0.21 cfs 0.014 af
D=8.0" n=0.012 L=30.0' S=0.0200 '/' Capacity=1.85 cfs Outflow=0.21 cfs 0.014 af

Reach R11: (new Reach) Peak Depth=0.35' Max Vel=6.2 fps Inflow=1.15 cfs 0.081 af
D=8.0" n=0.012 L=125.0' S=0.0264 '/' Capacity=2.13 cfs Outflow=1.14 cfs 0.081 af

Reach R12: (new Reach) Peak Depth=0.33' Max Vel=8.4 fps Inflow=1.46 cfs 0.104 af
D=8.0" n=0.012 L=20.0' S=0.0500 '/' Capacity=2.93 cfs Outflow=1.46 cfs 0.104 af

Subcatchment 15: (new Subcat) Runoff Area=10,777 sf Runoff Depth>3.29"
Flow Length=120' Tc=4.0 min CN=89 Runoff=1.03 cfs 0.068 af

Subcatchment 16: (new Subcat) Runoff Area=1,769 sf Runoff Depth>4.15"
Flow Length=75' Tc=0.9 min CN=98 Runoff=0.21 cfs 0.014 af

Subcatchment 17: Runoff Area=2,888 sf Runoff Depth>4.15"
Flow Length=100' Tc=1.4 min CN=98 Runoff=0.33 cfs 0.023 af

Subcatchment 19: (new Subcat) Runoff Area=36,506 sf Runoff Depth>3.19"
Flow Length=430' Tc=6.7 min CN=88 Runoff=3.13 cfs 0.223 af

Subcatchment 20: (new Subcat) Runoff Area=26,056 sf Runoff Depth>2.29"
Flow Length=325' Tc=4.5 min CN=78 Runoff=1.77 cfs 0.114 af

Subcatchment 21: (new Subcat) Runoff Area=8,648 sf Runoff Depth>3.19"
Flow Length=156' Tc=5.1 min CN=88 Runoff=0.77 cfs 0.053 af

Subcatchment 22: (new Subcat) Runoff Area=6,320 sf Runoff Depth>4.15"
Flow Length=190' Tc=1.8 min CN=98 Runoff=0.72 cfs 0.050 af

Subcatchment 23: (new Subcat) Runoff Area=22,420 sf Runoff Depth>1.89"
Flow Length=315' Tc=6.1 min CN=73 Runoff=1.20 cfs 0.081 af

Subcatchment 24: (new Subcat) Runoff Area=18,522 sf Runoff Depth>2.37"
Flow Length=420' Tc=4.8 min CN=79 Runoff=1.29 cfs 0.084 af

Subcatchment 25: (new Subcat) Runoff Area=7,697 sf Runoff Depth>0.85"
Flow Length=200' Tc=4.4 min CN=57 Runoff=0.16 cfs 0.012 af

Subcatchment 26: (new Subcat) Runoff Area=21,452 sf Runoff Depth>1.14"
Flow Length=385' Tc=3.9 min CN=62 Runoff=0.69 cfs 0.047 af

Subcatchment 27: (new Subcat) Runoff Area=11,136 sf Runoff Depth>2.21"
Flow Length=195' Tc=3.8 min CN=77 Runoff=0.75 cfs 0.047 af

Subcatchment 28: (new Subcat) Runoff Area=16,134 sf Runoff Depth>2.55"
Flow Length=120' Tc=1.7 min CN=81 Runoff=1.29 cfs 0.079 af

Subcatchment 29: (new Subcat) Runoff Area=7,880 sf Runoff Depth>3.49"
Flow Length=155' Tc=1.8 min CN=91 Runoff=0.82 cfs 0.053 af

Subcatchment 30: (new Subcat) Runoff Area=5,945 sf Runoff Depth>4.15"
Flow Length=260' Tc=1.1 min CN=98 Runoff=0.70 cfs 0.047 af

Reach 100: (new Reach) Peak Depth=0.43' Max Vel=5.0 fps Inflow=1.20 cfs 0.081 af
D=8.0" n=0.012 L=120.0' S=0.0150 '/' Capacity=1.60 cfs Outflow=1.18 cfs 0.081 af

Reach 101: (new Reach) Peak Depth=0.49' Max Vel=6.8 fps Inflow=2.58 cfs 0.179 af
D=12.0" n=0.012 L=30.0' S=0.0200 '/' Capacity=5.46 cfs Outflow=2.58 cfs 0.179 af

Reach 119: (new Reach) Peak Depth=0.24' Max Vel=6.0 fps Inflow=0.87 cfs 0.055 af
D=12.0" n=0.012 L=32.0' S=0.0313 '/' Capacity=6.82 cfs Outflow=0.87 cfs 0.055 af

Reach 120: (new Reach) Peak Depth=0.20' Max Vel=21.0 fps Inflow=2.27 cfs 0.145 af
D=12.0" n=0.012 L=35.0' S=0.4971 '/' Capacity=27.21 cfs Outflow=2.27 cfs 0.145 af

Reach POI 1: (new Reach) Inflow=7.48 cfs 0.522 af
Outflow=7.48 cfs 0.522 af

Reach POI 10: (new Reach) Inflow=0.33 cfs 0.021 af
Outflow=0.33 cfs 0.021 af

Reach POI 11: (new Reach) Inflow=0.62 cfs 0.038 af
Outflow=0.62 cfs 0.038 af

Reach POI 12: (new Reach) Inflow=0.47 cfs 0.029 af
Outflow=0.47 cfs 0.029 af

Reach POI 3: (new Reach) Inflow=1.94 cfs 0.132 af
Outflow=1.94 cfs 0.132 af

Reach POI 4: (new Reach) Inflow=0.58 cfs 0.037 af
Outflow=0.58 cfs 0.037 af

Reach POI 5: (new Reach) Inflow=2.48 cfs 0.170 af
Outflow=2.48 cfs 0.170 af

Reach POI 6: (new Reach) Inflow=0.91 cfs 0.064 af
Outflow=0.91 cfs 0.064 af

Reach POI 7: (new Reach) Inflow=0.42 cfs 0.028 af
Outflow=0.42 cfs 0.028 af

Reach POI 8: (new Reach) Inflow=0.79 cfs 0.068 af
Outflow=0.79 cfs 0.068 af

Reach POI 9: (new Reach) Inflow=1.06 cfs 0.082 af
Outflow=1.06 cfs 0.082 af

Reach R1: (new Reach) Peak Depth=0.72' Max Vel=8.9 fps Inflow=7.50 cfs 0.522 af
D=18.0" n=0.012 L=18.0' S=0.0200 '/' Capacity=16.09 cfs Outflow=7.48 cfs 0.522 af

Reach R10: (new Reach) Peak Depth=0.12' Max Vel=3.1 fps Inflow=0.13 cfs 0.009 af
D=8.0" n=0.012 L=30.0' S=0.0200 '/' Capacity=1.85 cfs Outflow=0.13 cfs 0.009 af

Reach R11: (new Reach) Peak Depth=0.27' Max Vel=5.5 fps Inflow=0.72 cfs 0.050 af
D=8.0" n=0.012 L=125.0' S=0.0264 '/' Capacity=2.13 cfs Outflow=0.71 cfs 0.050 af

Reach R12: (new Reach) Peak Depth=0.26' Max Vel=7.4 fps Inflow=0.91 cfs 0.064 af
D=8.0" n=0.012 L=20.0' S=0.0500 '/' Capacity=2.93 cfs Outflow=0.91 cfs 0.064 af

Subcatchment 15: (new Subcat) Runoff Area=10,777 sf Runoff Depth>1.78"
Flow Length=120' Tc=4.0 min CN=89 Runoff=0.58 cfs 0.037 af

Subcatchment 16: (new Subcat) Runoff Area=1,769 sf Runoff Depth>2.59"
Flow Length=75' Tc=0.9 min CN=98 Runoff=0.13 cfs 0.009 af

Subcatchment 17: Runoff Area=2,888 sf Runoff Depth>2.59"
Flow Length=100' Tc=1.4 min CN=98 Runoff=0.21 cfs 0.014 af

Subcatchment 19: (new Subcat) Runoff Area=36,506 sf Runoff Depth>1.70"
Flow Length=430' Tc=6.7 min CN=88 Runoff=1.72 cfs 0.119 af

Subcatchment 20: (new Subcat) Runoff Area=26,056 sf Runoff Depth>1.04"
Flow Length=325' Tc=4.5 min CN=78 Runoff=0.79 cfs 0.052 af

Subcatchment 21: (new Subcat) Runoff Area=8,648 sf Runoff Depth>1.70"
Flow Length=156' Tc=5.1 min CN=88 Runoff=0.42 cfs 0.028 af

Subcatchment 22: (new Subcat) Runoff Area=6,320 sf Runoff Depth>2.59"
Flow Length=190' Tc=1.8 min CN=98 Runoff=0.46 cfs 0.031 af

Subcatchment 23: (new Subcat) Runoff Area=22,420 sf Runoff Depth>0.78"
Flow Length=315' Tc=6.1 min CN=73 Runoff=0.47 cfs 0.033 af

Subcatchment 24: (new Subcat) Runoff Area=18,522 sf Runoff Depth>1.09"
Flow Length=420' Tc=4.8 min CN=79 Runoff=0.58 cfs 0.039 af

Subcatchment 25: (new Subcat) Runoff Area=7,697 sf Runoff Depth>0.21"
Flow Length=200' Tc=4.4 min CN=57 Runoff=0.02 cfs 0.003 af

Subcatchment 26: (new Subcat) Runoff Area=21,452 sf Runoff Depth>0.35"
Flow Length=385' Tc=3.9 min CN=62 Runoff=0.15 cfs 0.014 af

Subcatchment 27: (new Subcat) Runoff Area=11,136 sf Runoff Depth>0.98"
Flow Length=195' Tc=3.8 min CN=77 Runoff=0.33 cfs 0.021 af

Subcatchment 28: (new Subcat) Runoff Area=16,134 sf Runoff Depth>1.22"
Flow Length=120' Tc=1.7 min CN=81 Runoff=0.62 cfs 0.038 af

Subcatchment 29: (new Subcat) Runoff Area=7,880 sf Runoff Depth>1.95"
Flow Length=155' Tc=1.8 min CN=91 Runoff=0.47 cfs 0.029 af

Subcatchment 30: (new Subcat) Runoff Area=5,945 sf Runoff Depth>2.59"
Flow Length=260' Tc=1.1 min CN=98 Runoff=0.44 cfs 0.029 af

Reach 100: (new Reach) Peak Depth=0.25' Max Vel=4.0 fps Inflow=0.47 cfs 0.033 af
D=8.0" n=0.012 L=120.0' S=0.0150 '/' Capacity=1.60 cfs Outflow=0.46 cfs 0.033 af

Reach 101: (new Reach) Peak Depth=0.38' Max Vel=6.0 fps Inflow=1.64 cfs 0.112 af
D=12.0" n=0.012 L=30.0' S=0.0200 '/' Capacity=5.46 cfs Outflow=1.63 cfs 0.112 af

Reach R9: (new Reach)

Inflow Area = 0.222 ac, Inflow Depth > 4.29"
Inflow = 1.14 cfs @ 12.02 hrs, Volume= 0.079 af
Outflow = 1.13 cfs @ 12.03 hrs, Volume= 0.079 af, Atten= 1%, Lag= 0.3 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.4 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 1.8 fps, Avg. Travel Time= 0.3 min

Peak Depth= 0.46' @ 12.03 hrs
Capacity at bank full= 1.38 cfs
8.0" Diameter Pipe, n= 0.012
Length= 35.0' Slope= 0.0111 '/'

Reach R3: (new Reach)

Inflow Area = 0.172 ac, Inflow Depth > 4.87"
Inflow = 1.01 cfs @ 12.02 hrs, Volume= 0.070 af
Outflow = 0.98 cfs @ 12.04 hrs, Volume= 0.070 af, Atten= 3%, Lag= 1.2 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.9 fps, Min. Travel Time= 0.6 min
Avg. Velocity = 1.5 fps, Avg. Travel Time= 1.5 min

Peak Depth= 0.47' @ 12.04 hrs
Capacity at bank full= 1.21 cfs
8.0" Diameter Pipe, n= 0.013
Length= 140.0' Slope= 0.0100 '/'

Reach R4: (new Reach)

Inflow Area = 0.343 ac, Inflow Depth > 4.87"
Inflow = 1.98 cfs @ 12.04 hrs, Volume= 0.139 af
Outflow = 1.97 cfs @ 12.04 hrs, Volume= 0.139 af, Atten= 0%, Lag= 0.1 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 7.4 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 3.0 fps, Avg. Travel Time= 0.2 min

Peak Depth= 0.48' @ 12.04 hrs
Capacity at bank full= 2.29 cfs
8.0" Diameter Pipe, n= 0.013
Length= 30.0' Slope= 0.0360 '/'

Reach R5: (new Reach)

Inflow Area = 0.390 ac, Inflow Depth > 4.87"
Inflow = 2.23 cfs @ 12.04 hrs, Volume= 0.158 af
Outflow = 2.22 cfs @ 12.04 hrs, Volume= 0.158 af, Atten= 1%, Lag= 0.2 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 11.8 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 4.6 fps, Avg. Travel Time= 0.3 min

Peak Depth= 0.36' @ 12.04 hrs
Capacity at bank full= 4.01 cfs
8.0" Diameter Pipe, n= 0.013
Length= 90.0' Slope= 0.1100 '/'

Reach R12: (new Reach)

Inflow Area = 0.329 ac, Inflow Depth > 4.48"
Inflow = 1.73 cfs @ 12.04 hrs, Volume= 0.123 af
Outflow = 1.73 cfs @ 12.04 hrs, Volume= 0.123 af, Atten= 0%, Lag= 0.1 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 8.7 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 3.4 fps, Avg. Travel Time= 0.1 min

Peak Depth= 0.37' @ 12.04 hrs
Capacity at bank full= 2.93 cfs
8.0" Diameter Pipe, n= 0.012
Length= 20.0' Slope= 0.0500 '/'

Reach R13: (new Reach)

Inflow Area = 1.324 ac, Inflow Depth > 3.31"
Inflow = 5.95 cfs @ 12.04 hrs, Volume= 0.366 af
Outflow = 5.95 cfs @ 12.05 hrs, Volume= 0.366 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 21.9 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 7.8 fps, Avg. Travel Time= 0.1 min

Peak Depth= 0.38' @ 12.04 hrs
Capacity at bank full= 19.68 cfs
12.0" Diameter Pipe, n= 0.012
Length= 25.0' Slope= 0.2600 '/'

Reach R14: (new Reach)

Inflow Area = 0.066 ac, Inflow Depth > 4.87"
Inflow = 0.39 cfs @ 12.02 hrs, Volume= 0.027 af
Outflow = 0.38 cfs @ 12.03 hrs, Volume= 0.027 af, Atten= 3%, Lag= 0.8 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.7 fps, Min. Travel Time= 0.4 min
Avg. Velocity = 1.4 fps, Avg. Travel Time= 0.9 min

Peak Depth= 0.26' @ 12.03 hrs
Capacity at bank full= 0.71 cfs
6.0" Diameter Pipe, n= 0.012
Length= 80.0' Slope= 0.0138 '/'

Reach POI 4: (new Reach)

Inflow Area = 0.247 ac, Inflow Depth > 3.92"
Inflow = 1.23 cfs @ 12.06 hrs, Volume= 0.081 af
Outflow = 1.23 cfs @ 12.06 hrs, Volume= 0.081 af, Atten= 0%, Lag= 0.0 min

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

Reach POI 5: (new Reach)

Inflow Area = 1.324 ac, Inflow Depth > 3.31"
Inflow = 5.95 cfs @ 12.05 hrs, Volume= 0.366 af
Outflow = 5.95 cfs @ 12.05 hrs, Volume= 0.366 af, Atten= 0%, Lag= 0.0 min

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

Reach POI 6: (new Reach)

Inflow Area = 0.329 ac, Inflow Depth > 4.48"
Inflow = 1.73 cfs @ 12.04 hrs, Volume= 0.123 af
Outflow = 1.73 cfs @ 12.04 hrs, Volume= 0.123 af, Atten= 0%, Lag= 0.0 min

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

Reach POI 7: (new Reach)

Inflow Area = 0.119 ac, Inflow Depth > 2.93"
Inflow = 0.44 cfs @ 12.08 hrs, Volume= 0.029 af
Outflow = 0.44 cfs @ 12.08 hrs, Volume= 0.029 af, Atten= 0%, Lag= 0.0 min

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

Reach POI 8: (new Reach)

Inflow Area = 0.957 ac, Inflow Depth > 1.99"
Inflow = 2.06 cfs @ 12.07 hrs, Volume= 0.159 af
Outflow = 2.06 cfs @ 12.07 hrs, Volume= 0.159 af, Atten= 0%, Lag= 0.0 min

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

Reach POI 9: (new Reach)

Inflow Area = 1.077 ac, Inflow Depth > 2.75"
Inflow = 3.94 cfs @ 12.04 hrs, Volume= 0.247 af
Outflow = 3.94 cfs @ 12.04 hrs, Volume= 0.247 af, Atten= 0%, Lag= 0.0 min

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

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	80	0.0400	1.7		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.00"
0.7	330	0.1400	7.6		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.3	60	0.0200	2.9		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.8	470	Total			

Subcatchment 300: (new Subcat)

Runoff = 0.28 cfs @ 12.02 hrs, Volume= 0.019 af, Depth> 4.87"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr Rainfall=5.50"

Area (sf)	CN	Description
2,046	98	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.1	60	0.0100	0.9		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.00"
0.1	30	0.0100	3.8	1.31	**Circular Channel (pipe),** Diam= 8.0" Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.012
1.2	90	Total			

Subcatchment 310: (new Subcat)

Runoff = 0.54 cfs @ 12.01 hrs, Volume= 0.034 af, Depth> 4.13"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr Rainfall=5.50"

Area (sf)	CN	Description
2,857	98	
33	39	>75% Grass cover, Good, HSG A
1,389	74	>75% Grass cover, Good, HSG C
4,279	90	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	50	0.0800	2.0		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.00"
0.5	150	0.0650	5.2		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.9	200	Total			

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.4	40	0.0500	0.2		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.00"
1.0	210	0.0300	3.5		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
4.4	250	Total			

Subcatchment 260: (new Subcat)

Runoff = 1.30 cfs @ 12.04 hrs, Volume= 0.080 af, Depth> 1.83"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr Rainfall=5.50"

Area (sf)	CN	Description
1,600	98	
7,200	39	>75% Grass cover, Good, HSG A
13,899	74	>75% Grass cover, Good, HSG C
22,699	65	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	70	0.0900	2.3		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.00"
0.5	155	0.1100	5.0		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
0.8	140	0.0200	2.9		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.8	365	Total			

Subcatchment 270: (new Subcat)

Runoff = 2.01 cfs @ 12.02 hrs, Volume= 0.119 af, Depth> 2.67"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr Rainfall=5.50"

Area (sf)	CN	Description
3,059	98	
20,333	72	Woods/grass comb., Good, HSG C
23,392	75	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.5	36	0.0200	0.1		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.00"
0.6	120	0.0250	3.2		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
5.1	156	Total			

Subcatchment 220: (new Subcat)

Runoff = 0.85 cfs @ 12.03 hrs, Volume= 0.059 af, Depth> 4.87"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr Rainfall=5.50"

Area (sf)	CN	Description
6,320	98	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.1	100	0.0250	1.5		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.00"
0.7	90	0.0100	2.0		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.8	190	Total			

Subcatchment 230: (new Subcat)

Runoff = 1.10 cfs @ 12.11 hrs, Volume= 0.078 af, Depth> 1.53"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr Rainfall=5.50"

Area (sf)	CN	Description
9,452	98	
750	74	>75% Grass cover, Good, HSG C
16,638	39	>75% Grass cover, Good, HSG A
26,840	61	Weighted Average

Subcatchment 160: (new Subcat)

Runoff = 0.24 cfs @ 12.01 hrs, Volume= 0.016 af, Depth> 4.87"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr Rainfall=5.50"

Area (sf)	CN	Description
1,769	98	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	35	0.0100	0.8		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.00"
0.2	40	0.0100	2.9	0.56	**Circular Channel (pipe),** Diam= 6.0" Area= 0.2 sf Perim= 1.6' r= 0.13' n= 0.013
0.9	75	Total			

Subcatchment 170:

Runoff = 0.39 cfs @ 12.02 hrs, Volume= 0.027 af, Depth> 4.87"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr Rainfall=5.50"

Area (sf)	CN	Description
2,888	98	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.2	70	0.0100	0.9		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.00"
0.2	30	0.0100	2.9	0.56	**Circular Channel (pipe),** Diam= 6.0" Area= 0.2 sf Perim= 1.6' r= 0.13' n= 0.013
1.4	100	Total			

Subcatchment 200: (new Subcat)

Runoff = 1.01 cfs @ 12.02 hrs, Volume= 0.070 af, Depth> 4.87"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr Rainfall=5.50"

Area (sf)	CN	Description
7,512	98	

Area (sf)	CN	Description
9,504	98	
4,124	74	>75% Grass cover, Good, HSG C
13,628	91	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.9	45	0.2500	0.4		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.00"
0.2	85	0.0800	5.7		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.4	85	0.0300	3.5		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
2.5	215	Total			

Subcatchment 130: (new Subcat)

Runoff = 2.14 cfs @ 12.02 hrs, Volume= 0.131 af, Depth> 3.41"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr Rainfall=5.50"

Area (sf)	CN	Description
7,144	98	
12,877	74	>75% Grass cover, Good, HSG C
20,021	83	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	50	0.0300	1.4		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.00"
0.2	85	0.2700	7.8		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
0.4	130	0.0600	5.0		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.2	265	Total			

Subcatchment 140: (new Subcat)

Runoff = 1.11 cfs @ 12.02 hrs, Volume= 0.077 af, Depth> 4.87"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr Rainfall=5.50"

Area (sf)	CN	Description
8,250	98	

SECTION 12

STORMWATER MANAGEMENT REPORT

12.0 Introduction

DeLuca-Hoffman Associates, Inc. has been retained by Martin's Point to assist in the site design and site permitting of the proposed Martin's Point Redevelopment Project. The project includes demolition of two existing maintenance buildings, renovation of the existing Marine Hospital building, construction of a new 27,000 square foot footprint building, construction of a parking structure, associated access drives, parking area improvements, water quality features, and miscellaneous site improvements. Approximately four (4) acres of area will be disturbed as part of the project. Erosion controls will be especially important on this site due to steep existing grades and the proximity of the project to resource boundaries.

This narrative contains the stormwater management systems designed and required for this project.

The project is not in a lake watershed or a watershed most at risk from development.

12.1 Existing Site Conditions

The existing site consists of the property currently owned by Martin's Point as well as the City parcel which is currently under contract with Martin's Point which contains the Marine Hospital and School Department maintenance buildings. Many steep slopes and bedrock outcrops exist on the site.

Baseline information to prepare the permit applications and establish existing conditions includes:

- Topographic and Boundary Survey secured by Owen Haskell
- Geotechnical Studies by S. W. Cole Engineering
- Resource Delineation by Normandeau Associates

12.2 Existing and Proposed Drainage Features

The limited onsite storm drain system will be maintained and upgraded in the western portion of the site. In the eastern portion of the site the existing storm drains will be removed and a new system will be installed to serve the facility. Storm Treat water quality units and Stormcell storage blocks are proposed to treat impervious areas of the site as required by MeDEP Site Law.

The proposed drainage systems are not being designed to reduce peak discharge rates at or below existing levels. Instead, the flow will be conveyed in a new storm drain to stabile outlets. The control of the peak runoff rates is discussed in more detail below.

12.3 References

The following reference sources were reviewed during preparation of the stormwater analysis:

1. Technical Release Number 20 – Computer Program for Project Formulation – Hydrology, USDA Soil Conservation Service, May 1983

2. Section 4 – Hydrology, USDA Soil Conservation Service, March 1985

3. Technical Release Number 55 – Urban Hydrology for Small Watersheds, USDA Soil Conservation Service, June 1986

4. Civil Engineering Reference Manual, Lindeburg, 1995

5. HydroCAD Technical Reference Manual, Applied Micro-Computer System, 2001

6. Water Supply and Pollution Control, Clark, Viessman, Hammer, 1971

7. Stormwater Management, Best Management Practices, MeDEP, 1996

8. Federal Highway Administration, Hydraulic Design Services No. 5 – Hydraulic Design of Culverts

The following sources were used for preparation of the stormwater quality analysis:

1. Reducing the Impacts of Stormwater Runoff from New Development – New York State Department of Environmental Conservation, April 1993.

2. Stormwater Management, Best Management Practices, MeDEP, 1996.

3. EPA – Urban Targeting and BMP Selection – Terrene Institute, November 1990.

4. Urbanization and Water Quality – Terrene Institute, March 1994.

5. A Current Assessment of Urban Best Management Practices, Techniques for Reducing Non-point Source Pollution in the Coastal Zone, U.S.E.P.A. Office of Watersheds, March 1992.

6. MeDEP Chapter 500, Stormwater Management Rules.

7. MeDEP Phosphorus Manual, Phosphorus in Lake Watersheds, Revised September 1992.

Computer programs used to assist in the various components of this analysis include:

1. HydroCAD Stormwater Modeling System, version 6.0, Applied Microcomputer Systems – used for modeling watersheds for pre and postdevelopment conditions;

2. FlowMaster 1, version 2.06, Haested Methods, Inc., 1990 – used to determine flow depths in open channel; and

3. Microsoft Excel, version 7.0, 1997, Microsoft Corporation – used for spreadsheet computations.

Data and resources used to obtain the hydrologic input data for the stormwater model are identified later in this report.

12.4 Overview of Stormwater Runoff Modeling

The stormwater analysis evaluates seven elements of the project as follows:

1. Analysis of predevelopment and postdevelopment stormwater runoff rates including an assessment of the flows entering the site;

2. Review of the potential impacts of the proposed redevelopment of Martin's Point and subsequent modification to site discharge rates and locations;

3. Evaluation of the requirements for stormwater management;

4. Evaluation of storm drainage requirements for access driveways, parking areas, roof areas and other improvements;

5. Water quality measures requirements;

6. Ditch design and lining requirements; and

7. Inlet capacity of various catch basins and inlets.

12.5 Methods of Analysis – Stormwater Quantity

The hydrologic analyses for predevelopment and postdevelopment conditions have been conducted based upon the methodology contained in the USDA Soil Conservation Service's Technical Releases No. 20 and 55 (SCS TR-20 and TR-55) as modified for special site conditions. For Cumberland County, Maine, a 24-hour SCS Type III storm distribution was used for the analysis using the following storm frequencies and rainfall amounts:

Storm Event	24-Hour Rainfall
2-Year Storm	3.0
10-Year Storm	4.7
25-Year Storm	5.5

The HydroCAD computer program was used in the analysis. This program determines the critical points of the project watershed and uses SCS TR-20 methodology for evaluation of the anticipated conditions at these points. Drainage areas are defined with runoff curve numbers, times of concentration, and travel time data based on methods outlined in the USDA TR-55 manual. To assess storage and kinematic effects of runoff, the model uses reservoirs and pipes to imitate actual conditions. Specific hydrologic characteristics including travel times, storage capacity, and the effects of hydraulic head are considered for analysis with this program.

To model any watershed, the drainage system is represented by a system network consisting of four basic components:

- **Subcatchment:** A relatively homogenous area of land that drains into a single reach or pond. Each subcatchment generates a runoff hydrograph.
- **Reach:** A uniform stream, channel, or pipe which conveys water from one point to another reach or pond. The outflow of each reach is determined by a hydrograph routing calculation.
- **Pond:** A pond, swamp, dam, or other impoundment which fills with water from one or more sources and empties in a manner determined by a weir, culvert or other device(s) at its outlet. A pond may empty into a reach or into another pond. The outflow of each pond is also determined by a hydrograph routing calculation.
- **Link:** A multi-purpose mechanism for introducing a hydrograph from outside the diagram, by manual entry, file import, or linkage to another diagram. A link also allows the diversion and/or scaling of hydrographs.

After identifying each of the components, the system may be represented by a routing diagram such as shown in the schematics and computations contained in Attachment A.

To calculate the outflow for each structure, HydroCAD automatically performs these steps:

1. If there is more than one inflow, the inflows are summed together to produce a single hydrograph. If a pipe is being re-sized, its diameter will be calculated to handle the peak inflow.
2. The inflow is routed through the structure using the description and method previously specified. For subcatchments, the specified storm type and rainfall are used.
3. The peak depth, peak velocity, contact time, etc. are calculated for a reach.
4. For a pond, the peak elevation, peak storage, etc. are calculated.
5. Any warning messages are displayed.
6. For the inflow and outflow, the peak flow and time of peak are calculated by interpolating between the three highest points.
7. The total volume of inflow and outflow are calculated.
8. The results are stored in a database for subsequent calculations or examined at any time.

The process is automatically repeated for each structure until the design point is reached. HydroCAD is a hydrograph routing model. It is designed specifically to handle time varying flows, as required for pond design and other volume-sensitive calculations. As such, HydroCAD routes completely through one structure at a time. Only after determining the outflow hydrograph from a given structure does it consider the next structure downstream.

- **Subcatchment:** A relatively homogenous area of land that drains into a single reach or pond. Each subcatchment generates a runoff hydrograph.
- **Reach:** A uniform stream, channel, or pipe which conveys water from one point to another reach or pond. The outflow of each reach is determined by a hydrograph routing calculation.
- **Pond:** A pond, swamp, dam, or other impoundment which fills with water from one or more sources and empties in a manner determined by a weir, culvert or other device(s) at its outlet. A pond may empty into a reach or into another pond. The outflow of each pond is also determined by a hydrograph routing calculation.
- **Link:** A multi-purpose mechanism for introducing a hydrograph from outside the diagram, by manual entry, file import, or linkage to another diagram. A link also allows the diversion and/or scaling of hydrographs.

After identifying each of the components, the system may be represented by a routing diagram such as shown in the schematics and computations contained in Attachment A.

To calculate the outflow for each structure, HydroCAD automatically performs these steps:

1. If there is more than one inflow, the inflows are summed together to produce a single hydrograph. If a pipe is being re-sized, its diameter will be calculated to handle the peak inflow.
2. The inflow is routed through the structure using the description and method previously specified. For subcatchments, the specified storm type and rainfall are used.
3. The peak depth, peak velocity, contact time, etc. are calculated for a reach.
4. For a pond, the peak elevation, peak storage, etc. are calculated.
5. Any warning messages are displayed.
6. For the inflow and outflow, the peak flow and time of peak are calculated by interpolating between the three highest points.
7. The total volume of inflow and outflow are calculated.
8. The results are stored in a database for subsequent calculations or examined at any time.

The process is automatically repeated for each structure until the design point is reached. HydroCAD is a hydrograph routing model. It is designed specifically to handle time varying flows, as required for pond design and other volume-sensitive calculations. As such, HydroCAD routes completely through one structure at a time. Only after determining the outflow hydrograph from a given structure does it consider the next structure downstream.

The proposed storm drain system was designed to convey runoff from a 25-year storm event using Manning's Equation to compute full flow capacity of pipes. Flow values computed by HydroCAD were checked using peak rates developed using the rational method.

Ditch scour protection was based upon methods outlined in the Maine Erosion Control BMP Handbook. A nomograph was used which provides a d50 stone size for a given ditch flow and velocity.

Land use, cover, delineation of watershed subcatchments, hydraulic flow paths and hydrologic soil types were obtained using the following data:

1. Portland, Maine USGS 7.5 minute Quadrangles Maps.
2. Cumberland County, USDA Medium Intensity Soils Survey.
3. Onsite Topographic Survey with 1' contour intervals prepared by Owen Haskell, Inc.
4. Field Reconnaissance by DeLuca-Hoffman Associates, Inc.

12.6 Description of Site Watershed Model

The watershed model was developed to predict peak discharge rates emanating from various points of the property as well as adjacent locations for the current and future conditions. From discussion during a meeting with Doug Burdick and Ben Viola of the MeDEP on February 15, 2006, stormwater detention is not required for the site as it discharges to tidal waters; however, water quality will be required. The focus of water quality treatment will be on parking areas where the highest levels of contaminants emanate from.

The model allows the following analyses:

- Comparison of current storm water discharge rates with proposed conditions;
- Determination of flows within the pipe or channels allowing sizing, hydraulic grade lines, and velocities to be computed;
- Evaluation of the effect of hydrologic lag (the time difference between peak flows) in various portions of the drainage system.

12.7 Site Specific Predevelopment Conditions Assessed with the Stormwater Model

The predevelopment model included the following:

- Evaluation of flow rates at 12 points of interest. These 12 locations are shown on the watershed maps included with this application

The predevelopment model also was divided into reaches and nodes which were logical for comparison with postdevelopment conditions.

12.8 Predevelopment Watersheds

The predevelopment analysis was conducted by subdividing the area watersheds into subcatchments as shown on sheet W-1.

The hydrologic parameters for the predevelopment watersheds are provided in the attached predevelopment watershed calculations.

12.9 Postdevelopment Conditions

The postdevelopment conditions evaluated as part of this study included subdivision of watersheds of the site into smaller catchments to permit the post development conveyance requirements to be examined more closely. A total of 30 sub catchments were used and the catchments renumbered. The various catchments areas are shown on the postdevelopment watershed map. The computed hydrologic parameters for the various catchments and the computed flows for the various storms are shown in the attached calculations.

12.10 Requirement for Stormwater Management:

Stormwater management is intended to provide either:

- Conveyance of Stormwater Discharge, or
- Measures to address Non-Point Runoff and Stormwater Quality

From discussions with the MeDEP it was determined that onsite stormwater quantity detention was not warranted for this as it discharges to tidal waters. Conveyance capacity of the existing and proposed storm drain system would be required and has been analyzed by the attached calculations. A comparison of existing condition and postdevelopment condition flows was performed to check for areas where capacity could be an issue for the 25-year event. This comparison is summarized below:

Comparison of Peak 25-Year Pre and Postdevelopment Flows At Points of Interest			
POI	Predevelopment (cfs)	Postdevelopment (cfs)	Net Increase (cfs)
1	1.69	15.09	13.40
2	2.21	NA	NA
3	5.39	3.82	NA
4	1.23	1.25	0.02
5	5.95	5.96	0.01
6	1.73	1.73	NA
7	0.44	0.94	0.50
8	2.06	2.38	0.32
9	3.94	3.29	NA
10	2.01	0.97	NA
11	4.02	1.62	NA
12	5.24	0.98	NA

12.8 Predevelopment Watersheds

The predevelopment analysis was conducted by subdividing the area watersheds into subcatchments as shown on sheet W-1.

The hydrologic parameters for the predevelopment watersheds are provided in the attached predevelopment watershed calculations.

12.9 Postdevelopment Conditions

The postdevelopment conditions evaluated as part of this study included subdivision of watersheds of the site into smaller catchments to permit the post development conveyance requirements to be examined more closely. A total of 30 sub catchments were used and the catchments renumbered. The various catchments areas are shown on the postdevelopment watershed map. The computed hydrologic parameters for the various catchments and the computed flows for the various storms are shown in the attached calculations.

12.10 Requirement for Stormwater Management:

Stormwater management is intended to provide either:

- Conveyance of Stormwater Discharge, or
- Measures to address Non-Point Runoff and Stormwater Quality

From discussions with the MeDEP it was determined that onsite stormwater quantity detention was not warranted for this as it discharges to tidal waters. Conveyance capacity of the existing and proposed storm drain system would be required and has been analyzed by the attached calculations. A comparison of existing condition and postdevelopment condition flows was performed to check for areas where capacity could be an issue for the 25-year event. This comparison is summarized below:

Comparison of Peak 25-Year Pre and Postdevelopment Flows At Points of Interest

POI	Predevelopment (cfs)	Postdevelopment (cfs)	Net Increase (cfs)
1	1.69	15.09	13.40
2	2.21	NA	NA
3	5.39	3.82	NA
4	1.23	1.25	0.02
5	5.95	5.96	0.01
6	1.73	1.73	NA
7	0.44	0.94	0.50
8	2.06	2.38	0.32
9	3.94	3.29	NA
10	2.01	0.97	NA
11	4.02	1.62	NA
12	5.24	0.98	NA

POI #1: To address the increase in flow at POI #1 a riprap outlet apron and slope stabilization will be installed at the outlet of the 18-inch storm drain in this area. This discharge point will receive the majority of the stormwater runoff from the proposed development.

POI #4 and #5: Increases of 0.02 and 0.01 cfs are insignificant and do not warrant changes to the stormwater system. The water quality storage proposed in these two areas will also serve to provide slight reductions in peak stormwater flows for even the 25-year event.

POI #7: A seven-foot diameter infiltration ring exists at this location. Upon discussing drainage in this area with Martin's Point facility staff, it was noted that surcharging of this infiltration ring has not been observed in the past; therefore, the small increase in flow to this area is acceptable and will benefit from limited water quality treatment by the infiltration ring.

POI #8: Capacity issues in the area of POI #8 at Route 1 were not observed during recent site visits by our office; therefore, this slight increase in flow at the Route 1 system is not expected to be problematic, and at POI #9 just 200 feet up Route 1 from this location peak flows to Route 1 from the site will be reduced by 2 times this amount. At POI #10 and POI #11 the reduction of postdevelopment peak flows toward Route 1 from the site are even more significant.

12.11 Water Quality Provisions

A total of four (4) water quality treatment areas are proposed. Treatment will be focused on the paved areas of the site. Figures I-1 and I-2 attached show that change in use areas as well as new impervious area since 1975 results in 3.22 acres. The proposed new roof area is 0.62 acres. Treatment of pavement area instead of roof area is proposed at a ratio of 4:1, which was discussed with Jeff Dennis of the MeDEP; therefore, for water quality purposes, treatment of 2.75 acres of paved area is proposed. (3.22 acres less 0.62 roof area plus 25% of 0.62 = 2.75 acres.) Storm Treats are proposed at the site and are accepted by the MeDEP to treat up to 1/6 of an acre each, as noted in an email from Jeff Dennis of the MeDEP contained in Attachment D. Water quality calculations are provided in Attachment C.

Storm cell storage areas will be provided above the Storm Treat units to provide additional storage necessary to treat 1 inch of the runoff from the pavement area tributary to each group of Storm Treat units.

Calculations supporting the storage requirements for each treatment area are provided in Attachment C.

12.12 Maintenance of Facilities

This is discussed in another section of this application.

12.13 Conclusions

As the site discharges to tidal waters, stormwater detention is not required. Stable outlets are provided and capacity of the storm drain system to carry the 25-year storm event is provided.

Water quality provisions have been provided for the site using proprietary water quality units to meet the MeDEP requirements of treating 1 inch of runoff from tributary paved areas.

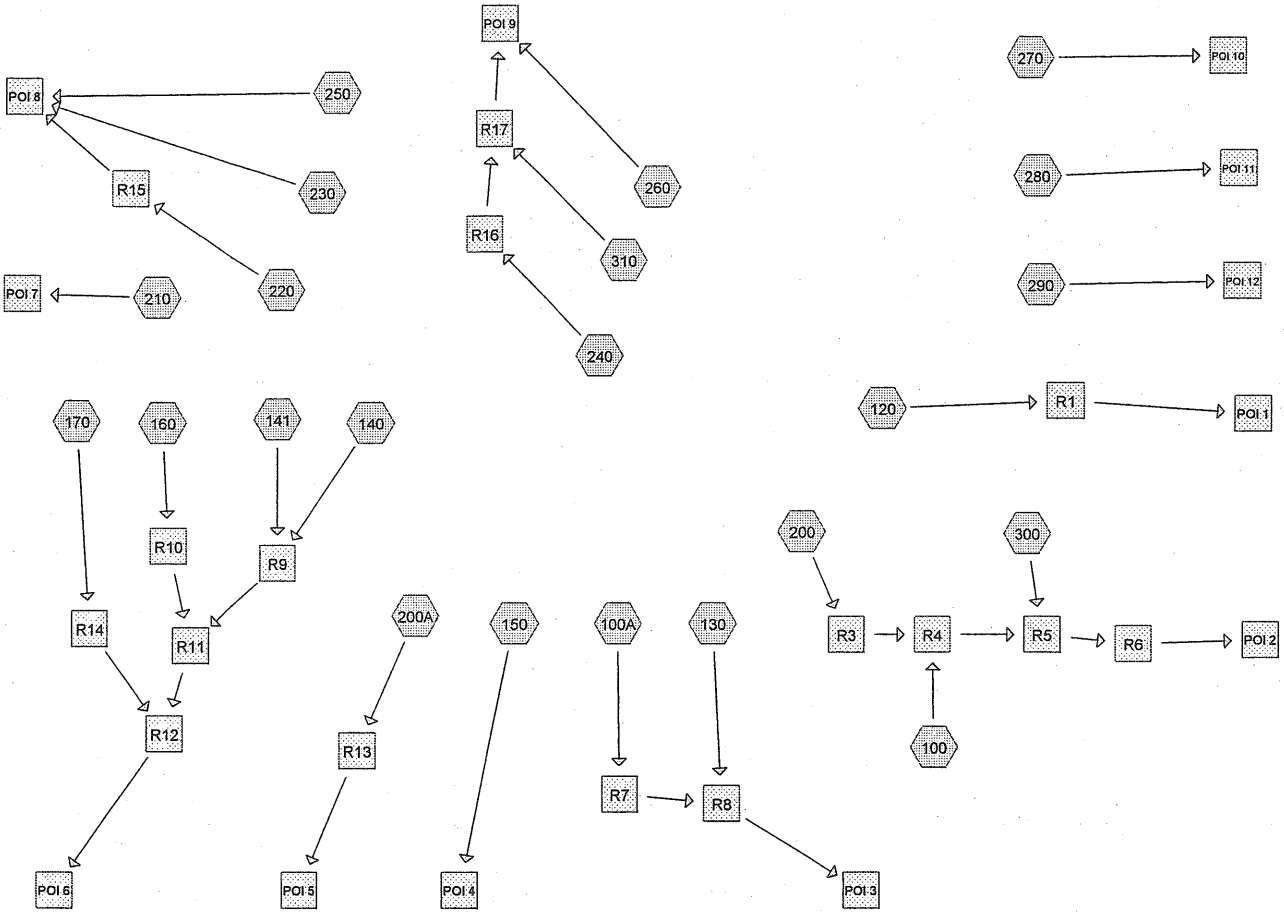
During our discussion with MeDEP, it was agreed that treatment of areas of the site which existed prior to 1975 would be acceptable as long as the net required treatment area of 2.75 acres was achieved for the site.

12.13 Conclusions

As the site discharges to tidal waters, stormwater detention is not required. Stable outlets are provided and capacity of the storm drain system to carry the 25-year storm event is provided.

Water quality provisions have been provided for the site using proprietary water quality units to meet the MeDEP requirements of treating 1 inch of runoff from tributary paved areas.

During our discussion with MeDEP, it was agreed that treatment of areas of the site which existed prior to 1975 would be acceptable as long as the net required treatment area of 2.75 acres was achieved for the site.



Subcat Reach Pond Link

Drainage Diagram for JN2344.03 Pre
Prepared by DELUCA-HOFFMAN 4/11/2006
HydroCAD® 7.10 s/n 000734 © 2005 HydroCAD Software Solutions LLC

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

Subcatchment 100: (new Subcat) Runoff Area=7,441 sf Runoff Depth>2.59"
Flow Length=155' Tc=2.1 min CN=98 Runoff=0.54 cfs 0.037 af

Subcatchment 100A: (new Subcat) Runoff Area=27,623 sf Runoff Depth>1.78"
Flow Length=330' Tc=1.8 min CN=89 Runoff=1.54 cfs 0.094 af

Subcatchment 120: (new Subcat) Runoff Area=13,628 sf Runoff Depth>1.95"
Flow Length=215' Tc=2.5 min CN=91 Runoff=0.82 cfs 0.051 af

Subcatchment 130: (new Subcat) Runoff Area=20,021 sf Runoff Depth>1.34"
Flow Length=265' Tc=1.2 min CN=83 Runoff=0.86 cfs 0.051 af

Subcatchment 140: (new Subcat) Runoff Area=8,250 sf Runoff Depth>2.59"
Flow Length=130' Tc=1.5 min CN=98 Runoff=0.60 cfs 0.041 af

Subcatchment 141: (new Subcat) Runoff Area=1,428 sf Runoff Depth>0.10"
Flow Length=65' Tc=2.0 min CN=52 Runoff=0.00 cfs 0.000 af

Subcatchment 150: (new Subcat) Runoff Area=10,778 sf Runoff Depth>1.70"
Flow Length=120' Tc=4.0 min CN=88 Runoff=0.55 cfs 0.035 af

Subcatchment 160: (new Subcat) Runoff Area=1,769 sf Runoff Depth>2.59"
Flow Length=75' Tc=0.9 min CN=98 Runoff=0.13 cfs 0.009 af

Subcatchment 170: Runoff Area=2,888 sf Runoff Depth>2.59"
Flow Length=100' Tc=1.4 min CN=98 Runoff=0.21 cfs 0.014 af

Subcatchment 200: (new Subcat) Runoff Area=7,512 sf Runoff Depth>2.59"
Flow Length=140' Tc=1.6 min CN=98 Runoff=0.54 cfs 0.037 af

Subcatchment 200A: (new Subcat) Runoff Area=57,652 sf Runoff Depth>1.28"
Flow Length=540' Tc=2.6 min CN=82 Runoff=2.33 cfs 0.141 af

Subcatchment 210: (new Subcat) Runoff Area=5,190 sf Runoff Depth>1.04"
Flow Length=156' Tc=5.1 min CN=78 Runoff=0.15 cfs 0.010 af

Subcatchment 220: (new Subcat) Runoff Area=6,320 sf Runoff Depth>2.59"
Flow Length=190' Tc=1.8 min CN=98 Runoff=0.46 cfs 0.031 af

Subcatchment 230: (new Subcat) Runoff Area=26,840 sf Runoff Depth>0.32"
Flow Length=410' Tc=6.4 min CN=61 Runoff=0.14 cfs 0.016 af

Subcatchment 240: (new Subcat) Runoff Area=19,944 sf Runoff Depth>1.41"
Flow Length=665' Tc=2.4 min CN=84 Runoff=0.89 cfs 0.054 af

Subcatchment 250: (new Subcat) Runoff Area=8,516 sf Runoff Depth>0.23"
Flow Length=250' Tc=4.4 min CN=58 Runoff=0.02 cfs 0.004 af

Subcatchment 260: (new Subcat) Runoff Area=22,699 sf Runoff Depth>0.45"
Flow Length=365' Tc=1.8 min CN=65 Runoff=0.26 cfs 0.019 af

Subcatchment 270: (new Subcat) Runoff Area=23,392 sf Runoff Depth>0.88"
Flow Length=170' Tc=0.9 min CN=75 Runoff=0.64 cfs 0.039 af

Subcatchment 280: (new Subcat) Runoff Area=41,140 sf Runoff Depth>1.15"
Flow Length=200' Tc=1.7 min CN=80 Runoff=1.50 cfs 0.091 af

Subcatchment 290: (new Subcat) Runoff Area=39,958 sf Runoff Depth>2.32"
Flow Length=470' Tc=1.8 min CN=95 Runoff=2.72 cfs 0.177 af

Subcatchment 300: (new Subcat) Runoff Area=2,046 sf Runoff Depth>2.59"
Flow Length=90' Tc=1.2 min CN=98 Runoff=0.15 cfs 0.010 af

Subcatchment 310: (new Subcat) Runoff Area=4,279 sf Runoff Depth>1.87"
Flow Length=200' Tc=0.9 min CN=90 Runoff=0.25 cfs 0.015 af

Reach POI 1: (new Reach) Inflow=0.82 cfs 0.051 af
Outflow=0.82 cfs 0.051 af

Reach POI 10: (new Reach) Inflow=0.64 cfs 0.039 af
Outflow=0.64 cfs 0.039 af

Reach POI 11: (new Reach) Inflow=1.50 cfs 0.091 af
Outflow=1.50 cfs 0.091 af

Reach POI 12: (new Reach) Inflow=2.72 cfs 0.177 af
Outflow=2.72 cfs 0.177 af

Reach POI 2: (new Reach) Inflow=1.19 cfs 0.084 af
Outflow=1.19 cfs 0.084 af

Reach POI 3: (new Reach) Inflow=2.36 cfs 0.146 af
Outflow=2.36 cfs 0.146 af

Reach POI 4: (new Reach) Inflow=0.55 cfs 0.035 af
Outflow=0.55 cfs 0.035 af

Reach POI 5: (new Reach) Inflow=2.33 cfs 0.141 af
Outflow=2.33 cfs 0.141 af

Reach POI 6: (new Reach) Inflow=0.91 cfs 0.064 af
Outflow=0.91 cfs 0.064 af

Reach POI 7: (new Reach) Inflow=0.15 cfs 0.010 af
Outflow=0.15 cfs 0.010 af

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

Subcatchment 100: (new Subcat) Runoff Area=7,441 sf Runoff Depth>4.15"
Flow Length=155' Tc=2.1 min CN=98 Runoff=0.85 cfs 0.059 af

Subcatchment 100A: (new Subcat) Runoff Area=27,623 sf Runoff Depth>3.29"
Flow Length=330' Tc=1.8 min CN=89 Runoff=2.75 cfs 0.174 af

Subcatchment 120: (new Subcat) Runoff Area=13,628 sf Runoff Depth>3.49"
Flow Length=215' Tc=2.5 min CN=91 Runoff=1.42 cfs 0.091 af

Subcatchment 130: (new Subcat) Runoff Area=20,021 sf Runoff Depth>2.72"
Flow Length=265' Tc=1.2 min CN=83 Runoff=1.72 cfs 0.104 af

Subcatchment 140: (new Subcat) Runoff Area=8,250 sf Runoff Depth>4.15"
Flow Length=130' Tc=1.5 min CN=98 Runoff=0.95 cfs 0.065 af

Subcatchment 141: (new Subcat) Runoff Area=1,428 sf Runoff Depth>0.59"
Flow Length=65' Tc=2.0 min CN=52 Runoff=0.02 cfs 0.002 af

Subcatchment 150: (new Subcat) Runoff Area=10,778 sf Runoff Depth>3.19"
Flow Length=120' Tc=4.0 min CN=88 Runoff=1.01 cfs 0.066 af

Subcatchment 160: (new Subcat) Runoff Area=1,769 sf Runoff Depth>4.15"
Flow Length=75' Tc=0.9 min CN=98 Runoff=0.21 cfs 0.014 af

Subcatchment 170: Runoff Area=2,888 sf Runoff Depth>4.15"
Flow Length=100' Tc=1.4 min CN=98 Runoff=0.33 cfs 0.023 af

Subcatchment 200: (new Subcat) Runoff Area=7,512 sf Runoff Depth>4.15"
Flow Length=140' Tc=1.6 min CN=98 Runoff=0.86 cfs 0.060 af

Subcatchment 200A: (new Subcat) Runoff Area=57,652 sf Runoff Depth>2.63"
Flow Length=540' Tc=2.6 min CN=82 Runoff=4.77 cfs 0.290 af

Subcatchment 210: (new Subcat) Runoff Area=5,190 sf Runoff Depth>2.29"
Flow Length=156' Tc=5.1 min CN=78 Runoff=0.34 cfs 0.023 af

Subcatchment 220: (new Subcat) Runoff Area=6,320 sf Runoff Depth>4.15"
Flow Length=190' Tc=1.8 min CN=98 Runoff=0.72 cfs 0.050 af

Subcatchment 230: (new Subcat) Runoff Area=26,840 sf Runoff Depth>1.08"
Flow Length=410' Tc=6.4 min CN=61 Runoff=0.75 cfs 0.055 af

Subcatchment 240: (new Subcat) Runoff Area=19,944 sf Runoff Depth>2.81"
Flow Length=665' Tc=2.4 min CN=84 Runoff=1.75 cfs 0.107 af

Reach POI 8: (new Reach) Inflow=1.50 cfs 0.120 af
Outflow=1.50 cfs 0.120 af

Reach POI 9: (new Reach) Inflow=3.07 cfs 0.193 af
Outflow=3.07 cfs 0.193 af

Reach R1: (new Reach) Peak Depth=0.44' Max Vel=5.8 fps Inflow=1.42 cfs 0.091 af
D=8.0" n=0.012 L=18.0' S=0.0200 '/' Capacity=1.85 cfs Outflow=1.41 cfs 0.091 af

Reach R10: (new Reach) Peak Depth=0.15' Max Vel=3.5 fps Inflow=0.21 cfs 0.014 af
D=8.0" n=0.012 L=30.0' S=0.0200 '/' Capacity=1.85 cfs Outflow=0.21 cfs 0.014 af

Reach R11: (new Reach) Peak Depth=0.35' Max Vel=6.2 fps Inflow=1.15 cfs 0.081 af
D=8.0" n=0.012 L=125.0' S=0.0264 '/' Capacity=2.13 cfs Outflow=1.14 cfs 0.081 af

Reach R12: (new Reach) Peak Depth=0.33' Max Vel=8.4 fps Inflow=1.46 cfs 0.104 af
D=8.0" n=0.012 L=20.0' S=0.0500 '/' Capacity=2.93 cfs Outflow=1.46 cfs 0.104 af

Reach R13: (new Reach) Peak Depth=0.34' Max Vel=20.6 fps Inflow=4.77 cfs 0.290 af
D=12.0" n=0.012 L=25.0' S=0.2600 '/' Capacity=19.68 cfs Outflow=4.76 cfs 0.290 af

Reach R14: (new Reach) Peak Depth=0.24' Max Vel=3.5 fps Inflow=0.33 cfs 0.023 af
D=6.0" n=0.012 L=80.0' S=0.0138 '/' Capacity=0.71 cfs Outflow=0.32 cfs 0.023 af

Reach R15: (new Reach) Peak Depth=0.22' Max Vel=6.1 fps Inflow=0.72 cfs 0.050 af
D=10.0" n=0.013 L=45.0' S=0.0440 '/' Capacity=4.60 cfs Outflow=0.72 cfs 0.050 af

Reach R16: (new Reach) Peak Depth=0.30' Max Vel=7.8 fps Inflow=1.75 cfs 0.107 af
D=15.0" n=0.012 L=40.0' S=0.0400 '/' Capacity=14.00 cfs Outflow=1.74 cfs 0.107 af

Reach R17: (new Reach) Peak Depth=0.36' Max Vel=6.6 fps Inflow=2.15 cfs 0.135 af
D=18.0" n=0.012 L=20.0' S=0.0225 '/' Capacity=17.07 cfs Outflow=2.15 cfs 0.135 af

Reach R3: (new Reach) Peak Depth=0.42' Max Vel=3.7 fps Inflow=0.86 cfs 0.060 af
D=8.0" n=0.013 L=140.0' S=0.0100 '/' Capacity=1.21 cfs Outflow=0.83 cfs 0.060 af

Reach R4: (new Reach) Peak Depth=0.42' Max Vel=7.2 fps Inflow=1.68 cfs 0.119 af
D=8.0" n=0.013 L=30.0' S=0.0360 '/' Capacity=2.29 cfs Outflow=1.68 cfs 0.119 af

Reach R5: (new Reach) Peak Depth=0.32' Max Vel=11.3 fps Inflow=1.90 cfs 0.135 af
D=8.0" n=0.013 L=90.0' S=0.1100 '/' Capacity=4.01 cfs Outflow=1.89 cfs 0.135 af

Reach R6: (new Reach) Peak Depth=0.39' Max Vel=5.9 fps Inflow=1.89 cfs 0.135 af
D=15.0" n=0.013 L=50.0' S=0.0200 '/' Capacity=9.14 cfs Outflow=1.88 cfs 0.135 af

Reach R7: (new Reach) Peak Depth=0.32' Max Vel=12.5 fps Inflow=2.75 cfs 0.174 af
D=12.0" n=0.012 L=80.0' S=0.1012 '/' Capacity=12.28 cfs Outflow=2.74 cfs 0.174 af

Reach R8: (new Reach) Peak Depth=0.65' Max Vel=8.2 fps Inflow=4.42 cfs 0.278 af
D=12.0" n=0.012 L=30.0' S=0.0233 '/' Capacity=5.90 cfs Outflow=4.41 cfs 0.278 af

Subcatchment 250: (new Subcat) Runoff Area=8,516 sf Runoff Depth>0.23"
Flow Length=250' Tc=4.4 min CN=58 Runoff=0.02 cfs 0.004 af

Subcatchment 260: (new Subcat) Runoff Area=22,699 sf Runoff Depth>0.45"
Flow Length=365' Tc=1.8 min CN=65 Runoff=0.26 cfs 0.019 af

Subcatchment 270: (new Subcat) Runoff Area=23,392 sf Runoff Depth>0.88"
Flow Length=170' Tc=0.9 min CN=75 Runoff=0.64 cfs 0.039 af

Subcatchment 280: (new Subcat) Runoff Area=41,140 sf Runoff Depth>1.15"
Flow Length=200' Tc=1.7 min CN=80 Runoff=1.50 cfs 0.091 af

Subcatchment 290: (new Subcat) Runoff Area=39,958 sf Runoff Depth>2.32"
Flow Length=470' Tc=1.8 min CN=95 Runoff=2.72 cfs 0.177 af

Subcatchment 300: (new Subcat) Runoff Area=2,046 sf Runoff Depth>2.59"
Flow Length=90' Tc=1.2 min CN=98 Runoff=0.15 cfs 0.010 af

Subcatchment 310: (new Subcat) Runoff Area=4,279 sf Runoff Depth>1.87"
Flow Length=200' Tc=0.9 min CN=90 Runoff=0.25 cfs 0.015 af

Reach POI 1: (new Reach) Inflow=0.82 cfs 0.051 af
Outflow=0.82 cfs 0.051 af

Reach POI 10: (new Reach) Inflow=0.64 cfs 0.039 af
Outflow=0.64 cfs 0.039 af

Reach POI 11: (new Reach) Inflow=1.50 cfs 0.091 af
Outflow=1.50 cfs 0.091 af

Reach POI 12: (new Reach) Inflow=2.72 cfs 0.177 af
Outflow=2.72 cfs 0.177 af

Reach POI 2: (new Reach) Inflow=1.19 cfs 0.084 af
Outflow=1.19 cfs 0.084 af

Reach POI 3: (new Reach) Inflow=2.36 cfs 0.146 af
Outflow=2.36 cfs 0.146 af

Reach POI 4: (new Reach) Inflow=0.55 cfs 0.035 af
Outflow=0.55 cfs 0.035 af

Reach POI 5: (new Reach) Inflow=2.33 cfs 0.141 af
Outflow=2.33 cfs 0.141 af

Reach POI 6: (new Reach) Inflow=0.91 cfs 0.064 af
Outflow=0.91 cfs 0.064 af

Reach POI 7: (new Reach) Inflow=0.15 cfs 0.010 af
Outflow=0.15 cfs 0.010 af

Subcatchment 250: (new Subcat) Runoff Area=8,516 sf Runoff Depth>0.90"
Flow Length=250' Tc=4.4 min CN=58 Runoff=0.20 cfs 0.015 af

Subcatchment 260: (new Subcat) Runoff Area=22,699 sf Runoff Depth>1.33"
Flow Length=365' Tc=1.8 min CN=65 Runoff=0.93 cfs 0.058 af

Subcatchment 270: (new Subcat) Runoff Area=23,392 sf Runoff Depth>2.05"
Flow Length=170' Tc=0.9 min CN=75 Runoff=1.54 cfs 0.092 af

Subcatchment 280: (new Subcat) Runoff Area=41,140 sf Runoff Depth>2.46"
Flow Length=200' Tc=1.7 min CN=80 Runoff=3.19 cfs 0.194 af

Subcatchment 290: (new Subcat) Runoff Area=39,958 sf Runoff Depth>3.89"
Flow Length=470' Tc=1.8 min CN=95 Runoff=4.44 cfs 0.297 af

Subcatchment 300: (new Subcat) Runoff Area=2,046 sf Runoff Depth>4.15"
Flow Length=90' Tc=1.2 min CN=98 Runoff=0.24 cfs 0.016 af

Subcatchment 310: (new Subcat) Runoff Area=4,279 sf Runoff Depth>3.39"
Flow Length=200' Tc=0.9 min CN=90 Runoff=0.45 cfs 0.028 af

Reach POI 1: (new Reach) Inflow=1.41 cfs 0.091 af
Outflow=1.41 cfs 0.091 af

Reach POI 10: (new Reach) Inflow=1.54 cfs 0.092 af
Outflow=1.54 cfs 0.092 af

Reach POI 11: (new Reach) Inflow=3.19 cfs 0.194 af
Outflow=3.19 cfs 0.194 af

Reach POI 12: (new Reach) Inflow=4.44 cfs 0.297 af
Outflow=4.44 cfs 0.297 af

Reach POI 2: (new Reach) Inflow=1.88 cfs 0.135 af
Outflow=1.88 cfs 0.135 af

Reach POI 3: (new Reach) Inflow=4.41 cfs 0.278 af
Outflow=4.41 cfs 0.278 af

Reach POI 4: (new Reach) Inflow=1.01 cfs 0.066 af
Outflow=1.01 cfs 0.066 af

Reach POI 5: (new Reach) Inflow=4.76 cfs 0.290 af
Outflow=4.76 cfs 0.290 af

Reach POI 6: (new Reach) Inflow=1.46 cfs 0.104 af
Outflow=1.46 cfs 0.104 af

Reach POI 7: (new Reach) Inflow=0.34 cfs 0.023 af
Outflow=0.34 cfs 0.023 af

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

Subcatchment 100: (new Subcat) Runoff Area=7,441 sf Runoff Depth>4.87"
Flow Length=155' Tc=2.1 min CN=98 Runoff=1.00 cfs 0.069 af

Subcatchment 100A: (new Subcat) Runoff Area=27,623 sf Runoff Depth>4.02"
Flow Length=330' Tc=1.8 min CN=89 Runoff=3.32 cfs 0.213 af

Subcatchment 120: (new Subcat) Runoff Area=13,628 sf Runoff Depth>4.23"
Flow Length=215' Tc=2.5 min CN=91 Runoff=1.70 cfs 0.110 af

Subcatchment 130: (new Subcat) Runoff Area=20,021 sf Runoff Depth>3.41"
Flow Length=265' Tc=1.2 min CN=83 Runoff=2.14 cfs 0.131 af

Subcatchment 140: (new Subcat) Runoff Area=8,250 sf Runoff Depth>4.87"
Flow Length=130' Tc=1.5 min CN=98 Runoff=1.11 cfs 0.077 af

Subcatchment 141: (new Subcat) Runoff Area=1,428 sf Runoff Depth>0.92"
Flow Length=65' Tc=2.0 min CN=52 Runoff=0.04 cfs 0.003 af

Subcatchment 150: (new Subcat) Runoff Area=10,778 sf Runoff Depth>3.92"
Flow Length=120' Tc=4.0 min CN=88 Runoff=1.23 cfs 0.081 af

Subcatchment 160: (new Subcat) Runoff Area=1,769 sf Runoff Depth>4.87"
Flow Length=75' Tc=0.9 min CN=98 Runoff=0.24 cfs 0.016 af

Subcatchment 170: Runoff Area=2,888 sf Runoff Depth>4.87"
Flow Length=100' Tc=1.4 min CN=98 Runoff=0.39 cfs 0.027 af

Subcatchment 200: (new Subcat) Runoff Area=7,512 sf Runoff Depth>4.87"
Flow Length=140' Tc=1.6 min CN=98 Runoff=1.01 cfs 0.070 af

Subcatchment 200A: (new Subcat) Runoff Area=57,652 sf Runoff Depth>3.31"
Flow Length=540' Tc=2.6 min CN=82 Runoff=5.95 cfs 0.366 af

Subcatchment 210: (new Subcat) Runoff Area=5,190 sf Runoff Depth>2.93"
Flow Length=156' Tc=5.1 min CN=78 Runoff=0.44 cfs 0.029 af

Subcatchment 220: (new Subcat) Runoff Area=6,320 sf Runoff Depth>4.87"
Flow Length=190' Tc=1.8 min CN=98 Runoff=0.85 cfs 0.059 af

Subcatchment 230: (new Subcat) Runoff Area=26,840 sf Runoff Depth>1.53"
Flow Length=410' Tc=6.4 min CN=61 Runoff=1.10 cfs 0.078 af

Subcatchment 240: (new Subcat) Runoff Area=19,944 sf Runoff Depth>3.51"
Flow Length=665' Tc=2.4 min CN=84 Runoff=2.16 cfs 0.134 af

Subcatchment 250: (new Subcat) Runoff Area=8,516 sf Runoff Depth>1.31"
Flow Length=250' Tc=4.4 min CN=58 Runoff=0.31 cfs 0.021 af

Subcatchment 260: (new Subcat) Runoff Area=22,699 sf Runoff Depth>1.83"
Flow Length=365' Tc=1.8 min CN=65 Runoff=1.30 cfs 0.080 af

Subcatchment 270: (new Subcat) Runoff Area=23,392 sf Runoff Depth>2.67"
Flow Length=170' Tc=0.9 min CN=75 Runoff=2.01 cfs 0.119 af

Subcatchment 280: (new Subcat) Runoff Area=41,140 sf Runoff Depth>3.12"
Flow Length=200' Tc=1.7 min CN=80 Runoff=4.02 cfs 0.246 af

Subcatchment 290: (new Subcat) Runoff Area=39,958 sf Runoff Depth>4.62"
Flow Length=470' Tc=1.8 min CN=95 Runoff=5.24 cfs 0.353 af

Subcatchment 300: (new Subcat) Runoff Area=2,046 sf Runoff Depth>4.87"
Flow Length=90' Tc=1.2 min CN=98 Runoff=0.28 cfs 0.019 af

Subcatchment 310: (new Subcat) Runoff Area=4,279 sf Runoff Depth>4.13"
Flow Length=200' Tc=0.9 min CN=90 Runoff=0.54 cfs 0.034 af

Reach POI 1: (new Reach) Inflow=1.69 cfs 0.110 af
Outflow=1.69 cfs 0.110 af

Reach POI 10: (new Reach) Inflow=2.01 cfs 0.119 af
Outflow=2.01 cfs 0.119 af

Reach POI 11: (new Reach) Inflow=4.02 cfs 0.246 af
Outflow=4.02 cfs 0.246 af

Reach POI 12: (new Reach) Inflow=5.24 cfs 0.353 af
Outflow=5.24 cfs 0.353 af

Reach POI 2: (new Reach) Inflow=2.21 cfs 0.158 af
Outflow=2.21 cfs 0.158 af

Reach POI 3: (new Reach) Inflow=5.39 cfs 0.343 af
Outflow=5.39 cfs 0.343 af

Reach POI 4: (new Reach) Inflow=1.23 cfs 0.081 af
Outflow=1.23 cfs 0.081 af

Reach POI 5: (new Reach) Inflow=5.95 cfs 0.366 af
Outflow=5.95 cfs 0.366 af

Reach POI 6: (new Reach) Inflow=1.73 cfs 0.123 af
Outflow=1.73 cfs 0.123 af

Reach R9: (new Reach) Peak Depth=0.41' Max Vel=4.2 fps Inflow=0.96 cfs 0.067 af
D=8.0" n=0.012 L=35.0' S=0.0111 '/' Capacity=1.38 cfs Outflow=0.95 cfs 0.067 af

Total Runoff Area = 8.249 ac Runoff Volume = 1.882 af Average Runoff Depth = 2.74"

Reach POI 7: (new Reach) Inflow=0.44 cfs 0.029 af
Outflow=0.44 cfs 0.029 af

Reach POI 8: (new Reach) Inflow=2.06 cfs 0.159 af
Outflow=2.06 cfs 0.159 af

Reach POI 9: (new Reach) Inflow=3.94 cfs 0.247 af
Outflow=3.94 cfs 0.247 af

Reach R1: (new Reach) Peak Depth=0.50' Max Vel=6.0 fps Inflow=1.70 cfs 0.110 af
D=8.0" n=0.012 L=18.0' S=0.0200 '/' Capacity=1.85 cfs Outflow=1.69 cfs 0.110 af

Reach R10: (new Reach) Peak Depth=0.16' Max Vel=3.7 fps Inflow=0.24 cfs 0.016 af
D=8.0" n=0.012 L=30.0' S=0.0200 '/' Capacity=1.85 cfs Outflow=0.24 cfs 0.016 af

Reach R11: (new Reach) Peak Depth=0.39' Max Vel=6.4 fps Inflow=1.36 cfs 0.096 af
D=8.0" n=0.012 L=125.0' S=0.0264 '/' Capacity=2.13 cfs Outflow=1.35 cfs 0.096 af

Reach R12: (new Reach) Peak Depth=0.37' Max Vel=8.7 fps Inflow=1.73 cfs 0.123 af
D=8.0" n=0.012 L=20.0' S=0.0500 '/' Capacity=2.93 cfs Outflow=1.73 cfs 0.123 af

Reach R13: (new Reach) Peak Depth=0.38' Max Vel=21.9 fps Inflow=5.95 cfs 0.366 af
D=12.0" n=0.012 L=25.0' S=0.2600 '/' Capacity=19.68 cfs Outflow=5.95 cfs 0.366 af

Reach R14: (new Reach) Peak Depth=0.26' Max Vel=3.7 fps Inflow=0.39 cfs 0.027 af
D=6.0" n=0.012 L=80.0' S=0.0138 '/' Capacity=0.71 cfs Outflow=0.38 cfs 0.027 af

Reach R15: (new Reach) Peak Depth=0.24' Max Vel=6.4 fps Inflow=0.85 cfs 0.059 af
D=10.0" n=0.013 L=45.0' S=0.0440 '/' Capacity=4.60 cfs Outflow=0.84 cfs 0.059 af

Reach R16: (new Reach) Peak Depth=0.33' Max Vel=8.3 fps Inflow=2.16 cfs 0.134 af
D=15.0" n=0.012 L=40.0' S=0.0400 '/' Capacity=14.00 cfs Outflow=2.16 cfs 0.134 af

Reach R17: (new Reach) Peak Depth=0.40' Max Vel=7.0 fps Inflow=2.65 cfs 0.168 af
D=18.0" n=0.012 L=20.0' S=0.0225 '/' Capacity=17.07 cfs Outflow=2.64 cfs 0.168 af

Reach R3: (new Reach) Peak Depth=0.47' Max Vel=3.9 fps Inflow=1.01 cfs 0.070 af
D=8.0" n=0.013 L=140.0' S=0.0100 '/' Capacity=1.21 cfs Outflow=0.98 cfs 0.070 af

Reach R4: (new Reach) Peak Depth=0.48' Max Vel=7.4 fps Inflow=1.98 cfs 0.139 af
D=8.0" n=0.013 L=30.0' S=0.0360 '/' Capacity=2.29 cfs Outflow=1.97 cfs 0.139 af

Reach R5: (new Reach) Peak Depth=0.36' Max Vel=11.8 fps Inflow=2.23 cfs 0.158 af
D=8.0" n=0.013 L=90.0' S=0.1100 '/' Capacity=4.01 cfs Outflow=2.22 cfs 0.158 af

Reach R6: (new Reach) Peak Depth=0.42' Max Vel=6.1 fps Inflow=2.22 cfs 0.158 af
D=15.0" n=0.013 L=50.0' S=0.0200 '/' Capacity=9.14 cfs Outflow=2.21 cfs 0.158 af

Reach R7: (new Reach) Peak Depth=0.36' Max Vel=13.2 fps Inflow=3.32 cfs 0.213 af
D=12.0" n=0.012 L=80.0' S=0.1012 '/' Capacity=12.28 cfs Outflow=3.31 cfs 0.212 af

Reach R8: (new Reach) Peak Depth=0.75' Max Vel=8.5 fps Inflow=5.40 cfs 0.343 af
D=12.0" n=0.012 L=30.0' S=0.0233 '/' Capacity=5.90 cfs Outflow=5.39 cfs 0.343 af

Reach R9: (new Reach) Peak Depth=0.46' Max Vel=4.4 fps Inflow=1.14 cfs 0.079 af
D=8.0" n=0.012 L=35.0' S=0.0111 '/' Capacity=1.38 cfs Outflow=1.13 cfs 0.079 af

Total Runoff Area = 8.249 ac Runoff Volume = 2.335 af Average Runoff Depth = 3.40"

TD Banknorth
Maine

One Portland Square
P.O. Box 9540
Portland, ME 04112-9540
T: **207 761-8500**
Toll Free: 800 761-3666

March 30, 2006

Cheryl Bragdon
Martin's Point Health Care, Inc.
P. O. Box 9746
Portland, Maine 04104

RE: Marine Hospital, Portland, Maine project

Dear Cheryl:

This letter will confirm that, based on our preliminary due diligence and subject to our underwriting requirements, Martin's Point Health Care Inc. has the financial capacity to complete all three phases of the proposed $17,673,000.00 renovation/construction project of the Marine Hospital located at 331 Veranda Street, Portland, Maine.

Martin's Point Health Care Inc. and its affiliates have been customers of the Bank since 1993 with an extensive relationship. All of the accounts with the Bank have always been handled in a satisfactory manner.

Please call me at 207-761-8783, should you have any questions.

Sincerely,

[signature]

Lawrence A. Wold
Executive Vice President

Martin's Point Construction Timeline

Phase I

Marine Hospital Renovation and limited site improvements (new water service, electrical service, and existing parking lot overlay)

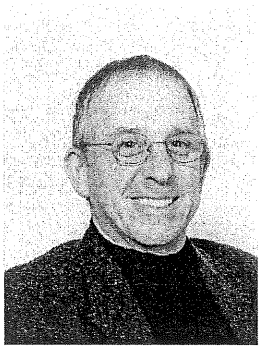
Commence renovations in June of 2006 and be complete by January 2007.

Phase II

New clinic/administrative building, parking structure, and balance of site improvements.

Design: +/- 6 months commencing September 2006.
Review/Costing: +/- 2 months commencing March 2007
Construction: +/- 1 year commencing in May 2007

DAVID C. WEBSTER, AIA, LEED
PRINCIPAL



49 Dartmouth Street
Portland, Maine 04101
207.775.1059
fax 207 775 2694
e-mail: webster@pdtarchs.com
www.pdtarchs.com

David Webster, president and managing partner of PDT, often works with long-term clients over a series of projects. He is currently principal-in-charge of several health care/office projects for Martin's Point Health Care and 50 Sewall Street, a LEED-registered medical office building in Portland, ME. He has recently completed a major middle school renovation at the Lincoln School, Providence, RI (opened September 2003). He has considerable expertise in directing projects involving multiple buildings and multiple architects and is a trained mediator and facilitator.

EDUCATION
University of Miami, Ohio, 1964–1970
Bachelor of Architecture

University of Southern Maine, 1995
•Certificate in Mediation
•Completed Facilitation Training

REGISTRATIONS
LEED Accredited Professional, 2004
State of Maine, #923
State of New Hampshire, #1031
State of Vermont, #1023
State of Rhode Island, #2646
Commonwealth of Massachusetts, #4001
NCARB Certificate, 1977, #19269

MEMBERSHIP
American Society for Healthcare Engineering of the American Hospital Association

PRACTICE
PDT Architects (was Portland Design Team)
Portland, Maine
President and Founding Principal
1977–present

TEACHING EXPERIENCE
Boston Architectural Center, Boston, Massachusetts
Instructor, 1976–1978

PUBLIC SERVICE
Member and Past President, Maine Chapter, American Institute of Architects

Member, Advisory Board, Maine State Housing Authority

Member, Advisory Board, St. Elizabeth's Child Development Center

Dwight D. Anderson, P.E.

Senior Engineer

Mr. Anderson is a Senior Engineer with DeLuca-Hoffman Associates, Inc.'s Land Design and Engineering Services Group, and Environmental and Water Resources Group. He performs the preparation of preliminary and final design as well as permit applications for a variety of civil/site engineering and environmental projects. Mr. Anderson's expertise includes civil/site design, hydrologic and hydraulic analysis, and construction administration.

DeLuca-Hoffman Associates, Inc. Since 1997

Spring Street Trunk Storm Drain Project, Saco, Maine:

Design, permitting and construction administration services for the construction of a 2,400 linear foot trunk storm drain along Spring Street, to convey the upper reaches of the 350-acre Sawyer Brook watershed directly to the Saco River. The trunk storm drain is comprised of 185 linear feet of 5-foot by 10-foot precast concrete box storm drain, 665 linear feet of twin 72-inch diameter reinforced concrete pipe, 1,210 linear feet of 96-inch diameter reinforced concrete pipe and 340 linear feet of 84-inch diameter reinforced concrete pipe. The project also included reconstruction of the majority of the 45-foot-wide Spring Street roadway, water main relocation and sewer main relocation. Permitting efforts for the project involved the Saco River Corridor Commission, the Maine Department of Environmental Protection, the US Army Corps of Engineers and several other resource agencys. The $2.6 million project was part of a joint effort by the City of Saco and the Federal Emergency Management Agency.

MSAD #51 Greely Middle School, Cumberland, Maine:

Participation in the design, permitting and construction administration services for construction of a 750-student middle school on a 52-acre parcel. The project includes water quantity and quality ponds, athletic fields, infrastructure upgrades and parking for over 180 vehicles. The stormwater quantity analysis for this project was complicated due to poor drainage conditions in a residential neighborhood downgradient from the school site.

Athletic Field Upgrades and Playground Improvements Buxton/Hollis/ Limington and Standish, Maine:

Participation in the design, permitting (local, state and federal) and construction administration services for upgrades and improvements to playgrounds and athletic fields throughout the MSAD #6 school district. Design considerations included ADA accessibility, irrigation for athletic fields, water supply source and modern playground equipment arrangements. The overall funding for this project, which impacts nine different school sites is $2.4 million.

Advance Auto Parts, Biddeford and Windham, Maine:

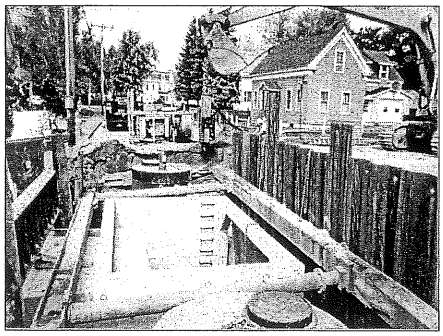
Design and permitting services for construction of 7,000 square foot auto parts retail stores in Biddeford and Windham, Maine. Both sites required formal stormwater control systems and attention to local requirements to achieve Planning Board approvals.

UNUM Provident's Centralized Mechanical Project, Portland, Maine:

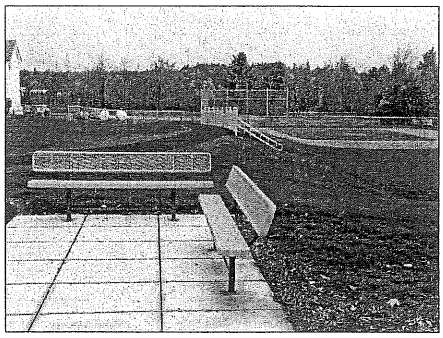
Design and construction of a centralized mechanical piping connection between Home Office 1 and Home Office 2 to provide heating between the buildings. The site required extensive geophysical utility survey and test pitting to determine rock elevations and utility locations to be considered in planning the route between the buildings. The project cost was on the order of $750,000.

Oak Ridge Subdivision, Portland, Maine.

Design and permitting services for an eighteen-lot subdivision off Plymouth Street in Portland, Maine. The project design included formal stormwater controls for both water quantity and quality including hydrologic modeling, sanitary sewer design, water system design and street design. This project required special consideration to minimize impacts to abutting neighbors to the front of the site and railroad tracks to the back of the site.



Spring Street Trunk Storm Drain in Saco, Maine



Athletic Field Upgrades for MSAD #6

MBNA Operations Facility Phase III Expansion, Belfast, Maine:

Performed surface water quantity and quality analyses in order to prepare the Stormwater Management Report for MBNA's Phase III Operations Facility Expansion including development of an additional 30 acres on MBNA's 334-acre parcel. Development of the stormwater management plan included analysis for a 111-acre watershed within the parcel, review of the water quality impacts to Belfast Reservoir No. 2 as well as streams conveying stormwater from the site, and the design of four water quality retention facilities for phosphorus removal and stormwater detention.

Lower Route 1 Infrastructure Improvements, Whitney Road, Falmouth, Maine:

Design and construction phase services for the replacement of sanitary sewer main and service leads along Whitney Road in Falmouth. The project also included the installation of a new storm drain system designed with service leads to receive illicit inflows from residential home foundation drains and sump pumps. The primary purpose of the project was to reduce the amount of infiltration and ground water inflow into the sanitary sewer system. The total cost of construction for the project was $250,000.

Wayside Road and Woodfield Road Sewer Separation Project, Portland, Maine:

Design of infrastructure improvements which included 3,500 feet of roadway and sidewalk reconstruction, approximately 2,400 linear feet of sanitary sewer and separate storm drains. This project included the hydrologic evaluation of a 13-acre urban watershed and hydraulic analysis of proposed sanitary sewers and storm sewers within the watershed. The Rational Method was used for analyzing stormwater runoff volumes and Manning's Equation was used for analyzing minor losses in the formal drainage systems. The total construction cost for the project was $1.3 million.

Boy Scouts of America Headquarters Building, Portland, Maine:

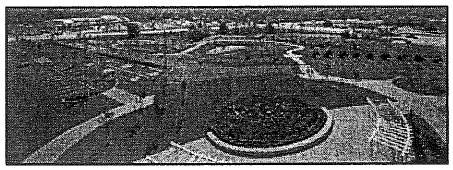
Design and permitting for the construction of an 11,800 square foot Headquarters building and associated site improvements located in existing wetlands between airport and MTA property on the border between the City of Portland and South Portland. The project includes sewer force main and effluent pump analysis and stormwater analysis. The overall project included disturbance of nearly one acre of wetland to construct the 11,800 square foot building, paved access drive and 50-space parking area.

Education:	BSCE - University of Maine, Orono, Maine
Registration:	Registered Professional Engineer, Maine
Experience in Field:	In Private Practice Since 1994

Shelley E. Brunelle, RLA

Registered Landscape Architect

Ms. Brunelle performs the preparation of preliminary and final design, as well as project management and construction administration for a variety of site and landscape design projects. She collaborates with the engineering staff in our office and also works closely with architects, landscape architects, and professional engineers from other firms.



West Falmouth Crossing

DeLuca-Hoffman Associates, Inc. Since 2005

Prior Projects Working with DeLuca-Hoffman Associates, Inc.:

West Falmouth Crossing – Falmouth, Maine:

Assisted with site planning, landscape and irrigation design for a 140,000 s.f. commercial office building. Designs led to a jogging trail through the natural areas of the site, extensive buffering against residential abutters, and the creation of several outdoor spaces.

Multiple outdoor plazas and pocket parks, both formal and natural, are defined by stone walls, landscaping, granite pavers and site furnishings. These elements were linked to earlier phases of development by change in pavement type, texture or color, including pavement stamping and stone dust jogging trail. The extensive landscaping was designed in accordance with design guidelines and municipal ordinances.

Mill Brook Business Park – Saco, Maine:

The entrance to a business park was transformed from a used car storage lot to a medianed entry with new project signage and perennial plantings framed by grassed mounds planted with shade trees. Street trees continue into the development, lining both sides of the road. This project is currently under construction. Landscape grading and installation oversight is being managed through DeLuca-Hoffman Associates, Inc.

Nationwide Office Solutions – Scarborough, Maine:

Landscape, walkway and railing design for office space in a business park. This project is currently under construction; landscape installation oversight will be provided through DeLuca-Hoffman Associates, Inc.

Tidewater Farm/Tidewater Village – Falmouth, Maine:

While at Orcutt Associates, Ms. Brunelle assisted with documentation of Master Planning concepts derived from a public charette conducted in 2001. She later assisted and completed the approved Master Plan for a 75-acre parcel of undeveloped land on the Presumpscot Estuary, adjacent to Falmouth's Village Center. She worked with DeLuca-Hoffman Associates, Inc. and the developer to provide permitting plans and construction documents for common areas, landscape buffering, street and wetland plantings, and decorative street lighting. Developed design guidelines for both residential and commercial development parcels. Designed a variety of landscape package options for use with sale of residential unit prototypes. The residential portion, Tidewater Farm, is under construction. Construction oversight and review of residential site and landscape plans required by Design Guidelines will be provided through DeLuca-Hoffman Associates, Inc. Subdivision site design, landscaping and site lighting for the commercial portion, Tidewater Village, are in progress under DeLuca-Hoffman Associates, Inc. purview.

Philippi Residence Hall, USM Campus, Gorham, Maine:

Siting the building, parking, and connecting accessible walkways for a new residence hall and a series of terraced parking bays on a steep site was one of the significant challenges faced during preliminary design. Detailed grading, landscape design and selection of site furnishings and lighting completed the plans provided to the University.

Hannaford Bros. Co.

Landscape design for eight new and renovation projects in Maine, New Hampshire and New York. Landscape installation oversight for these projects will be provided through DeLuca-Hoffman Associates, Inc.

Projects Since Working with DeLuca-Hoffman Associates, Inc.:

Hannaford Bros. Co.

Landscape architectural services for several new projects in Maine and New Hampshire, including outparcel site design and assistance with local permitting.

Town of Arundel Recreation Area – Arundel, Maine:

Preliminary site studies and cost estimation for several ball field, tennis court/playground and parking schemes.

Lowe's – Brewer, Maine:

Landscape design for a new commercial site.

Martin's Point Health Care – Portland, Maine:

Landscape and courtyard design for new medical facility near the historic Marine Hospital Building.

Projects Prior to Working with DeLuca-Hoffman Associates, Inc.:

While employed at Orcutt Associates in Yarmouth, Maine (1999-2005), Ms. Brunelle was involved in the majority of their projects, primarily commercial and recreational in nature, including several master planning, institutional, downtown revitalization and streetscape designs. Her responsibilities ranged from assisting facilitation of public design charrettes, working with building committees, municipal planning staff, and design teams in all stages of site and landscape design, and coordinating plan development through construction administration of the built project.

- Westbrook Riverfront Development, Phase I – Westbrook, Maine
- Eastport Downtown Revitalization – Eastport, Maine
- Penobscot Bay YMCA – Rockport, Maine
- Freeport Recreation Area – Freeport, Maine
- Merriconeag Waldorf School Community Hall & Landscape Master Plan – Freeport, Maine
- Camp Tracy Master Plan for Waterville Boys & Girls Club – Oakland, Maine
- One Riverfront Plaza & City Parking Structure – Westbrook, Maine
- Charrettes: Westbrook Route 302 TND & Wm. Clarke Drive – Westbrook, Maine
- Evie Chianchette Block – Old Port, Portland, Maine
- Carrabassett Valley Academy Ballfields & Campus Master Plan – Carrabassett Valley, Maine
- University of Maine Cloke Plaza Master Plan & Fogler Library Terrace Renovation – Orono, Maine
- Darrow School Landscape Master Plan – New Lebanon, New York
- Pineland Campus Master Plan & Hill Farm Equestrian Center – Gray/New Gloucester - Maine

Education:	BS in Landscape Horticulture – Virginia Polytechnic Institute & State University
Registration:	Registered Landscape Architect – Maine, Florida, New York
	Certified Member, Council of Landscape Architectural Registration Board (CLARB)
Affiliations:	Member, American Society of Landscape Architects (ASLA) Maine Chapter, Boston Society of Landscape Architects (MSLA – Secretary & Licensure Committee)
Experience in Field:	In Private Practice Since 1982