BATES COLLEGE

DINING FACILITY AND WALK

DRAINAGE REPORT NARRATIVE

1.0 PROJECT OVERVIEW

The proposed project consists of an approximately 47,800 square foot Dining Facility, walkway improvements (Bates Walk), and associated site work on a parcel of land owned by Bates College. The parcel is bound on the west by College Street, on the south by Campus Avenue, on the east by Central Avenue, and to the north by Russell Avenue (See Figure 1 – Location Plan). The project site consists of approximately 13.7 acres of existing development and lies within the property lines of Bates College. The proposed development area is accessible by Central Avenue and North Bardwell Street from the north, and a field access road from the south. Andrews Road can also be used to access the site but vehicle access is to be limited as part of the site improvement work. The project site is generally rectangular in shape, with approximately 240 feet of frontage on Central Avenue. The project site lies within the property lines of Bates College and is zoned as an Institutional Office region ("IO"). Construction of the Dining Facility and Bates Walk is scheduled to begin mid-September 2006.

2.0 DESIGN OBJECTIVE AND METHODOLOGY

The proposed drainage design is based on the Maine Department of Environmental Protection (MDEP) Stormwater Management Law. The stormwater management system and associated mitigation plan were designed to achieve two major goals: to maintain or decrease existing peak stormwater flow, and to increase the quality of water joining the existing stormwater systems. Due to an increase in impervious area, flows to the existing stormwater systems would increase without mitigation. Subsurface detention is incorporated into the design to provide the mitigation for the increased stormwater runoff. A Vortechnics® Stormwater Treatment System, grass swales, and catch basins with sumps and hoods are being utilized to improve water quality.

The Natural Resources Conservation Services ("NRCS"), formerly the Soil Conservation Service ("SCS"), Technical Releases No. 20 and 55 (TR-20 and TR-55), were used in the HydroCAD® computer software program to model the hydrology of the project site. This program was used to calculate existing and proposed conditions.

Design criteria included the following:

- The stormwater management system is designed for the 2-, 10-, and 25-year storm event using HydroCAD®, a TR-20 and TR-55 based hydrologic software program.

- Post-development peak discharge runoff rates will not exceed pre-development peak discharge runoff rates for the 2, 10 and 25-year storm event.
- Times of Concentration ("Tc") were arrived at using TR-55 methodologies. Sheet flow lengths of 50-100 feet maximum were used, as appropriate for the Northeast. Minimum Tc is five minutes.
- Group C soils were assumed, in accordance with the NRCS survey of Androscoggin and Sagadahoc Counties, Maine (See Figure 2 – Soil Survey Plan).
- Runoff from most altered driveways and parking areas will now be treated prior to connection to the existing storm drainage system.
- All catch basins have 4-foot sumps and hoods.
- Pipe sizing design is based on flows from the 10-year storm (4.8 inch/hour) using the Rational Method for predicting runoff.
- Minimum pipe size is 12-inches in diameter with the exception of roof leaders and outlet control devices for the subsurface detention systems.
- Pipe velocities are maintained at a minimum of 2 feet per second ("fps") and a maximum of 12 fps.

The following rainfall amounts were used:

Table 1 Type III – 24 Hour Rainfall

Storm Event Type	
2 Year	3.00 Inches
10 Year	4.60 Inches
25 Year	5.40 Inches

Source: NRCS's National Weather and Climate Center

3.0 EXISTING RUNOFF/DRAINAGE CONDITIONS

Existing land use within the project limits consists of asphalt parking areas and walkways, landscaped areas, an asphalt tennis court and an asphalt running track. The topography of the site starts at elevation 258 adjacent to College Street. There is a slight drop in grade along the length of Andrews Road and continues as the road becomes a walkway. The existing elevation at the proposed Dining Facility at the end of the walkway is 252. The low point along the walkway, elevation 238, occurs behind Pettengill Hall. There are slight flooding issues at a low point between Hedge Hall and Roger Williams Hall. This location is within the project site (See Figure 3 – Site Vicinity Plan). The existing elevation at the proposed parking area is 259. A swale occurs between Merrill Gym and the proposed parking location, directing water to the existing stormwater system.

The area of analysis is entirely within the property boundary of Bates College and consists of sub-catchment areas ranging in size from 0.19 acres to 3.53 acres (See Figures 4, 5 and 6 – Existing Conditions Watershed Plans). The majority of the runoff from the proposed Dining Facility and Bates Walk locations is picked up by existing catch basins which drain into Andrews Pond. Andrews Pond is located approximately 650 feet from the proposed Dining Facility location and discharges to the City of Lewiston stormwater system of Russell Street. A small percentage of the site drains to College Street or on to other areas within the Bates property boundary. 0.75 acres from the proposed Dining Facility location drain to catch basins leading to the City of Lewiston's CSO system on Campus Avenue.

Approximately 0.43 acres of stormwater runoff from the proposed parking lot location joins an on-campus stormwater system with underground detention. This system discharges to the City of Lewiston stormwater system on Russell Street. Approximately 0.94 acres join the Russell Street stormwater system through a separate collection system with no detention. The remaining 0.17 acres in the proposed parking lot location drain to the abutting property.

For stormwater analysis purposes, the existing drainage conditions were divided into three areas: the proposed Bates Walk location, the proposed Dining Facility location, and the proposed parking lot location. Eight (8) points of analysis were used to determine existing flows from these three sites.

For this analysis, conservative assumptions for the existing campus systems had to be made. Because flow information for this existing system was not available, we assumed all pipe sizes were adequate to handle the existing stormwater runoff, but could not handle an increase in peak flow. We also assumed all locations with field underdrainage would join the stormwater system through overland runoff, rather than by infiltration to the underdrain pipes, increasing the peak flow estimate for the given point of analysis.

The project site lies outside flood zones in the City of Lewiston resulting in no floodplain encroachments (See Figure 7 – Flood Insurance Rate Map). It does not lie in the watershed of a Lake Most at Risk From Development, or a Sensitive or Threatened Region or Watershed. Therefore, stormwater quality standards issued by the MDEP do not apply. These standards, however, were still met with the proposed stormwater system.

DINING FACILITY – FIGURE 4

Study Point #1 (POA #1):

This study point takes the discharge from the existing watersheds labeled E-1, E-2 and E-5 at the proposed Dining Facility. This point of analysis connects into a system leading to Andrews Pond. The abutting subcatchement, E-3, joins the existing track underdrainage system which eventually discharges in Andrews Pond and therefore is not included in POA #1.

Study Point #2 (POA #2):

This study point takes the discharge from the existing watershed labeled E-4 at the proposed Dining Facility and discharges into the existing on-campus system that connects to the existing CSO system in Campus Avenue.

Study Point #3 (POA #3):

Study point #3 is at the discharge point in Andrews Pond. Multiple stormwater systems within the boundary of the work related to the proposed Dining Facility discharge to the pond. This point of analysis will provide an overall analysis of how the work related to the Dining Facility is functioning as a whole. The Andrews Pond point of analysis for the Dining Facility is independent of that used for analyzing the proposed Bates Walk stormwater system.

BATES WALK – FIGURE 5

Study Point #4 (POA #4):

This study point takes the discharge from the existing watersheds labeled E-12 and E-13 at the proposed Bates Walk location. This point discharges into Andrews Pond.

Study Point #5 (POA #5):

This study point takes the discharge from the existing watersheds labeled E-14 through E-18 at the proposed Bates Walk location. This system joins the existing system from the proposed Dining

Facility location and discharges to Andrews Pond. This system consists of both catch basin and roof leader discharge.

Study Point #6 (POA #6):

Study point #6 is Andrews Pond. This point includes all systems from the proposed Bates Walk location and is independent of the proposed Dining Facility systems.

PARKING AREA (DINING FACILITY PROJECT) – FIGURE 6

Study Point #7 (POA #7):

This study point takes the discharge from the existing watersheds labeled E-7 and E-8 at the proposed parking lot location. This point joins the existing stormwater system that discharges into the City of Lewiston stormwater system.

Study Point #8 (POA #8):

This study point takes the discharge from the existing watershed labeled E-9 at the proposed parking lot location. This system enters an existing underground detention system and eventually discharges to the City of Lewiston stormwater system.

4.0 PROPOSED RUNOFF/DRAINAGE CONDITIONS

The proposed site will consist of a new 47,800 square foot building, new landscaping including areas of peastone, lawn and tree planting, new asphalt walkways, and a new parking area. The site work will also include the removal of the asphalt running track.

At the Dining Facility location, the proposed roof runoff will be routed into a new subsurface detention basin. Stormwater runoff quality will be maintained for a large portion of the remaining increased impervious area by a Vortechnics© Stormwater Treatment System. The majority of stormwater runoff on Bates Walk will also be routed into a subsurface detention system before being released to Andrews Pond. The parking lot will also have subsurface detention to mitigate for an increase in impervious area and grass swales will be implemented to direct the stormwater runoff to area drains. Catch basins with sumps and hoods will also be used at all locations to improve water quality.

As recommended by the Geotechnical Engineer for this project, existing soil conditions will prohibit the use of soil infiltration (See Appendix E). Therefore, the detention basin has been designed for zero infiltration. However, there is likely to be some infiltration in the new subdetention basins.

A hydrologic study of the site was conducted in order to determine the impact of the proposed development on stormwater runoff in comparison to the existing conditions. The study determined the rates of runoff at the outlined points of analysis (POA) discussed in the existing conditions analysis (See Figures 8, 9, and 10 – Proposed Conditions Watershed Plans).

DINING FACILITY – FIGURE 8

Study Point #1 (POA #1):

This study point takes the discharge from the proposed watersheds labeled P-1 through P-3, P-5, P-6, and P-17 at the proposed Dining Facility. This point of analysis connects into a system leading to Andrews Pond. The abutting subcatchement, P-7, is captured by the existing athletic field

underdrainage system which eventually discharges in Andrews Pond and therefore is not included in POA #1.

Study Point #2 (POA #2):

This study point takes the discharge from the proposed watersheds labeled P-4 and P-16 at the proposed Dining Facility and discharges into the existing on campus system that then connects to the existing CSO system in Campus Avenue. Stormwater from P-16 is routed through a Vortechnics® water quality system before joining the existing stormwater structures.

Study Point #3 (POA #3):

Study point #3 is at the discharge point in Andrews Pond. The Andrews Pond point of analysis for the Dining Facility is independent of that used for analyzing the proposed Bates Walk stormwater system.

BATES WALK – FIGURE 9

Study Point #4 (POA #4):

This study point takes the discharge from the proposed watersheds labeled P-21 and P-22 at the proposed Bates Walk location. This point discharges into Andrews Pond.

Study Point #5 (POA #5):

The proposed watersheds labeled P-19 and P-23 through P-27 at the proposed Bates Walk location combine to provide the stormwater flow at study point #5. The flow from this system, with the exception of the subcatchment labeled P-27, is routed through an underground detention system before being reintroduced to the exiting system and discharging in Andrews Pond. This system consists of both catch basin and roof leader discharge.

Study Point #6 (POA #6):

Study point #6 is Andrews Pond. This point includes all systems from the proposed Bates Walk location and is independent of the proposed Dining Facility systems.

PARKING AREA (DINING FACILITY PROJECT) – FIGURE 10

Study Point #7 (POA #7):

This study point takes the discharge from the proposed watersheds labeled P-8 through P-11 and P-15 at the proposed parking lot location. P-9, P-10 and P-15 are collected by area drains at the end of grass swales and enter an underground detention system below the parking lot before being released to the existing system. This point joins the existing stormwater system that discharges into the City of Lewiston stormwater system.

Study Point #8 (POA #8):

This study point takes the discharge from the proposed watersheds labeled P-12 and P-13 at the proposed parking lot location. P-13 is routed through grass swale before joining the existing system. This system enters an existing underground detention system and eventually discharges to the City of Lewiston stormwater system.

5.0 STORMWATER MANAGEMENT

Table 2 Surface Comparison (Acres)

Project	Existing Pervious	Proposed Pervious	Existing Impervious	Proposed Impervious
Dining Facility	6.96	6.45	2.33	2.85
Bates Walk	3.51	3.25	1.36	1.63
Total	10.47	9.70	3.69	4.48

Due to an overall increase in impervious surface of 0.79 acres, it is necessary to integrate new subsurface detention systems into the design. The systems will maintain peak flows equal to or less than existing condition flows.

Table 3 Peak Runoff Rates

	2-Year Storm	10-Year Storm	25-Year Storm
Point of Analysis #1			
Existing Runoff (CFS)	6.28	12.57	15.84
Proposed Runoff (CFS)	6.27	12.48	15.82
Point of Analysis #2			
Existing Runoff (CFS)	1.78	3.54	4.44
Proposed Runoff (CFS)	1.66	2.94	3.60
Point of Analysis #3			
Existing Runoff (CFS)	15.84	31.92	40.30
Proposed Runoff (CFS)	12.29	26.02	33.42
Point of Analysis #4			
Existing Runoff (CFS)	1.89	3.57	4.43
Proposed Runoff (CFS)	0.93	1.54	1.84
Point of Analysis #5			
Existing Runoff (CFS)	5.90	12.19	15.50
Proposed Runoff (CFS)	5.58	12.16	15.47
Point of Analysis #6			
Existing Runoff (CFS)	10.36	20.68	26.04
Proposed Runoff (CFS)	7.49	15.32	19.46
Point of Analysis #7			
Existing Runoff (CFS)	1.72	3.76	4.85
Proposed Runoff (CFS)	1.65	3.53	4.58
Point of Analysis #8			
Existing Runoff (CFS)	1.34	2.39	2.92
Proposed Runoff (CFS)	1.31	2.27	2.75

6.0 CONCLUSIONS

The stormwater management design incorporates Best Management Practices to protect water resources and measures to reduce peak runoff from the site between existing and proposed conditions. The stormwater design incorporates deep sump hooded catch basins, grass swales, underground detention systems, and a Vortechnics® unit. The existing peak runoff rates for the 2-year, 10-year and 25-year storm events entering all existing systems have been reduced for the proposed construction. All stormwater runoff leaving the limit of work without entering the existing or proposed drainage system has been reduced both in peak flow and volume.