

220-C-1

1651 Congress St.

Phase II office Expansion

Mitchell and Assoc.

on Spreadsheet

Department of Planning & Development
Lee D. Urban, Director



CITY OF PORTLAND

Division Directors
Mark B. Adelson
Housing & Neighborhood Services

Alexander Q. Jaegerman, AICP
Planning

John N. Lufkin
Economic Development

September 14, 2004

John Mitchell
Mitchell & Associates
70 Center Street
Portland ME 04101

RE: Maine Orthopaedic Center, 1601 Congress Street
CBL: 220-C-001

Dear Mr. Mitchell:

On September 14, 2004, the Portland Planning Authority approved your plan for Phase II Medical Office Expansion at 1601 Congress Street as shown on the approved plan.

The approval is based on the submitted site plan. If you need to make any modifications to the approved site plan, you must submit a revised site plan for staff review and approval.

Please note the following provisions and requirements for all site plan approvals:

1. Where submission drawings are available in electronic form, the applicant shall submit any available electronic CADD.DXF files with seven (7) sets of the final plans.
2. A performance/defect guarantee covering the site improvements as well as an inspection fee payment of 2.0% of the guarantee amount and 7 final sets of plans must be submitted to and approved by the Planning Division and Public Works prior to the release of the building permit. If you need to make any modifications to the approved site plan, you must submit a revised site plan for staff review and approval.
3. The site plan approval will be deemed to have expired unless work in the development has commenced within one (1) year of the approval or within a time period agreed upon in writing by the City and the applicant. Requests to extend approvals must be received before the expiration date.
4. A defect guarantee, consisting of 10% of the performance guarantee, must be posted before the performance guarantee will be released.

5. Prior to construction, a pre-construction meeting shall be held at the project site with the contractor, development review coordinator, Public Work's representative and owner to review the construction schedule and critical aspects of the site work. At that time, the site/building contractor shall provide three (3) copies of a detailed construction schedule to the attending City representatives. It shall be the contractor's responsibility to arrange a mutually agreeable time for the pre-construction meeting.
6. If work will occur within the public right-of-way such as utilities, curb, sidewalk and driveway construction, a street opening permit(s) is required for your site. Please contact Carol Merritt at 874-8300, ext. 8828. (Only excavators licensed by the City of Portland are eligible.)

The Development Review Coordinator must be notified five (5) working days prior to date required for final site inspection. The Development Review Coordinator can be reached at the Planning Division at 874-8632. Please make allowances for completion of site plan requirements determined to be incomplete or defective during the inspection. This is essential as all site plan requirements must be completed and approved by the Development Review Coordinator prior to issuance of a Certificate of Occupancy. Please schedule any property closing with these requirements in mind.

If there are any questions, please contact Sarah Hopkins, Development Review Services Manager at 874-8720.

Sincerely,



Alexander Jaegerman
Planning Division Director

cc: Lee D. Urban, Planning and Development Department Director
Sarah Hopkins, Development Review Services Manager
Jay Reynolds, Development Review Coordinator
Marge Schmuckal, Zoning Administrator
Gayle Guertin, Inspections
Michael Bobinsky, Public Works Director
Traffic Division
Eric Labelle, City Engineer
Jeff Tarling, City Arborist
Penny Littell, Associate Corporation Counsel
Lt. Gaylen McDougall, Fire Prevention
Assessor's Office
Approval Letter File

MITCHELL & ASSOCIATES
LANDSCAPE ARCHITECTS

August 30, 2004

Ms. Sarah Hopkins, Senior Planner
City of Portland Planning Division
389 Congress Street
Portland, Maine 04101

**RE: Maine Orthopaedic Center, 1601 Congress Street
Response to Engineering Review**

Dear Sarah:

This letter and enclosures are in response to the review letter, dated June 30, 2004, from Jim Seymour of Sebago Technics, regarding Maine Orthopaedic Center. We have prepared the following responses and plan revisions to address and or clarify the points raised in his correspondence:

1. **Stormwater Management**
 - A. **Treatment of Stormwater Runoff.** A Vortechinics Model 5000 has been selected for treatment of stormwater runoff. Please see attached letter, dated August 18, 2004, from Les Berry, P.E. of BH2M Engineers.
 - B. **New Catch Basin.** The cover of DMH #1 has been converted to a catchbasin grate. Curbing has been added to the plan to direct water toward the proposed CB #7 (formerly DMH #1). A detail for the bituminous curbing has been added to Sheet 3.
 - C. **Level-Lip Spreader.** The level lip-spreader has remained in the same location to avoid crossing the sanitary sewer line. Site grading has been added to Sheet 2. The dimensions, stone size, elevations and the invert are present on Sheet 3. Please see attached letter, dated August 20, 2004, from Les Berry, P.E. of BH2M Engineers stating design size for the level-lip spreader.

D. Roof Drainage. Roof lines have been added to Sheet 2, Site Plan. Water within the flat roof on the eastern side of the addition will be exiting the building through a roof drain into the proposed catchbasin to the east of the addition. The portions of the sloped roof which do not drain onto the flat roof will drain from the eave onto a drip strip and into a foundation drain system. The foundation drain will connect into the existing foundation drain system. A detail for the drip strip and foundation drain have been added to Sheet 3.

3. Utilites

A. Capacity Letter from PWD. We requested a sewer capacity letter from Frank Brancely on July 30, 2004. We will forward this letter as soon as we receive it from Mr. Brancely.

B. Water Service. An additional 6" water line for the sprinkler system has been added to the plan, tapped from the 8" line. The route of this line is within the lawn area so as not to disturb existing pavement or plantings. The domestic water service for the building addition will connect internally through the existing building. Please see Sheet 2 for water line location.

4. Grading and Erosion Control

A. Additional Silt Fence. Silt fence has been added to the area of the site where bituminous curbing has been added to the plan. This silt fence also accounts for the addition of the Vortech unit. Please see Sheet 2 for silt fence location.

5. Water Quality Treatment

A. Treatment of Stormwater Runoff. Please see attached letter from Les Berry, P.E. of BH2M Engineers regarding stormwater quality.

6. General

A. Building Layout. The Existing Conditions Plan is an As-Built Survey, prepared by Pat Cayer, of Land Services Inc. in March of 2004. The 20-foot setback is noted on the plan and the building addition does not violate this setback. Since the Layout Plan has been prepared from

an As-Built Survey, we do not feel that a letter of certification is necessary.

Submission

This submission includes the following information:

1. Cover letter, dated August 30, 2004.
2. Letter from Frank Brancely (forthcoming)
3. Letter from Les Berry, P.E., dated August 20, 2004.
4. Stormwater Calculations, prepared by BH2M Engineers.
5. Two (2) sets of plans (24" x 36")

We trust that the above responses and attached plans and documentation addresses Mr. Seymour's comments. Should you have any questions or require additional information, please do not hesitate to call.

Sincerely,
Mitchell & Associates


John D. Mitchell

Enclosure

cc: Sean T. Hanley, MD – OGH Realty, Inc.
John Whipple – Whipple-Callender Architects

LESTER S. BERRY
WILLIAM A. THOMPSON

TIMOTHY G. BROWN
ROBERT C. LIBBY, Jr.
JOHN D. KUCHINSKI
ANDREW S. MORRELL

August 20, 2004

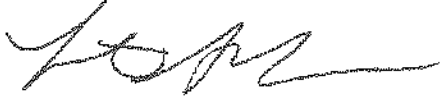
John Mitchell
Mitchell & Associates
70 Center Street
Portland, ME 04101

RE: Maine Orthopaedic Center
1601 Congress Street
Portland, ME 04102

Dear John:

In accordance with Chapter 500, State Stormwater Law, level spreaders are sized at 0.25 c.f.s. per linear foot for a 10-year storm. Your proposed level spreader has a drainage area of 9,600 s.f. and a peak 10-year storm (4.7 inches of rain) flow of 1.58 c.f.s. This requires just over six feet of level spreader. Therefore, we recommend that you design the level spreader eight-feet long.

Sincerely,



Lester Berry, P.E.

MitchellOrthoSpreader

August 18, 2004

John Mitchell
Mitchell & Associates
70 Center Street
Portland, ME 04101

RE: Maine Orthopaedic Center
1601 Congress Street
Portland, ME 04102

Dear John:

As requested, we have calculated the stormwater flows to size a Vortechnic structure to meet the needs of the Congress Street project. Utilizing your "Site Plan", the results for the flow from the DMH#1 to the proposed Vortechnic structure are as follows:

1-Year Storm (2.50") = 3.50 cfs

25-Year Storm (5.50") = 7.82 cfs

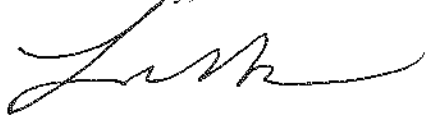
*See the 1-year & 25-year summary in the attached calculations.

The 1- year storm is the treatment design storm and the 25-year storm is the peak capacity storm. The above flow rates were discussed with Vortechnic (Jeremy) and the following option is recommended for 50% treatment:

Vortechnic Model 5000

I believe that this model is satisfactory for Portland Site Plan Standards. The physical layout of the model can be found and downloaded from the Vortechnic web site.

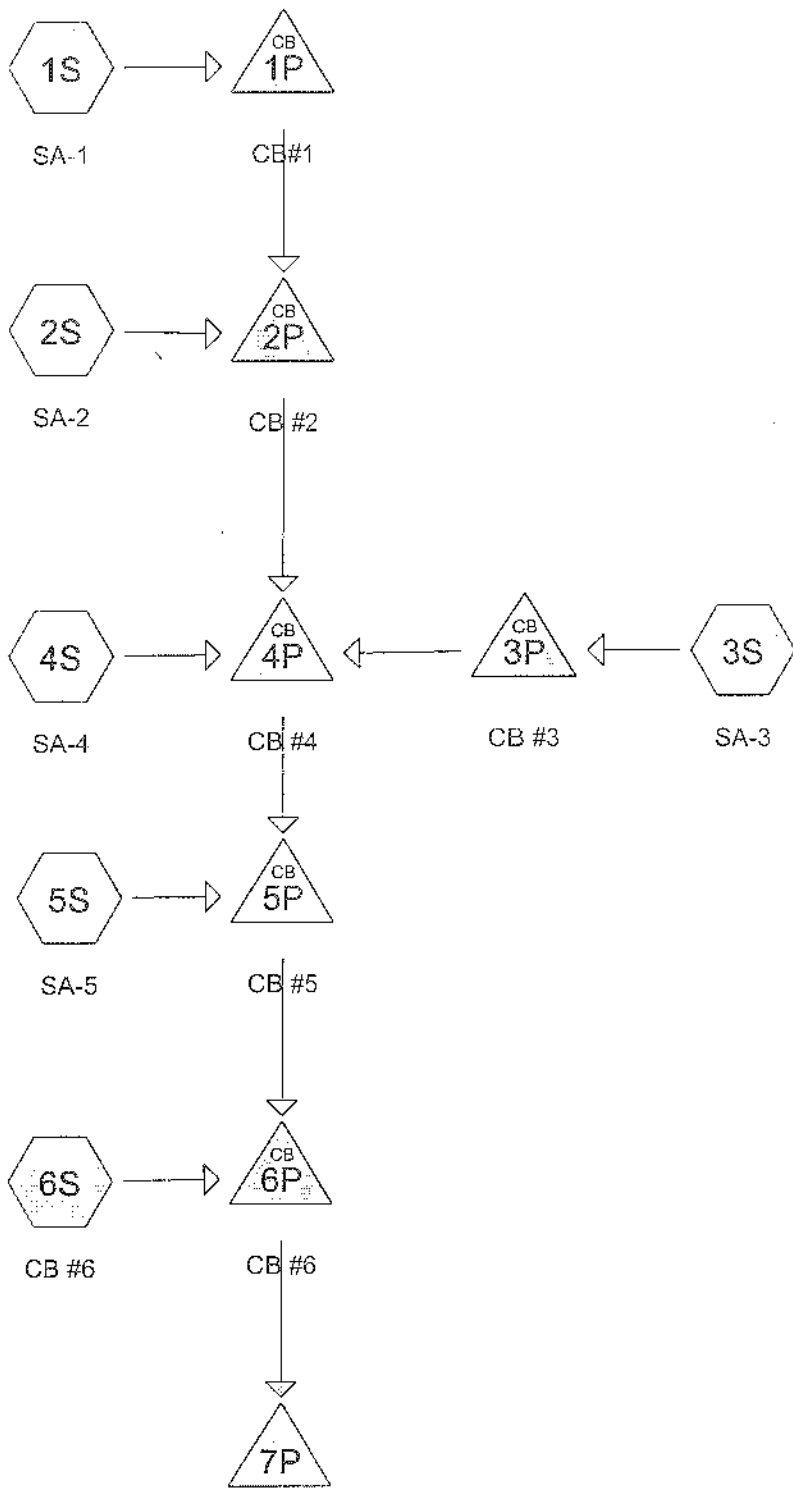
Sincerely,



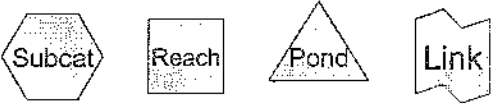
Lester Berry, P.E.

Attachments: 1-Year Storm Calculations
25-Year Storm Calculation
Standard Detail Model 5000
Vortechnic Treatment Efficiency Calculations

MitchellOrthoCalcs



VORTECHNICS UNIT



Drainage Diagram for Addition to Center 1yr storm 12 in. pipe
 Prepared by BH2M Engineers 8/17/04
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Addition to Center 1yr storm 12 in. pipe

Type II 24-hr Rainfall=2.50"

Prepared by BH2M Engineers

Page 1

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Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points

Runoff by SCS TR-20 method, UH=SCS

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

Subcatchment 1S: SA-1	Runoff Area=9,400 sf Runoff Depth=2.11" Flow Length=200' Tc=2.4 min CN=98 Runoff=0.79 cfs 0.038 af
Subcatchment 2S: SA-2	Runoff Area=12,800 sf Runoff Depth=2.11" Flow Length=370' Tc=4.1 min CN=98 Runoff=1.08 cfs 0.052 af
Subcatchment 3S: SA-3	Runoff Area=10,400 sf Runoff Depth=2.11" Flow Length=395' Tc=7.3 min CN=98 Runoff=0.79 cfs 0.042 af
Subcatchment 4S: SA-4	Runoff Area=6,400 sf Runoff Depth=2.11" Flow Length=260' Tc=3.3 min CN=98 Runoff=0.55 cfs 0.026 af
Subcatchment 5S: SA-5	Runoff Area=4,050 sf Runoff Depth=2.11" Flow Length=950' Tc=11.3 min CN=98 Runoff=0.27 cfs 0.016 af
Subcatchment 6S: CB #6	Runoff Area=5,200 sf Runoff Depth=2.11" Flow Length=1,550' Tc=19.9 min CN=98 Runoff=0.27 cfs 0.021 af
Pond 1P: CB#1	Peak Elev=48.61' Inflow=0.79 cfs 0.038 af 12.0" x 38.0' Culvert Outflow=0.79 cfs 0.038 af
Pond 2P: CB #2	Peak Elev=47.87' Inflow=1.87 cfs 0.090 af 12.0" x 100.0' Culvert Outflow=1.87 cfs 0.090 af
Pond 3P: CB #3	Peak Elev=42.94' Inflow=0.79 cfs 0.042 af 12.0" x 20.0' Culvert Outflow=0.79 cfs 0.042 af
Pond 4P: CB #4	Peak Elev=43.89' Inflow=3.14 cfs 0.157 af 12.0" x 100.0' Culvert Outflow=3.14 cfs 0.157 af
Pond 5P: CB #5	Peak Elev=38.26' Inflow=3.35 cfs 0.174 af 12.0" x 20.0' Culvert Outflow=3.35 cfs 0.174 af
Pond 6P: CB #6	Peak Elev=37.93' Inflow=3.50 cfs 0.195 af 12.0" x 20.0' Culvert Outflow=3.50 cfs 0.195 af
Pond 7P: VORTECHNICS UNIT	Inflow=3.50 cfs 0.195 af Primary=3.50 cfs 0.195 af

Total Runoff Area = 1.108 ac Runoff Volume = 0.195 af Average Runoff Depth = 2.11"

Addition to Center 1yr storm 12 in. pipe

Type II 24-hr Rainfall=2.50"

Prepared by BH2M Engineers

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Subcatchment 1S: SA-1

[49] Hint: Tc<2dt may require smaller dt

Runoff = 0.79 cfs @ 11.92 hrs, Volume= 0.038 af, Depth= 2.11"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=2.50"

Area (sf)	CN	Description
9,400	98	Paved parking & roofs

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.3	150	0.0120	1.1		Sheet Flow, PAVED Smooth surfaces n= 0.011 P2= 2.50"
0.1	50	0.0760	5.6		Shallow Concentrated Flow, PAVEMENT Paved Kv= 20.3 fps
2.4	200	Total			

Subcatchment 2S: SA-2

[49] Hint: Tc<2dt may require smaller dt

Runoff = 1.08 cfs @ 11.94 hrs, Volume= 0.052 af, Depth= 2.11"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=2.50"

Area (sf)	CN	Description
12,800	98	Paved parking & roofs

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0	150	0.0066	0.8		Sheet Flow, PAVEMENT Smooth surfaces n= 0.011 P2= 2.50"
1.1	220	0.0260	3.3		Shallow Concentrated Flow, PVMT Paved Kv= 20.3 fps
4.1	370	Total			

Subcatchment 3S: SA-3

Runoff = 0.79 cfs @ 11.98 hrs, Volume= 0.042 af, Depth= 2.11"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=2.50"

Area (sf)	CN	Description
10,400	98	Paved parking & roofs

Addition to Center 1yr storm 12 in. pipe

Type II 24-hr Rainfall=2.50"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.3	150	0.0010	0.4		Sheet Flow, PAVMENT Smooth surfaces n= 0.011 P2= 2.50"
1.0	245	0.0388	4.0		Shallow Concentrated Flow, PVMT Paved Kv= 20.3 fps
7.3	395	Total			

Subcatchment 4S: SA-4

[49] Hint: Tc<2dt may require smaller dt

Runoff = 0.55 cfs @ 11.93 hrs, Volume= 0.026 af, Depth= 2.11"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Type II 24-hr Rainfall=2.50"

Area (sf)	CN	Description
6,400	98	Paved parking & roofs

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.9	150	0.0070	0.9		Sheet Flow, PAVED Smooth surfaces n= 0.011 P2= 2.50"
0.4	110	0.0500	4.5		Shallow Concentrated Flow, PVMT Paved Kv= 20.3 fps
3.3	260	Total			

Subcatchment 5S: SA-5

Runoff = 0.27 cfs @ 12.02 hrs, Volume= 0.016 af, Depth= 2.11"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Type II 24-hr Rainfall=2.50"

Area (sf)	CN	Description
4,050	98	Paved parking & roofs

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.4	150	0.0047	0.7		Sheet Flow, PAVED Smooth surfaces n= 0.011 P2= 2.50"
7.9	800	0.0069	1.7		Shallow Concentrated Flow, PAVED Paved Kv= 20.3 fps
11.3	950	Total			

Addition to Center 1yr storm 12 in. pipe

Type II 24-hr Rainfall=2.50"

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Subcatchment 6S: CB #6

Runoff = 0.27 cfs @ 12.11 hrs, Volume= 0.021 af, Depth= 2.11"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=2.50"

Area (sf)	CN	Description
5,200	98	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0	150	0.0066	0.8		Sheet Flow, PAVED Smooth surfaces n= 0.011 P2= 2.50"
16.9	1,400	0.0046	1.4		Shallow Concentrated Flow, PVMT Paved Kv= 20.3 fps
19.9	1,550	Total			

Pond 1P: CB#1

[82] Warning: Early inflow requires earlier time span

[57] Hint: Peaked at 48.61' (Flood elevation advised)

Inflow Area = 0.216 ac, Inflow Depth = 2.11"
 Inflow = 0.79 cfs @ 11.92 hrs, Volume= 0.038 af
 Outflow = 0.79 cfs @ 11.92 hrs, Volume= 0.038 af, Atten= 0%, Lag= 0.0 min
 Primary = 0.79 cfs @ 11.92 hrs, Volume= 0.038 af

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

Peak Elev= 48.61' @ 11.92 hrs

Plug-Flow detention time= (not calculated: outflow precedes inflow)

Center-of-Mass det. time= (not calculated)

#	Routing	Invert	Outlet Devices
1	Primary	48.09'	12.0" x 38.0' long Culvert CPP, projecting, no headwall, Ke= 0.900 Outlet Invert= 46.98' S= 0.0292 ' n= 0.012 Cc= 0.900

Primary OutFlow Max=0.77 cfs @ 11.92 hrs HW=48.60' (Free Discharge)

1=Culvert (Inlet Controls 0.77 cfs @ 1.9 fps)

Pond 2P: CB #2

[82] Warning: Early inflow requires earlier time span

[57] Hint: Peaked at 47.87' (Flood elevation advised)

[79] Warning: Submerged Pond 1P Primary device # 1 OUTLET by 0.87'

Inflow Area = 0.510 ac, Inflow Depth = 2.11"
 Inflow = 1.87 cfs @ 11.93 hrs, Volume= 0.090 af
 Outflow = 1.87 cfs @ 11.93 hrs, Volume= 0.090 af, Atten= 0%, Lag= 0.0 min
 Primary = 1.87 cfs @ 11.93 hrs, Volume= 0.090 af

Addition to Center 1yr storm 12 in. pipe

Type II 24-hr Rainfall=2.50"

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

Peak Elev= 47.87' @ 11.93 hrs

Plug-Flow detention time= (not calculated: outflow precedes inflow)

Center-of-Mass det. time= (not calculated)

#	Routing	Invert	Outlet Devices
1	Primary	46.98'	12.0" x 100.0' long Culvert CPP, projecting, no headwall, Ke= 0.900 Outlet Invert= 42.29' S= 0.0469 '/' n= 0.012 Cc= 0.900

Primary OutFlow Max=1.79 cfs @ 11.93 hrs HW=47.84' (Free Discharge)

↑1=Culvert (Inlet Controls 1.79 cfs @ 2.5 fps)

Pond 3P: CB #3

[82] Warning: Early inflow requires earlier time span

[57] Hint: Peaked at 42.94' (Flood elevation advised)

Inflow Area = 0.239 ac, Inflow Depth = 2.11"
 Inflow = 0.79 cfs @ 11.98 hrs, Volume= 0.042 af
 Outflow = 0.79 cfs @ 11.98 hrs, Volume= 0.042 af, Atten= 0%, Lag= 0.0 min
 Primary = 0.79 cfs @ 11.98 hrs, Volume= 0.042 af

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

Peak Elev= 42.94' @ 11.98 hrs

Plug-Flow detention time= (not calculated: outflow precedes inflow)

Center-of-Mass det. time= (not calculated)

#	Routing	Invert	Outlet Devices
1	Primary	42.31'	12.0" x 20.0' long Culvert CPP, projecting, no headwall, Ke= 0.900 Outlet Invert= 42.29' S= 0.0010 '/' n= 0.012 Cc= 0.900

Primary OutFlow Max=0.76 cfs @ 11.98 hrs HW=42.93' (Free Discharge)

↑1=Culvert (Barrel Controls 0.76 cfs @ 2.1 fps)

Pond 4P: CB #4

[82] Warning: Early inflow requires earlier time span

[57] Hint: Peaked at 43.89' (Flood elevation advised)

[79] Warning: Submerged Pond 2P Primary device # 1 OUTLET by 1.59'

[81] Warning: Exceeded Pond 3P by 0.95' @ 11.95 hrs

Inflow Area = 0.895 ac, Inflow Depth = 2.11"
 Inflow = 3.14 cfs @ 11.94 hrs, Volume= 0.157 af
 Outflow = 3.14 cfs @ 11.94 hrs, Volume= 0.157 af, Atten= 0%, Lag= 0.0 min
 Primary = 3.14 cfs @ 11.94 hrs, Volume= 0.157 af

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

Peak Elev= 43.89' @ 11.94 hrs

Plug-Flow detention time= (not calculated: outflow precedes inflow)

Center-of-Mass det. time= (not calculated)

Addition to Center 1yr storm 12 in. pipe

Type II 24-hr Rainfall=2.50"

Prepared by BH2M Engineers

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#	Routing	Invert	Outlet Devices
1	Primary	42.29'	12.0" x 100.0' long Culvert CPP, projecting, no headwall, Ke= 0.900 Outlet Invert= 36.51' S= 0.0578 '/' n= 0.012 Cc= 0.900

Primary OutFlow Max=3.04 cfs @ 11.94 hrs HW=43.83' (Free Discharge)

↑1=Culvert (Inlet Controls 3.04 cfs @ 3.9 fps)

Pond 5P: CB #5

- [82] Warning: Early inflow requires earlier time span
- [57] Hint: Peaked at 38.26' (Flood elevation advised)
- [79] Warning: Submerged Pond 4P Primary device # 1 OUTLET by 1.75'

Inflow Area = 0.988 ac, Inflow Depth = 2.11"
 Inflow = 3.35 cfs @ 11.94 hrs, Volume= 0.174 af
 Outflow = 3.35 cfs @ 11.94 hrs, Volume= 0.174 af, Atten= 0%, Lag= 0.0 min
 Primary = 3.35 cfs @ 11.94 hrs, Volume= 0.174 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 38.26' @ 11.94 hrs
 Plug-Flow detention time= (not calculated: outflow precedes inflow)
 Center-of-Mass det. time= (not calculated)

#	Routing	Invert	Outlet Devices
1	Primary	36.51'	12.0" x 20.0' long Culvert CPP, projecting, no headwall, Ke= 0.900 Outlet Invert= 36.09' S= 0.0210 '/' n= 0.012 Cc= 0.900

Primary OutFlow Max=3.27 cfs @ 11.94 hrs HW=38.21' (Free Discharge)

↑1=Culvert (Inlet Controls 3.27 cfs @ 4.2 fps)

Pond 6P: CB #6

- [82] Warning: Early inflow requires earlier time span
- [57] Hint: Peaked at 37.93' (Flood elevation advised)
- [79] Warning: Submerged Pond 5P Primary device # 1 INLET by 1.42'

Inflow Area = 1.108 ac, Inflow Depth = 2.11"
 Inflow = 3.50 cfs @ 11.94 hrs, Volume= 0.195 af
 Outflow = 3.50 cfs @ 11.94 hrs, Volume= 0.195 af, Atten= 0%, Lag= 0.0 min
 Primary = 3.50 cfs @ 11.94 hrs, Volume= 0.195 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 37.93' @ 11.94 hrs
 Plug-Flow detention time= (not calculated: outflow precedes inflow)
 Center-of-Mass det. time= (not calculated)

#	Routing	Invert	Outlet Devices
1	Primary	36.06'	12.0" x 20.0' long Culvert CPP, projecting, no headwall, Ke= 0.900 Outlet Invert= 34.11' S= 0.0975 '/' n= 0.012 Cc= 0.900

Addition to Center 1yr storm 12 in. pipe

Type II 24-hr Rainfall=2.50"

Prepared by BH2M Engineers

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Primary OutFlow Max=3.44 cfs @ 11.94 hrs HW=37.89' (Free Discharge)

↑-1=Culvert (Inlet Controls 3.44 cfs @ 4.4 fps)

Pond 7P: VORTECHNICS UNIT

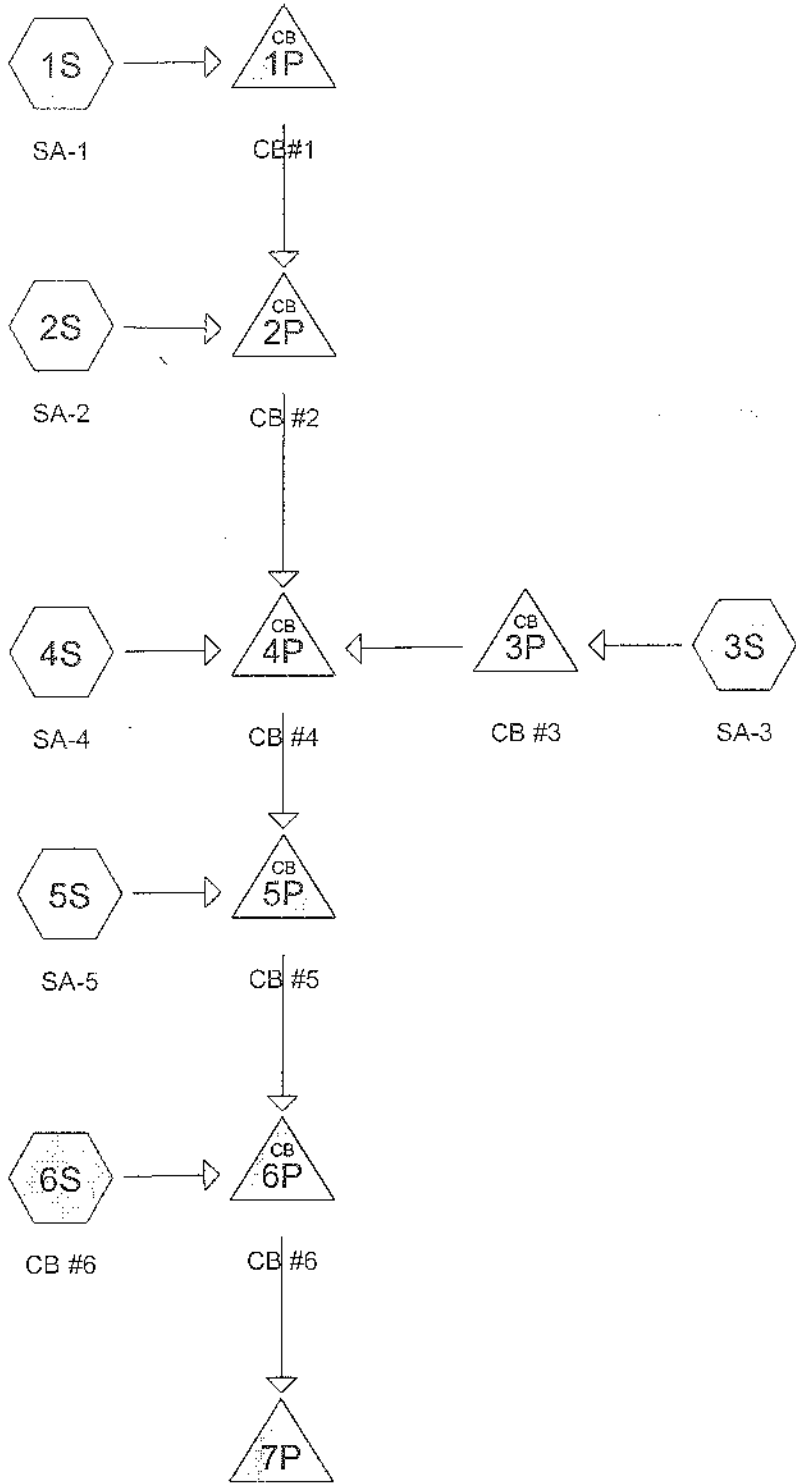
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.108 ac, Inflow Depth = 2.11"

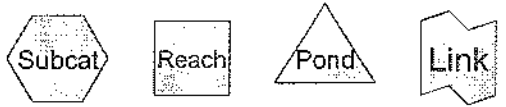
Inflow = 3.50 cfs @ 11.94 hrs, Volume= 0.195 af

Primary = 3.50 cfs @ 11.94 hrs, Volume= 0.195 af, Atten= 0%, Lag= 0.0 min

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



VORTECHNICS UNIT



Drainage Diagram for Addition to Center 25yr storm 12 in. pipe
 Prepared by BH2M Engineers 8/17/04
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Addition to Center 25yr storm 12 in. pipe

Type II 24-hr Rainfall=5.50"

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Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points

Runoff by SCS TR-20 method, UH=SCS

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

Subcatchment 1S: SA-1	Runoff Area=9,400 sf Runoff Depth=4.82" Flow Length=200' Tc=2.4 min CN=98 Runoff=1.76 cfs 0.087 af
Subcatchment 2S: SA-2	Runoff Area=12,800 sf Runoff Depth=4.82" Flow Length=370' Tc=4.1 min CN=98 Runoff=2.40 cfs 0.118 af
Subcatchment 3S: SA-3	Runoff Area=10,400 sf Runoff Depth=4.82" Flow Length=395' Tc=7.3 min CN=98 Runoff=1.77 cfs 0.096 af
Subcatchment 4S: SA-4	Runoff Area=6,400 sf Runoff Depth=4.82" Flow Length=260' Tc=3.3 min CN=98 Runoff=1.22 cfs 0.059 af
Subcatchment 5S: SA-5	Runoff Area=4,050 sf Runoff Depth=4.82" Flow Length=950' Tc=11.3 min CN=98 Runoff=0.61 cfs 0.037 af
Subcatchment 6S: CB #6	Runoff Area=5,200 sf Runoff Depth=4.82" Flow Length=1,550' Tc=19.9 min CN=98 Runoff=0.61 cfs 0.048 af
Pond 1P: CB#1	Peak Elev=48.94' Inflow=1.76 cfs 0.087 af 12.0" x 38.0' Culvert Outflow=1.76 cfs 0.087 af
Pond 2P: CB #2	Peak Elev=49.34' Inflow=4.17 cfs 0.205 af 12.0" x 100.0' Culvert Outflow=4.17 cfs 0.205 af
Pond 3P: CB #3	Peak Elev=43.32' Inflow=1.77 cfs 0.096 af 12.0" x 20.0' Culvert Outflow=1.77 cfs 0.096 af
Pond 4P: CB #4	Peak Elev=48.22' Inflow=7.00 cfs 0.360 af 12.0" x 100.0' Culvert Outflow=7.00 cfs 0.360 af
Pond 5P: CB #5	Peak Elev=43.26' Inflow=7.47 cfs 0.397 af 12.0" x 20.0' Culvert Outflow=7.47 cfs 0.397 af
Pond 6P: CB #6	Peak Elev=43.41' Inflow=7.82 cfs 0.445 af 12.0" x 20.0' Culvert Outflow=7.82 cfs 0.445 af
Pond 7P: VORTECHNICS UNIT	Inflow=7.82 cfs 0.445 af Primary=7.82 cfs 0.445 af

Total Runoff Area = 1.108 ac Runoff Volume = 0.445 af Average Runoff Depth = 4.82"

Addition to Center 25yr storm 12 in. pipe

Type II 24-hr Rainfall=5.50"

Prepared by BH2M Engineers

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8/17/04

Subcatchment 1S: SA-1

Runoff = 1.76 cfs @ 11.92 hrs, Volume= 0.087 af, Depth= 4.82"

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

Area (sf)	CN	Description
9,400	98	Paved parking & roofs

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.3	150	0.0120	1.1		Sheet Flow, PAVED Smooth surfaces n= 0.011 P2= 2.50"
0.1	50	0.0760	5.6		Shallow Concentrated Flow, PAVEMENT Paved Kv= 20.3 fps
2.4	200	Total			

Subcatchment 2S: SA-2

Runoff = 2.40 cfs @ 11.94 hrs, Volume= 0.118 af, Depth= 4.82"

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

Area (sf)	CN	Description
12,800	98	Paved parking & roofs

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0	150	0.0066	0.8		Sheet Flow, PAVEMENT Smooth surfaces n= 0.011 P2= 2.50"
1.1	220	0.0260	3.3		Shallow Concentrated Flow, PVMT Paved Kv= 20.3 fps
4.1	370	Total			

Subcatchment 3S: SA-3

Runoff = 1.77 cfs @ 11.98 hrs, Volume= 0.096 af, Depth= 4.82"

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

Area (sf)	CN	Description
10,400	98	Paved parking & roofs

Addition to Center 25yr storm 12 in. pipe

Type II 24-hr Rainfall=5.50"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.3	150	0.0010	0.4		Sheet Flow, PAVMENT Smooth surfaces n= 0.011 P2= 2.50"
1.0	245	0.0388	4.0		Shallow Concentrated Flow, PVMT Paved Kv= 20.3 fps
7.3	395	Total			

Subcatchment 4S: SA-4

Runoff = 1.22 cfs @ 11.93 hrs, Volume= 0.059 af, Depth= 4.82"

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

Area (sf)	CN	Description
6,400	98	Paved parking & roofs

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.9	150	0.0070	0.9		Sheet Flow, PAVED Smooth surfaces n= 0.011 P2= 2.50"
0.4	110	0.0500	4.5		Shallow Concentrated Flow, PVMT Paved Kv= 20.3 fps
3.3	260	Total			

Subcatchment 5S: SA-5

Runoff = 0.61 cfs @ 12.02 hrs, Volume= 0.037 af, Depth= 4.82"

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

Area (sf)	CN	Description
4,050	98	Paved parking & roofs

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.4	150	0.0047	0.7		Sheet Flow, PAVED Smooth surfaces n= 0.011 P2= 2.50"
7.9	800	0.0069	1.7		Shallow Concentrated Flow, PAVED Paved Kv= 20.3 fps
11.3	950	Total			

Addition to Center 25yr storm 12 in. pipe

Type II 24-hr Rainfall=5.50"

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8/17/04

Subcatchment 6S: CB #6

Runoff = 0.61 cfs @ 12.11 hrs, Volume= 0.048 af, Depth= 4.82"

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

Area (sf)	CN	Description
5,200	98	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0	150	0.0066	0.8		Sheet Flow, PAVED Smooth surfaces n= 0.011 P2= 2.50"
16.9	1,400	0.0046	1.4		Shallow Concentrated Flow, PVMT Paved Kv= 20.3 fps
19.9	1,550	Total			

Pond 1P: CB#1

Inflow Area = 0.216 ac, Inflow Depth = 4.82"
 Inflow = 1.76 cfs @ 11.92 hrs, Volume= 0.087 af
 Outflow = 1.76 cfs @ 11.92 hrs, Volume= 0.087 af, Atten= 0%, Lag= 0.0 min
 Primary = 1.76 cfs @ 11.92 hrs, Volume= 0.087 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 48.94' @ 11.92 hrs
 Plug-Flow detention time= (not calculated: outflow precedes inflow)
 Center-of-Mass det. time= (not calculated)

#	Routing	Invert	Outlet Devices
1	Primary	48.09'	12.0" x 38.0' long Culvert CPP, projecting, no headwall, Ke= 0.900 Outlet Invert= 46.98' S= 0.0292 ' n= 0.012 Cc= 0.900

Primary OutFlow Max=1.71 cfs @ 11.92 hrs HW=48.92' (Free Discharge)
 1=Culvert (Inlet Controls 1.71 cfs @ 2.5 fps)

Pond 2P: CB #2

Inflow Area = 0.510 ac, Inflow Depth = 4.82"
 Inflow = 4.17 cfs @ 11.93 hrs, Volume= 0.205 af
 Outflow = 4.17 cfs @ 11.93 hrs, Volume= 0.205 af, Atten= 0%, Lag= 0.0 min
 Primary = 4.17 cfs @ 11.93 hrs, Volume= 0.205 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 49.34' @ 11.94 hrs
 Plug-Flow detention time= (not calculated: outflow precedes inflow)
 Center-of-Mass det. time= (not calculated)

Addition to Center 25yr storm 12 in. pipe

Type II 24-hr Rainfall=5.50"

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#	Routing	Invert	Outlet Devices
1	Primary	46.98'	12.0" x 100.0' long Culvert CPP, projecting, no headwall, Ke= 0.900 Outlet Invert= 42.29' S= 0.0469 '/' n= 0.012 Cc= 0.900

Primary OutFlow Max=3.98 cfs @ 11.93 hrs HW=49.26' (Free Discharge)

↑1=Culvert (Inlet Controls 3.98 cfs @ 5.1 fps)

Pond 3P: CB #3

Inflow Area = 0.239 ac, Inflow Depth = 4.82"
 Inflow = 1.77 cfs @ 11.98 hrs, Volume= 0.096 af
 Outflow = 1.77 cfs @ 11.98 hrs, Volume= 0.096 af, Atten= 0%, Lag= 0.0 min
 Primary = 1.77 cfs @ 11.98 hrs, Volume= 0.096 af

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

Peak Elev= 43.32' @ 11.98 hrs

Plug-Flow detention time= (not calculated: outflow precedes inflow)

Center-of-Mass det. time= (not calculated)

#	Routing	Invert	Outlet Devices
1	Primary	42.31'	12.0" x 20.0' long Culvert CPP, projecting, no headwall, Ke= 0.900 Outlet Invert= 42.29' S= 0.0010 '/' n= 0.012 Cc= 0.900

Primary OutFlow Max=1.70 cfs @ 11.98 hrs HW=43.30' (Free Discharge)

↑1=Culvert (Barrel Controls 1.70 cfs @ 2.7 fps)

Pond 4P: CB #4

Inflow Area = 0.895 ac, Inflow Depth = 4.82"
 Inflow = 7.00 cfs @ 11.94 hrs, Volume= 0.360 af
 Outflow = 7.00 cfs @ 11.94 hrs, Volume= 0.360 af, Atten= 0%, Lag= 0.0 min
 Primary = 7.00 cfs @ 11.94 hrs, Volume= 0.360 af

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

Peak Elev= 48.22' @ 11.94 hrs

Plug-Flow detention time= (not calculated: outflow precedes inflow)

Center-of-Mass det. time= (not calculated)

#	Routing	Invert	Outlet Devices
1	Primary	42.29'	12.0" x 100.0' long Culvert CPP, projecting, no headwall, Ke= 0.900 Outlet Invert= 36.51' S= 0.0578 '/' n= 0.012 Cc= 0.900

Primary OutFlow Max=6.79 cfs @ 11.94 hrs HW=47.97' (Free Discharge)

↑1=Culvert (Inlet Controls 6.79 cfs @ 8.6 fps)

Addition to Center 25yr storm 12 in. pipe

Type II 24-hr Rainfall=5.50"

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Pond 5P: CB #5

Inflow Area = 0.988 ac, Inflow Depth = 4.82"
 Inflow = 7.47 cfs @ 11.94 hrs, Volume= 0.397 af
 Outflow = 7.47 cfs @ 11.94 hrs, Volume= 0.397 af, Atten= 0%, Lag= 0.0 min
 Primary = 7.47 cfs @ 11.94 hrs, Volume= 0.397 af

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

Peak Elev= 43.26' @ 11.94 hrs

Plug-Flow detention time= (not calculated: outflow precedes inflow)

Center-of-Mass det. time= (not calculated)

#	Routing	Invert	Outlet Devices
1	Primary	36.51'	12.0" x 20.0' long Culvert CPP, projecting, no headwall, Ke= 0.900 Outlet Invert= 36.09' S= 0.0210 '/' n= 0.012 Cc= 0.900

Primary OutFlow Max=7.30 cfs @ 11.94 hrs HW=42.99' (Free Discharge)

↑1=Culvert (Inlet Controls 7.30 cfs @ 9.3 fps)

Pond 6P: CB #6

Inflow Area = 1.108 ac, Inflow Depth = 4.82"
 Inflow = 7.82 cfs @ 11.94 hrs, Volume= 0.445 af
 Outflow = 7.82 cfs @ 11.94 hrs, Volume= 0.445 af, Atten= 0%, Lag= 0.0 min
 Primary = 7.82 cfs @ 11.94 hrs, Volume= 0.445 af

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

Peak Elev= 43.41' @ 11.94 hrs

Plug-Flow detention time= 0.0 min calculated for 0.445 af (100% of inflow)

Center-of-Mass det. time= (not calculated: outflow precedes inflow)

#	Routing	Invert	Outlet Devices
1	Primary	36.06'	12.0" x 20.0' long Culvert CPP, projecting, no headwall, Ke= 0.900 Outlet Invert= 34.11' S= 0.0975 '/' n= 0.012 Cc= 0.900

Primary OutFlow Max=7.68 cfs @ 11.94 hrs HW=43.18' (Free Discharge)

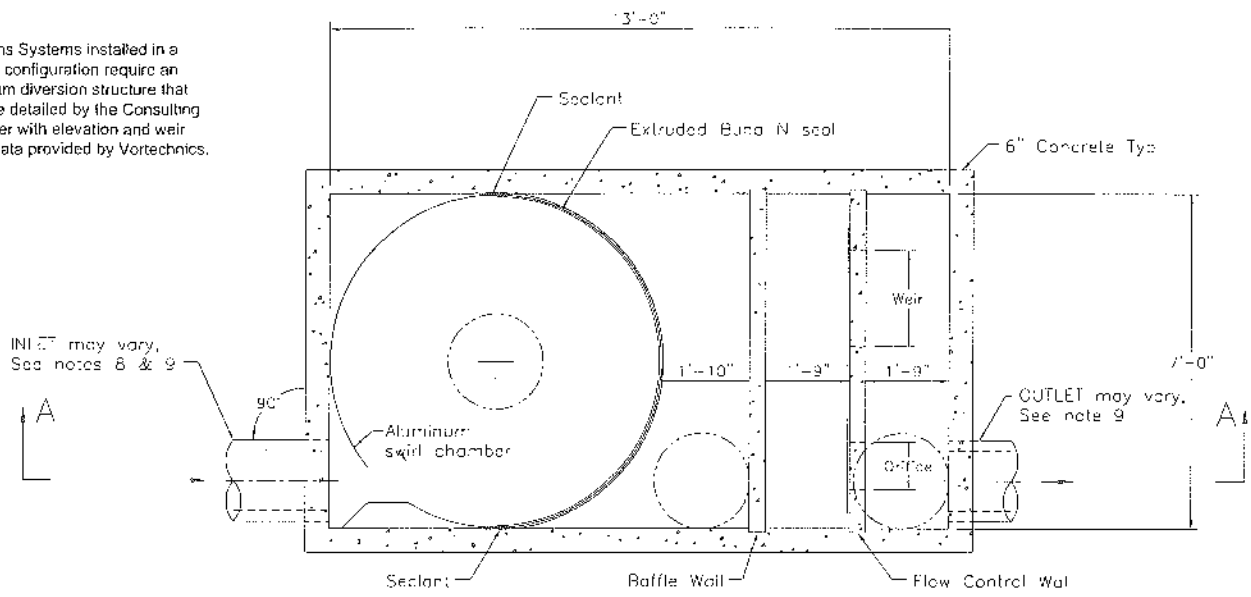
↑1=Culvert (Inlet Controls 7.68 cfs @ 9.8 fps)

Pond 7P: VORTECHNICS UNIT

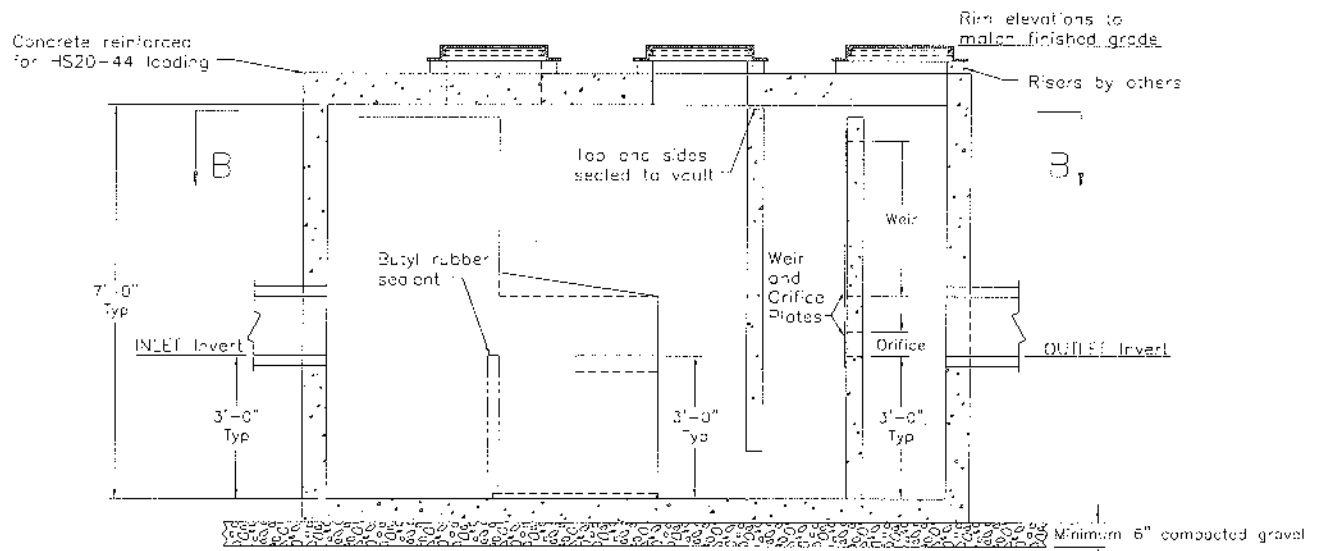
Inflow Area = 1.108 ac, Inflow Depth = 4.82"
 Inflow = 7.82 cfs @ 11.94 hrs, Volume= 0.445 af
 Primary = 7.82 cfs @ 11.94 hrs, Volume= 0.445 af, Atten= 0%, Lag= 0.0 min

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

NOTE:
 Vortechs Systems installed in a bypass configuration require an upstream diversion structure that shall be detailed by the Consulting Engineer with elevation and weir width data provided by Vortechs.



PLAN VIEW B - B



SECTION A - A

NOTES:

1. Stormwater Treatment System (SWTS) shall have:
 Peak treatment capacity: 8.5 cfs
 Sediment storage: 3.25 cu yd
 Sediment chamber dia: 7' min
2. SWTS shall be contained in one rectangular structure
3. SWTS removal efficiency shall be documented based on particle size
4. SWTS shall retain floatables and trapped sediment up to and including peak treatment capacity
5. SWTS inverts in and out shall be at the same elevation
6. SWTS shall not be compromised by effects of downstream tailwater
7. SWTS shall have no internal components that obstruct maintenance access
8. Inlet pipe must be perpendicular to the structure
9. Pipe orientation may vary; see site plan for size and location
10. Purchaser shall not be responsible for assembly of unit
11. Manhole frames and perforated covers supplied with system, not installed
12. Purchaser to prepare excavation and provide crane for off-loading & setting at time of delivery
13. Contact Vortechs @ (207) 885-9830 for ordering information

This CADD file is for the purpose of specifying stormwater treatment equipment to be furnished by Vortechs, Inc. and may only be transferred to other documents exactly as provided by Vortechs. Title block information, excluding the Vortechs logo and the Vortechs Stormwater Treatment System designation and patent number, may be deleted if necessary. Revisions to any part of this CADD file without prior coordination with Vortechs shall be considered unauthorized use of proprietary information.



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 Scarborough, ME 04074
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 Fax: 207-885-9825

**STANDARD DETAIL
 STORMWATER TREATMENT SYSTEM
 VORTECHS® MODEL 5000**

U.S. PATENT No. 5,759,415

PROPRIETARY INFORMATION - NOT TO BE USED FOR CONSTRUCTION PURPOSES

DATE: 09/09/02 SCALE: 1/4" = 1'-0" FILE NAME: STD5K DRAWN BY: DMF CHECKED BY: NDG



VORTECHS SYSTEM NET ANNUAL TSS REMOVAL EFFICIENCY
Maine Orthopaedic Center
Portland, ME
Model 5000
System DMH1

Design Ratio¹ = $\frac{(1.1 \text{ acres}) \times (0.98) \times (449 \text{ gpm/cfs})}{(38.5 \text{ sf})}$ = 12.6

<u>Rainfall Intensity</u> "/hr	<u>Operating Rate</u> ² gpm/sf	<u>% Total Rainfall</u> Volume ³	<u>Rmvl. Effcy</u> ⁴ (%)	<u>Rel. Effcy</u> (%)
0.02	0.3	10.5%	98.0%	10.3%
0.04	0.5	10.4%	98.0%	10.2%
0.06	0.8	11.0%	98.0%	10.7%
0.08	1.0	8.9%	98.0%	8.7%
0.10	1.3	7.7%	98.0%	7.5%
0.12	1.5	5.5%	98.0%	5.4%
0.14	1.8	5.4%	98.0%	5.3%
0.16	2.0	5.2%	97.0%	5.0%
0.18	2.3	4.4%	97.0%	4.3%
0.20	2.5	3.6%	97.0%	3.5%
0.25	3.2	7.1%	95.8%	6.8%
0.35	4.4	7.8%	94.1%	7.4%
0.45	5.7	4.5%	92.6%	4.2%
0.65	8.2	4.3%	88.3%	3.8%
1.00	12.6	2.1%	82.2%	1.8%
1.50	18.9	1.1%	72.3%	0.8%
2.50	31.5	0.5%	56.0%	0.3%

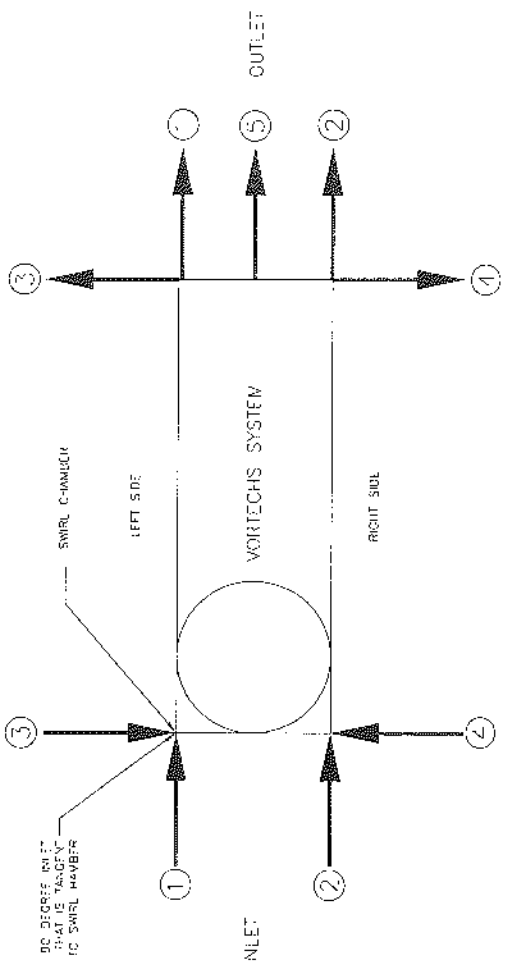
95.9%

% rain falling at >2.5"/hr = 0.0%
 Assumed Removal Efficiency of remaining % = 0.0%
 Removal Efficiency Adjustment⁵ = 0.0%
Net Annual TSS Removal Efficiency = 96%

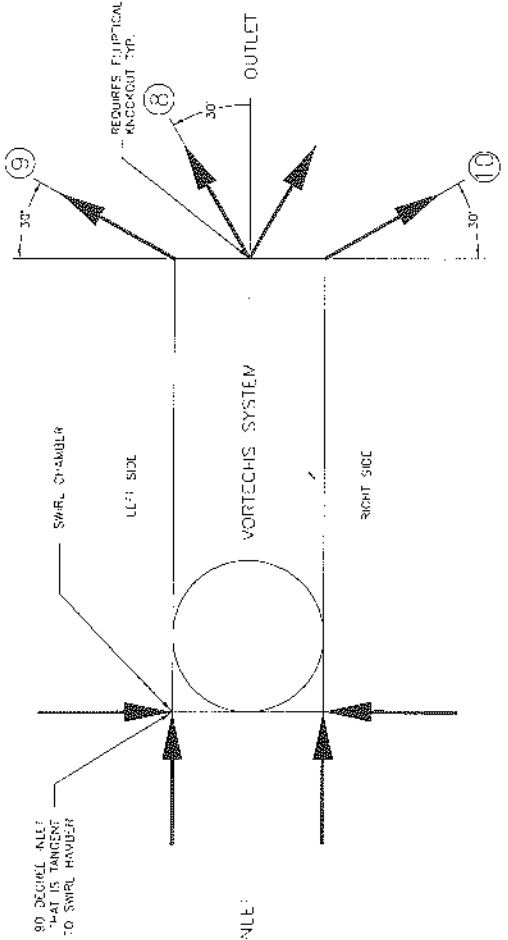
- 1 - Design Ratio = (Total Drainage Area) x (Runoff Coefficient) x (cfs to gpm conversion) / Grit Chamber Area
 - The Total Drainage Area and Runoff Coefficient is specified by the site engineer.
 - The conversion factor from cfs to gpm is 449.
- 2 - Operating Rate (gpm/sf) = intensity ("/hr) x Design Ratio
- 3 - Based on 10 years of rainfall data from NCDC station 6905, Portland Airport, Cumberland County, ME
- 4 - Based on Vortechs laboratory verified removal of 50 micron particles (see Technical Bulletin #1).
- 5- Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.

Calculated by: JAG 8/13/2004

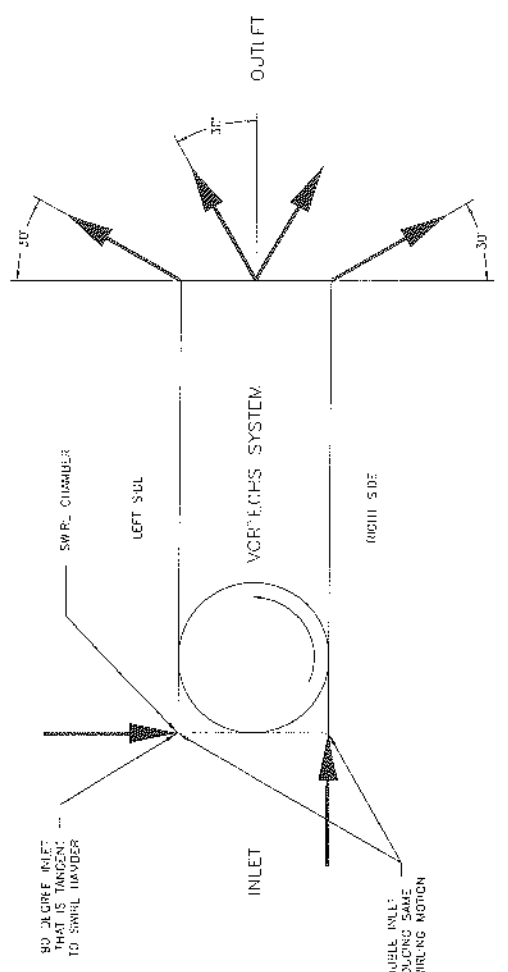
Checked by:



TYPICAL INLET/OUTLET ORIENTATION



ALTERNATIVE INLET/OUTLET ORIENTATION



ALTERNATIVE INLET/OUTLET ORIENTATION

ORIENTATIONS	ABBREVIATIONS	INLET	OUTLET
① LEFT END	LE		
② RIGHT END	RE		
③ LEFT SIDE	LS		
④ RIGHT SIDE	RS		
⑤ CENTER END	CE		
⑥ LEFT END ANGLED	LEA		
⑦ RIGHT END ANGLED	REA		
⑧ CENTER END ANGLED	CEA		
⑨ LEFT SIDE ANGLED	LSA		
⑩ RIGHT SIDE ANGLED	RSA		



PROJECT NAME
 PROJECT LOCATION
 VORTECHS SYSTEM TYPICAL ORIENTATION

From: Gaylen McDougall
To: Sarah Hopkins
Date: 06/28/2004 11:46:35 AM
Subject: 1601 Congress

I met with Ms. Melrose to discuss the required access lane. She stated the contract zone required the buffer zone right where the fire access lane should be. I told her you would have to review the contract for your reading. I told her also that if they sprinklered the complete building I would wave the fire access lane.

Mac