Burlington International Airport

STORMWATER MANAGEMENT PROGRAM
June, 2013

VOLUME 1: MS4 FLOW RESTORATION PLAN AND STORMWATER RUNOFF CONTROL MEASURES

Prepared by:

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Volume 1 – MS4 Flow Restoration Plan and Stormwater Runoff Control Measures contains information on how BTV has implemented six minimum stormwater runoff control measures and intends to develop a Flow Restoration Plan as required by the MS4 permit. The six minimum control measures are as follows:

- Public Education and Outreach
- Public Participation/Involvement
- Illicit Discharge Detection and Elimination
- Construction Site Runoff Control
- Post-Construction Runoff Control
- Pollution Prevention/Good Housekeeping

The information and procedures contained in Volume 1 shall be used by BTV staff and representatives to comply with the Stormwater Rule. Failure to comply with the six minimum control measures may lead to enforcement action against BTV.

The information and procedures of Volume 1 shall be reviewed and

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Executive Summary

In June 2003 and April 2008, the Burlington International Airport (BTV) submitted a Notice of Intent (NOI) for Stormwater Discharges from Small Municipal Separate Storm Sewer Systems (MS4) to the Vermont Agency of Natural Resources to meet the regulations associated with the Environmental Protection Agency Phase II Stormwater Rule.

The Vermont Department of Environmental Conservation (DEC) issued General Permit 3-9014 (2012) for Stormwater Discharges from Small Municipal Separate Storm Sewer Systems (MS4) on December 5, 2012. Designed to address pollution from stormwater runoff, the re-issued MS4 permit applies to thirteen municipalities and three institutional entities in the Lake Champlain watershed. Communities already subject to the 2003 MS4 General Permit include Burlington, Colchester, Essex, Essex Junction, Milton, Shelburne, South Burlington, Williston and Winooski, as well as the non-municipal or non-traditional entities including the Burlington International Airport, the University of Vermont, and the Vermont Agency of Transportation within the geographical boundaries of these municipalities.

In addition to the communities noted above, which need to meet the new requirements of the updated permit, the DEC has designated Rutland town and city, and St. Albans town and city as new MS4s subject to the requirements of the re-authorized General Permit 3-9014 (2012). The primary additional condition of General Permit 3-9014 (2012) is the requirement to develop and submit a Flow Restoration Plan (FRP) for the portion of each stormwater – impaired watershed located within a permittee's boundaries.

To satisfy the requirements of the MS4 permit, BTV has developed a Stormwater Management Program (SWMP) designed to reduce the discharge of pollutants from the airport, to protect water quality, and to satisfy the appropriate water quality requirements of the Clean Water Act.

The SWMP consists of three volumes:

Volume 1 – MS4 Stormwater Runoff Control Measures

Volume 1 – MS4 Flow Restoration Plan and Stormwater Runoff Control Measures contains information on how BTV has implemented six minimum stormwater runoff control measures and how BTV intends to develop a Flow Restoration Plan as required by the re-authorized MS4 permit. The six minimum control measures are as follows:

- Public Education and Outreach
- Public Participation/Involvement
- Illicit Discharge Detection and Elimination

- Construction Site Runoff Control
- Post-Construction Runoff Control
- Pollution Prevention/Good Housekeeping

The information and procedures contained in Volume 1 shall be used by BTV staff and representatives to comply with the Stormwater Rule.

Volume 2 – Stormwater Pollution Prevention Plan (SWPPP)

Volume 2 – Stormwater Pollution Prevention Plan describes the Burlington International Airport facility and its operations, develops an inventory of potential pollutant sources, identifies controls and best management practices (BMPs) for reducing the discharge of pollutants in stormwater runoff, and outlines measures for implementation and review of this plan. The Stormwater Pollution Prevention Plan was developed as a requirement of the Multi-Sector General Permit 3-9003 (MSGP).

The Stormwater Pollution Prevention Plan shall be used by BTV staff and representatives to comply with the Stormwater Rule.

Volume 3 – Stormwater Management Study, Final Report

Volume 3 – Stormwater Management Study – Final Report was completed to meet regulations associated with the Phase II Stormwater Rule issued in 2002 and the proposed Vermont Watershed Improvement Permits (WIP). The study components are as follows:

- Review existing BTv stormwater discharge permits
- Update existing airport drainage system mapping
- Evaluate existing stormwater discharge outlets
- Development of a stormwater management action plan

This study provides historical information regarding BTVs efforts to comply with the Federal Phase II rule and forms the basis for Volumes 1 and 2 of the SWMP.

Failure to comply with the information and procedures contained in the Stormwater Management Program may lead to enforcement action against BTV.

Volumes 1 and 2 of the Stormwater Management Program shall be reviewed and updated annually by BTV staff and/or representatives. Volume 3 is included for informational purposes only and does not require updates.

Table of Contents – Volume 1: MS4 Flow Restoration Plan and Stormwater Runoff Control Measures

Executive Summary v

1 Introduction 1

2 Discharges to Impaired Waters (Flow Restoration Plan) 3
- 2.1 Discharges to Impaired Waters with an Approved TMDL 3
- 2.2 Discharges to Impaired Waters without an Approved TMDL 6

3 Public Education and Outreach (Minimum Measure #1) 8

4 Public Participation/Involvement (Minimum Measure #2) 10
- 4.1 Chittenden County Stream Team 10
- 4.2 Advertisement Space 12
- 4.3 Storm Drain Tagging Program 12

5 Illicit Discharge Detection and Elimination Plan (Minimum Measure #3) 13
- 5.1 History 13
- 5.2 Plan to Detect and Address Future Non-Storm Water Discharges 14
  - 5.2.1 Outfall Monitoring Schedule 14
  - 5.2.2 Procedures for Tracking and Eliminating Illicit Discharges 15
- 5.3 Policy for Prohibiting Non-Storm Water Discharges 15
- 5.4 Outfall Monitoring Schedule 15
- 5.5 Staff and Tenant Training 15

6 Construction Site-Runoff Control Plan (Minimum Measure #4) 16
- 6.1 Construction Site Runoff Control Policy 16
  - 6.1.1 Introduction 16
  - 6.1.2 Preliminary Reporting Procedures 16
  - 6.1.3 Construction Site Runoff Control Procedures 17
- 6.2 Temporary Erosion Prevention and Sediment Control Specification 21
- 6.3 Proper Disposal of Removed Waste 21

7 Post-Construction Runoff Control Plan (Minimum Measure #5) 22
- 7.1 Operations/Maintenance for Pollution Prevention and Reduction 22
- 7.2 Compliance with ANR Stormwater Regulations 22
- 7.3 Best Management Practices for Projects that do not Require Permit Coverage 22
- 7.4 Stormwater Management System Certification 23
- 7.5 Inspection and Maintenance of Long Term Structural Best Management Practices 23
- 7.6 Proper Disposal of Removed Waste 23
- 7.7 Storm Sewer System Mapping 23

8 Pollution Prevention and Good Housekeeping Plan (Minimum Measure #6) 24

8.1 Operations/Maintenance for Pollution Prevention and Reduction 24
8.2 Inspection and Maintenance of Long Term Structural Best Management Practices 24
8.2.1 Existing Best Management Practices 24
8.2.2 Future Best Management Practices 24
8.3 Proper Disposal of Removed Waste 24
8.4 Staff and Tenant Training 25
8.5 Storm Sewer System Mapping 25

Appendix A Construction Site Runoff Control Policy Documentation A-1
A.1 Preliminary Reporting Documentation A-3
A.2 Construction Site Runoff Control Procedures A-6

Appendix B Post-Construction Runoff Control Plan Documentation B-1

Appendix C Technical Specifications P-156 and D-755 ..... C-1

Appendix D Storm Sewer System Mapping D-1

Appendix E Master Inspection and Reporting Schedule for Long Term BMPs and All Previously Issued Permits E-1

Appendix F Operations and Maintenance (O&M) Manuals F-1

1 Introduction

In June 2003 and April 2008, the Burlington International Airport (BTV) submitted a Notice of Intent (NOI) for Stormwater Discharges from Small Municipal Separate Storm Sewer Systems (MS4) to the Vermont Agency of Natural Resources to meet the regulations associated with the Environmental Protection Agency Phase II Stormwater Rule.

To satisfy the requirements of the newly issued General Permit 3-9014 (2012) MS4 permit, BTV has developed a Stormwater Management Program (SWMP) designed to reduce the discharge of pollutants from the airport, to protect water quality, and to satisfy the appropriate water quality requirements of the Clean Water Act.

The SWMP consists of three volumes:

- Volume 1 – MS4 Flow Restoration Plan and Stormwater Runoff Control Measures
- Volume 2 – Stormwater Pollution Prevention Plan
- Volume 3 – Stormwater Management Study, Final Report

Volume 1 and 2 of the Stormwater Management Program will be updated on an annual basis. Volume 3 is a completed study, and therefore will not be updated.

Volume 1 – MS4 Stormwater Runoff Control Measures contains information on how BTV has implemented the six minimum stormwater runoff control measures required by the MS4 permit.

The six minimum control measures are as follows:

- Public Education and Outreach
- Public Participation/Involvement
- Illicit Discharge Detection and Elimination
- Construction Site Runoff Control
- Post-Construction Runoff Control
- Pollution Prevention/Good Housekeeping

In addition, as part of the re-authorized General Permit 3-9014 (2012) MS4 permit requirements, Volume 1 contains information related to discharges to impaired waters with approved Total Maximum Daily Loads (TMDL), and to impaired waters for which a

TMDL has not yet been approved by the Secretary of the Vermont Agency of Natural Resources (VT ANR) or the U.S. Environmental Protection Agency (EPA).

The information and procedures contained in Volume 1 shall be used by BTV staff and representatives to comply with the Stormwater Rule. Failure to comply with the discharges to impaired waters section and the six minimum control measures may lead to enforcement action against BTV.

2 Discharges to Impaired Waters (Flow Restoration Plan)

Impaired waters are those waters that the Secretary of the VT ANR has identified pursuant to Section 303(d) of the Clean Water Act as not meeting the Vermont Water Quality Standards. As part of the re-authorized General Permit 3-9014 (2012) MS4 permit requirements, each MS4 must evaluate, monitor, and develop plans for each discharge to an impaired water with approved Total Maximum Daily Loads (TMDL), and to impaired waters for which a TMDL has not yet been approved by the Secretary of the Vermont Agency of Natural Resources (VT ANR) or the U.S. Environmental Protection Agency (EPA).

BTV discharges stormwater runoff to two impaired waters of the State. One outfall (DO18) discharges to Muddy Brook, while five outfalls (POO1, POO2, POO5, POO6, and POO7) discharge to Class 2 wetlands contiguous to Potash Brook. Both waterways are considered to be impaired yet one waterway has no approved TMDL while the other has an approved TMDL.

2.1 Discharges to Impaired Waters with an Approved TMDL

Potash Brook is an impaired water with a Total Maximum Daily Load (TMDL) that was approved by EPA on December 19, 2006. For the Potash Brook TMDL, it is stormwater runoff volume that is being limited overall and allocated among sources.

Table 1 below gives the overall Potash Brook TMDL allocation for the high flows only. EPA does not consider the low flow targets applicable to an allocation scenario, and thus they were not presented as such in the TMDL.

It is noted that even though the low flow targets are not part of the formal TMDL allocation, VT DEC remains committed to retaining these low flow targets within the overall remediation plan for the watershed.

Table 1 - Potash Brook TMDL High Flow Allocation at Q0.3%.

Wasteload Allocation	Stormwater reduction from current Urban/Developed areas	-14.6%	-16.5%
	Additional stormwater flow reduction from Urban/Developed areas to account for future growth	-1.9 %	
Load Allocation	Stormwater reduction from Agriculture/Open areas		-1.4%
Total Potash Brook watershed stormwater flow reduction allocation at Q0.3%			-17.9 %

BTV has five discharges that drain to a Class 2 wetland, contiguous with a tributary to Potash Brook. Potash Brook in turn drains to Lake Champlain. The outfall designations are PO01, PO02, PO05, PO06, and PO07 as depicted on the Storm Sewer System Map contained in Appendix D. These five outfalls are located at the southern end of the BTV property site. Discharge point PO05 is also a sampling point for Benchmark Monitoring as a condition of BTV's General Permit 3-9003 MSGP. It is noted that discharge point PO01 has been plugged and buried, and no longer serves as a discharge point for stormwater runoff.

Flow Restoration Plan

BTV will work with the City of South Burlington during development and implementation of BTV's Flow Restoration Plan (FRP).

The following Flow Restoration Plan (FRP) development and implementation schedule will apply to BTV. Actual milestone dates are calculated from the date of issuance of an authorization to discharge to BTV under General Permit 3-9014 (2012) MS4.

- **Month 3** - BTV will submit a plan for approval for meeting the requirements of subsection IV.C.1(e)(7) (flow monitoring plan) by September 3, 2013.

- **Month 6** - BTV will submit a plan for approval for addressing expired state stormwater permits discharging to BTV's MS4 system by December 3, 2013. This plan may include a request to the Secretary to exercise its Residual Designation Authority (RDA) pursuant to Clean Water Act §§402(p)(2)(E) and (6) and 40 C.F.R § 122.26 (a)(9)(i)(C) and (D) to require NPDES permits for stormwater systems with expired state stormwater permits. BTV's plan for addressing the expired permits will insure that all permitted facilities demonstrate compliance with the existing expired permit, at a minimum, and insure that these facilities are incorporated into the FRP.

  The submitted plan will identify the process that BTV intends to use to meet the requirements of subsection IV.C.1 (development of FRP).

  As part of the December 3, 2013 submission, BTV will submit verification of implementation of flow monitoring, per subsection IV.C.1(e)(7).

- **Month 12** - BTV will submit a Semi-Annual Report by June 3, 2014 for VT. DEC review.

  The semi-annual report will provide information on the development and implementation of BTV's FRP. The report will address actions taken to implement all FRP components, including the extent of BMP implementation, an estimate of the extent of completion for remaining

items, and an assessment of the ability to meet outstanding schedule items. The FRP report will include a written statement signed by a designer that any BMP built or implemented within the preceding 6 month period was constructed in compliance with the approved plans. BTV will include in each FRP report an estimate of any associated reductions in phosphorus loading that occur as a result of implementation measures undertaken by BTV to meet the flow reduction targets.

- **Month 18** - BTV will submit a Semi-Annual Report by December 3, 2014 for VT. DEC review.

  The semi-annual report will provide information on the development and implementation of BTV's FRP. The report will address actions taken to implement all FRP components, including the extent of BMP implementation, an estimate of the extent of completion for remaining items, and an assessment of the ability to meet outstanding schedule items. The FRP report will include a written statement signed by a designer that any BMP built or implemented within the preceding 6 month period was constructed in compliance with the approved plans. BTV will include in each FRP report an estimate of any associated reductions in phosphorus loading that occur as a result of implementation measures undertaken by BTV to meet the flow reduction targets.

  The semi-annual report will report the status of the BTV's development of the FRP, including a schedule for completion of the FRP.

- **Month 24** - BTV will submit a report by June 3, 2015 for VT. DEC review. The report will verify that all existing stormwater systems with expired permits are in compliance with the existing expired permit or subject to a NPDES RDA permit, including verification that all required maintenance has been performed.

- **Month 30** - BTV will submit a Semi-Annual Report by December 3, 2015 for VT. DEC review.

  The semi-annual report will provide information on the development and implementation of BTV's FRP. The report will address actions taken to implement all FRP components, including the extent of BMP implementation, an estimate of the extent of completion for remaining items, and an assessment of the ability to meet outstanding schedule items. The FRP report will include a written statement signed by a designer that any BMP built or implemented within the preceding 6

month period was constructed in compliance with the approved plans. BTV will include in each FRP report an estimate of any associated reductions in phosphorus loading that occur as a result of implementation measures undertaken by BTV to meet the flow reduction targets.

- **Year 3** - BTV will submit a complete FRP by June 3, 2016 for VT. DEC review and approval.

- **Month 42 and Every 6 Months Thereafter** - BTV will submit a Semi-Annual Report by December 3, 2016 for VT. DEC review.

  The semi-annual report will provide information on the development and implementation of BTV's FRP. The report will address actions taken to implement all FRP components, including the extent of BMP implementation, an estimate of the extent of completion for remaining items, and an assessment of the ability to meet outstanding schedule items. The FRP report will include a written statement signed by a designer that any BMP built or implemented within the preceding 6 month period was constructed in compliance with the approved plans. BTV will include in each FRP report an estimate of any associated reductions in phosphorus loading that occur as a result of implementation measures undertaken by BTV to meet the flow reduction targets.

  BTV will continue to submit a Semi-Annual Report every six (6) months after December 3, 2016 for VT. DEC review.

- **Year 20** - BTV will complete implementation of the approved FRP by June 3, 2033.

2.2 *Discharges to Impaired Waters without an Approved TMDL*

BTV will comply with Part IV of General Permit 3-9014 (2012), and address in its SWMP and annual reports how any discharges that have the potential to cause or contribute to the impairment will be controlled so that they do not cause or contribute to the impairment.

Elimination of such discharges are not possible within 60 days. Therefore, BTV will submit to the VT ANR Secretary a plan for eliminating or controlling its discharges. The plan will include an assessment of whether MS4 discharges are potential contributors to the identified impairment and identify the sources of the discharge and, unless available information indicates that BTV's discharges are not a potential contributor to an impairment, a response plan that identifies additional or modified BMPs to be implemented. This plan shall be designed as an iterative

process. If required, the content of the response plan will reflect the magnitude and complexity of the impairment and the BTV's potential to contribute to the impairment. This 60 day period does not constitute a grace period for purposes of enforcement of Water Quality Standards or of General Permit 3-9014 (2012) requirements.

BTV has one outfall discharging to Muddy Brook (DO18).

Muddy Brook is an impaired water as it is listed on page 5 of 9 in the *State of Vermont, 2010, 303(d) List of Waters, Part A – Impaired Surface Waters In Need of TMDL*. Muddy Brook is, therefore, an impaired water without an approved or established TMDL. Pollutants listed on the 303(d) list from the mouth to 7 miles upstream are "*Toxics, Nutrients, and Temperature*".

As part of the Impaired Waters monitoring requirement contained in BTV's General Permit 309003 MSGP, BTV is required to monitor the Muddy Brook outfall (DO18) annually for nutrients including Total Phosphorus and Total Nitrogen. Temperature does not need to be monitored. Stormwater discharge monitoring performed to date at outfall DO18 does not indicate elevated levels of Total Phosphorus or Total Nitrogen. Although not required, temperature is monitored and does not appear to be out of acceptable range in samples taken to date.

In addition, as part of the Benchmark monitoring requirement contained in BTV's General Permit 309003 MSGP, BTV is required to monitor the Muddy Brook outfall (DO18) quarterly for BOD, COD, Ammonia, and pH. Stormwater discharge monitoring performed during the winter 2012 - 2013 deicing season at outfall DO18 does not indicate elevated levels of all four constituents.

Although not required, temperature is taken at DO18 during all monitoring noted above. Results do not appear to be out of acceptable range in samples taken to date.

3 Public Education and Outreach (Minimum Measure #1)

The Burlington International Airport is a member of the Chittenden County Regional Stormwater Education Program (RSEP). The purpose of the RSEP is to educate the public on water quality issues and provide tips on how to keep pollutants out of stormwater. Please visit www.smartwaterways.org to learn more about how you can help improve water quality in Vermont.

For additional information on water quality issues in Burlington, please visit the following pages on the City of Burlington's website:

http://www.ci.burlington.vt.us/planning/cb/stormwater_management.html

http://www.dpw.ci.burlington.vt.us/stormwater/

These links, a link to the RSEP website, previous MS4 Annual Reports, and BTV's Stormwater Management Program are posted on the environmental page of the airport's website:

http://www.btv.aero/index.php/airport-guide/community-connection

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4 Public Participation/Involvement (Minimum Measure #2)

BTV has implemented four (4) programs to encourage public participation and involvement in Vermont's water quality improvement efforts.

4.1 Chittenden County Stream Team

The Chittenden County Regional Planning Commission (CCRPC) has created the Chittenden County Stream Team (CCST). This Team has become the community outreach of the CCRPC related to stormwater issues. BTV is, and will continue to be, an active partner in the CCST mission.

Background Information:

In the fall of 2009, the MS4 communities began to explore a collaborative approach to fulfilling their Minimum Control Measure #2 (MCM) permit requirement. At the request of these MS4s, the Chittenden County Regional Planning Commission (CCRPC) applied for and received two grants totaling $22,500. Using these grants, CCRPC assisted the MS4s in developing a regional pilot project called the Chittenden County Stream Team (CCST). In its pilot year, CCST created a logo, launched a website and Facebook page, surveyed local residents, hosted a number of workshops, and completed a variety of local projects. The success of the pilot project lead to the formal adoption of the CCST program in 2011 by eleven of the MS4 communities including Burlington, South Burlington, Williston, Winooski, Shelburne, Milton, Essex, Essex Junction, the University of Vermont, VTrans and the Burlington Airport. The program was put out to bid and awarded to the Winooski Natural Resources Conservation District (WNRCD), a regional entity focused on natural resource protection and management. Under the guidance of the participating MS4s, the WNRCD completed a second successful year in fulfilling MCM2 requirement.

Current Status:

In 2012, the CCST template evolved to focus activities on three target towns per year. This year, they included Shelburne, Winooski, and Milton. A targeted approach aims to strengthen relationships in select areas and inspire greater involvement and capacity by volunteers. Similarly, they focused volunteer opportunities on four main categories in order to increase quality. They include: stream clean ups, Adopt-a-Rain Garden programming, water quality monitoring, and flow monitoring. Numbers of participants in activities were low in two of the targeted towns for 2012, Milton and Shelburne, though their participation in outreach was high. The time spent in 2012 doing much-needed outreach and cultivating community connections is paying off

for the planning period of 2013 as they have already heard from a number of contacts in both Milton and Shelburne about an interest in partnering on stream clean-ups, water quality monitoring and rain garden installations. Hence, they believe that town focus may be best achieved over a two-year rolling basis with the first year dedicated to general outreach and building connections and the second year allowing time to implement identified projects with a stronger volunteer base. Using this model, CCST would move into hands-on project phase with Milton and Shelburne in 2013 and increase outreach and community connections in Essex and Essex Junction in preparation for on-the-ground project implementation in those towns in 2014.

CCST Goals:

The program will engage citizens across an eight-town area in implementing programs to reduce non-point source pollution and stormwater volume at the local level to enable compliance by these MS4 permitees with MM#2. The program will utilize social networking tools to form a cadre of concerned citizens and professionals interested in hands-on activities to reduce the harmful effects of stormwater. The program will then organize a series of events and workshops to engage the Stream Team members and citizens at large in discussion and use of key Best Management Practices designed to address the negative effects of stormwater. The scope of services for the CCST is as follows:

1. Regular Tasks:
    - Maintain Facebook page with regular postings;
    - Maintain website with up to date information on stormwater related workshops and projects sponsored by CCST as well as other partners;
    - Recruit and maintain volunteers from member communities, recruit neighborhood leaders to help spread the word and build esprit de corps by articulating the mission and vision of CCST, staying in touch with volunteers and keeping it fun!
    - Organize quarterly Steering Committee meetings and communicate with members between meetings.
    - Build relationships with and leverage expertise from other organizations working on water quality issues (i.e. Friends of the Winooski, Winooski Natural Resources Conservation District, Lake Champlain Committee, Green Up Day, Lake Champlain Basin Program) including potential joint sponsorship of workshops and projects.

2. Event-driven tasks
    - Host a Spring kickoff event to get neighborhood leaders in touch with one another and excited about the upcoming field season;

- Hold outreach events at spring farmers' markets or other spring/early summer events in three municipalities per year to continue to reach new volunteers;
- Complete three workshops or projects in each year with at least one event in each of the areas of the full members over the five year permit period;
- Provide guidance to volunteers on techniques and materials they can use to host their own projects or workshops.

3. Annual Tasks
    - Prepare an annual summary including the number of events, number of participants and other measureable quantities showing how CCST met the MM-#2 requirements that members can use in their annual reports to Vermont ANR.

4.2 Advertisement Space

BTV has designated advertisement space in the terminal building for public participation and involvement. Entities that can use the space include other traditional and non-traditional MS4 communities, the State of Vermont, the Lake Champlain Committee, Friends of the Winooski River, and any other groups dedicated to the storm water pollution prevention and water quality. In addition, a banner displaying the RSEP web address is hung in the baggage claim area.

4.3 Storm Drain Tagging Program

All publicly viewed storm drains have been tagged to inform the public as to where the drains lead to, and to discourage illegal dumping into the drains. The tags are inspected and replaced each year as necessary.

5 Illicit Discharge Detection and Elimination Plan (Minimum Measure #3)

As a permit condition, each MS4 must develop, implement and enforce a Stormwater Management Program (SWMP) designed to reduce the discharge of pollutants from the MS4, if it has not already done so. This section of the SWMP consists of a plan to detect and eliminate all illicit discharges at Burlington International Airport (BTV).

5.1 History

Burlington International Airport (BTV) completed a study to evaluate stormwater quality at outfall locations, evaluate existing stormwater discharge permits and establish a course of action for meeting State and Federal stormwater regulations. This study, entitled *Burlington International Airport Stormwater Management Study – Final Report*, was completed in December 2004, and is Volume 3 of the Stormwater Management Program.

As part of this study, a water quality monitoring program was undertaken by BTV to evaluate existing stormwater discharges at airport outfalls. The water quality monitoring program was undertaken from December 2002 to December 2003, and involved base flow and wet weather/storm event-based sampling. A total of ten individual sampling locations were designated at the various discharge points. Discharges sampled during the study included those occurring to Muddy Brook, a tributary to Potash Brook, and tributaries to the Winooski River. All outfall locations are shown on the Storm Sewer System Mapping contained in Appendix D. Sampling and analysis was conducted for hydrocarbons, trace metals, pathogens, sediment, nutrients and deicing products (urea, glycol). A total of three wet weather sampling events were conducted, representing fall/winter, spring, and summer. A second winter sampling event was conducted at the north end discharge point to evaluate discharge of deicing fluids. Dry weather sampling occurred during the fall/winter and summer.

The most significant result of the sampling program was the identification of deicing compounds or decay products at the north end outfall discharge to tributary of the Winooski River during the winter wet weather sampling event (December 2003). Elevated levels of propylene glycol, BOD_5, and COD were found, and attributed to a failure of the existing aircraft deicing pump system which directed aircraft deicing fluid to the South Burlington Airport Parkway Wastewater Treatment Facility. The airport implemented a temporary collection system for the remainder of the 2003-2007 winter seasons. A permanent underground aircraft de-icing fluid (ADF) treatment facility was constructed for the Main Terminal Apron and the NOTE2 Apron in 2007 and 2008. Two additional ADF treatment systems have been

constructed since 2008 as well. The new, fully operational systems serve the Valley West Apron and the 890 Carge Ramp. Each of the three ADF treatment systems operate under Underground Injection Permits (UIC) and associated operational Stormwater Discharge Permits as noted below:

- UIC Permit No. 6-0075, Aircraft Deicing Fluid Treatment Facility, Main Terminal Apron and NOTE2.
- UIC permit #6-0084, South End Development, Phase 2 (Valley West Apron).
- UIC Permit #6-0117, Aircraft Deicing Fluid Treatment System, 890 Cargo Ramp.

At various sampling locations, elevated levels of ammonia nitrogen compounds were noted during certain sampling events during the 2002 – 2003 water quality monitoring program. These values were likely due to the use of urea as a surface deicer on runways and taxiways. The airport has discontinued use of urea and has relied solely on propylene glycol. Otherwise, the sampling results generally indicated slightly elevated levels of metals, sediment, nutrient and pathogens from the sampled discharge points. These values were generally consistent with, and on the low end of the range of values typically observed from stormwater runoff from impervious surfaces. No significant detection of hydrocarbons was found at any of the sampling locations.

In addition to the illicit discharges discovered at the north outfalls, the study revealed that the rental car carwash facility was discharging to the storm drainage system. This was subsequently corrected by connecting the carwash discharge to the municipal sewer system.

5.2 Plan to Detect and Address Future Non-Storm Water Discharges

To evaluate the effectiveness of BTV's program, BTV has established an outfall monitoring schedule and illicit discharge elimination plan to protect the quality of water resources.

5.2.1 Outfall Monitoring Schedule

A monitoring schedule of BTV outfalls consisting of quarterly visual and smell tests, benchmark monitoring, and annual monitoring of outfalls to impaired waterways has been established, and is included in Volume 2 - Stormwater Pollution Prevention Plan (SWPP). All monitoring and reporting shall be conducted as outlined in the SWPP as provided in Volume 2.

5.2.2 Procedures for Tracking and Eliminating Illicit Discharges

Currently, all illicit discharges from BTV have been detected and eliminated. In the event future monitoring results reveal the presence of illicit discharges, BTV will establish a plan to track and eliminate the illicit discharge on a case-by-case basis.

5.3 Policy for Prohibiting Non-Storm Water Discharges

All non-stormwater discharges to the BTV storm sewer system other than those listed in Volume 2 – Stormwater Pollution Prevention Plan, Section 4 are strictly prohibited.

5.4 Outfall Monitoring Schedule

A monitoring schedule of BTV outfalls consisting of quarterly visual and smell tests, benchmark monitoring, and annual monitoring of outfalls to impaired waterways has been established, and is Volume 2 - Stormwater Pollution Prevention Plan, Section 7.

5.5 Staff and Tenant Training

BTV will conduct trainings annually to ensure that airport staff and tenants are following all rules and regulations. New employees will be trained within two weeks of hire. Topics included in the employee training are included in Volume 2 - Stormwater Pollution Prevention Plan, Section 6.2.

6 Construction Site-Runoff Control Plan
(Minimum Measure #4)

As a permit condition, each MS4 must develop, implement and enforce a Stormwater Management Program (SWMP) designed to reduce the discharge of pollutants from the MS4, if it has not already done so. This section of the SWMP consists of a plan to prevent or reduce pollutants in construction site runoff.

6.1 Construction Site Runoff Control Policy

6.1.1 Introduction

All projects that result in earth disturbance at Burlington International Airport (BTV), with the exception of maintenance projects, are required to seek coverage under Construction General Permit (CGP) 3-9020(2008) or an Individual Construction Permit. The following procedures shall be used by airport staff, designers, contractors, or anybody else who is proposing to disturb earth, to ensure that all construction projects at BTV employ proper erosion prevention and sediment control (EPSC) practices, and are properly designed and permitted. Implementing these procedures will ensure that surface water pollution from construction site runoff at BTV is minimized. Failure to implement these procedures may lead to enforcement actions against BTV and other parties that maintain co-permittee status for state issued construction site runoff permits.

This policy was developed to satisfy the requirements of the Vermont Agency of Natural Resources (ANR) Small Municipal Separate Storm Sewer Systems (MS4) General Permit.

All documents referenced in the following procedure are contained in Appendix A.

6.1.2 Preliminary Reporting Procedures

The following steps describe the Preliminary Reporting Procedure that shall be completed before any earth disturbance activity occurs at Burlington International Airport. These steps are necessary to meet the reporting requirements set forth in the MS4 General Permit.

STEP 1: Complete the EPSC Project Summary Form

STEP 2: Prepare EPSC Project Summary Letter

STEP 3: Submit EPSC Project Summary Letter and Form to BTV Engineer for review

STEP 4: Submit EPSC Project Summary Letter and Form to ANR (Jurisdictional Projects only)

For "jurisdictional" projects, the Preliminary Reporting Procedure must be completed no less than 90 days prior to construction. For routine maintenance activities ("non-jurisdictional" projects), the Preliminary Reporting Procedure must be completed prior to the start of the project. The BTV Engineer has the right to waive the Preliminary Reporting Procedure for maintenance projects that require immediate attention.

Upon completion of the Preliminary Reporting Procedure, the following Construction Site Runoff Control Procedures shall be followed based on the type of project, "non-jurisdictional" or "jurisdictional", as determined from the EPSC Project Summary Form completed in STEP 1.

6.1.3 Construction Site Runoff Control Procedures

6.1.3.1 Non-Jurisdictional Projects (Maintenance Activities)

Earth disturbance that is a normal part of the long-term use or maintenance of airport property (e.g. pipe and structure repairs, dirt road regrading, routine road and/or runway resurfacing) does not require coverage under the CGP-3-9020(2008) or Individual Construction Permit. The practices included in the *The Low Risk Site Handbook for Erosion Prevention and Sediment Control* shall be implemented when necessary and as directed by the BTV Engineer.

6.1.3.2 Jurisdictional Projects

All earth disturbances that are not considered maintenance activities will require coverage under the CGP-3-9020 or an Individual Construction Permit. A Risk Evaluation (Appendix A of CGP-3-9020 (2008)) must be completed to determine if the proposed activities constitute Low-risk construction activities, Moderate-risk construction activities, or construction activities that require an Individual Permit.

Low-Risk

For projects that are determined to be Low-Risk the following procedure shall be followed. Earth disturbances covered under the following procedure shall also comply with the general conditions outlined in the Construction General Permit and the project specific

conditions outlined in the Authorization issued by ANR. In the event of a conflict, the permit conditions shall take precedent over the following procedure.

STEP 1: No less than 70 days prior to Contract Plans Submittal, the following shall be submitted to the BTV Engineer for review and approval:

- CGP-3-9020(2008) Notice of Intent (NOI)
- Risk Evaluation (Appendix A of CGP-3-9020)

These forms shall be completed in accordance with Part 2 of CGP-3-9020(2008).

STEP 2: No less than 60 days prior to bid letting and upon approval by the BTV Engineer, the NOI, Appendix A, and the application fee shall be submitted to ANR. A copy of the NOI shall be submitted to the South Burlington City Clerk and a copy of the entire submittal shall be submitted to the BTV Engineer.

STEP 3: Upon issuance of Authorization from ANR, the following shall be included in the Contract Documents:

- Erosion Prevention and Sediment Control Plan Specification
- Completed Notice of Intent
- Completed Risk Evaluation (Appendix A of CGP-3-9020)
- ANR's authorization
- Notice of Addition of Co-Permittee
- Discharge Report

STEP 4: Once the contract has been awarded, the following shall be submitted to the BTV Engineer for approval. Upon approval, the information shall then be submitted to ANR:

- Completed Notice of Addition of Co-Permittee, if necessary, in accordance with Part 7.2 of CGP-3-9020.
- Contact information and qualifications of the On-Site Coordinator

- Any risk re-evaluations, permit amendments, NOI forms, fees, EPSC plans, etc. that are required as a result of “minor” or “major” changes to the project as defined in Part 5 of CGP-3-9020(2008).

STEP 5: During construction, the On-Site Coordinator shall implement all applicable erosion prevention and sediment control measures and conduct site inspections in accordance with *The Low Risk Site Handbook for Erosion Prevention and Sediment Control* and Part 6.1 of CGP-3-9020(2008).

STEP 6: Upon final, permanent stabilization of the construction site, all temporary erosion prevention and sediment control measures shall be removed.

Moderate-Risk

For projects that are determined to be Moderate-Risk the following procedures shall be followed. Earth disturbances covered under the following procedure shall also comply with the general conditions outlined in the Construction General Permit and the project specific conditions outlined in the Authorization issued by ANR. In the event of a conflict, the permit conditions shall take precedent over the following procedure.

STEP 1: No less than 70 days prior to Contract Plans Submittal, the following shall be submitted to the BTV Engineer for review and approval:

- CGP 3-9020 Notice of Intent (NOI)
- Risk Evaluation (Appendix A of CGP-3-9020)
- Erosion Prevention and Sediment Control Plan
- EPSC Plan Summary Forms

The NOI and Appendix A forms shall be completed in accordance with Part 3 of CGP-3-9020(2008). The EPSC Plans shall be developed in accordance with Part 4 and Appendix B of CGP-3-9020(2008).

STEP 2: No less than 60 days prior to bid letting and upon approval by the BTV Engineer, the NOI, Appendix A, EPSC Plans and Summary Forms, and the application fee shall be submitted to ANR. A copy of the NOI shall be submitted to the South Burlington City Clerk and a

copy of the entire submittal shall be submitted to the BTV Engineer. The BTv Engineer shall file the submittal in the BTV records.

STEP 3: Upon issuance of Authorization from ANR, the following shall be included in the Contract Documents:

- EPSC Plan sheets
- *Erosion Prevention and Sediment Control Plan Specification*
- Completed CGP 3-9020(2008) Notice of Intent (NOI)
- Completed Risk Evaluation (Appendix A of CGP-3-9020(2008))
- ANR's authorization
- Notice of Addition of Co-Permittee
- Notice of Termination of Co-Permittee
- Notice of Termination for Portions of Ongoing Project
- Notice of Termination for Entire Project
- Notice of Winter Construction
- Notification of On-Site Plan Coordinator
- Minor Amendment Record
- Inspection Record
- Discharge Report

STEP 4: Once the contract has been awarded, the following shall be submitted to the BTV Engineer for approval. Upon approval, the information shall then be submitted to ANR:

- Completed Notice of Addition of Co-Permittee, if necessary, in accordance with Part 7.2 of CGP-3-9020(2008).
- Contact information and qualifications of the On-Site Coordinator
- Any risk re-evaluations, permit amendments, NOI forms, fees, EPSC plans, etc. that are required as a result of "minor" or "major" changes to the project as defined in Part 5 of CGP-3-9020(2008).

STEP 5: During construction, the On-Site Coordinator shall be responsible for ensuring that all applicable erosion prevention and sediment control measures are implemented and site inspections are conducted in accordance with the EPSC Plans, the EPSC Specification, ANR's Authorization, and Parts 6.2 – 6.5 of CGP-3-9020(2008).

STEP 6: Upon final, permanent stabilization of the construction site, all temporary erosion prevention and sediment control measures shall be removed, and a completed Notice of Termination shall be submitted to the BTV Engineer for approval. Upon approval, the Notice of Termination shall be sent to ANR.

Individual Construction Permit

An Individual Construction Stormwater Discharge Permit is required when a project scores out of the low and moderate risk classification in Appendix A or as required by the Secretary of ANR. It is a customized permit for discharges of stormwater from construction activities specifically tailored to the proposed construction project, and typically includes additional protective measures (e.g. the requirement for oversight by an Environmental Specialist and likely turbidity monitoring). Unlike a General Permit, which has already been through a public comment and appeal process, all Individual Permits require a 30-day public comment period and have a 30-day appeal period once they are issued.

The application process for an Individual Permit is similar to that of the CGP-3-9020(2008). Instead of a Notice of Intent, a Permit Application Form is filed, accompanied by an Erosion Prevention and Sediment Control Plan. The same general procedure described under Moderate Risk shall be employed.

6.2 Temporary Erosion Prevention and Sediment Control Specification

Technical Specification P-156 Temporary Erosion Prevention and Sediment Control shall be included in all construction contracts that have coverage under General Permit 3-9020(2008). Appendix C contains Technical Specification P-156.

6.3 Proper Disposal of Removed Waste

Procedures for proper disposal of removed waste are included in Volume 2 - Stormwater Pollution Prevention Plan.

7 Post-Construction Runoff Control Plan
(Minimum Measure #5)

As a permit condition, each MS4 must develop, implement and enforce a Stormwater Management Program (SWMP) designed to reduce the discharge of pollutants from the MS4, if it has not already done so. This section of the SWMP consists of a plan to prevent or reduce pollutants in runoff from post-construction sites.

7.1 Operations/Maintenance for Pollution Prevention and Reduction

Source protection best management practices (BMPs) have been implemented at BTV to prevent (preferable) or control pollutants in stormwater discharges from the site. Source protection BMPs are included in Volume 2 - Stormwater Pollution Prevention Plan, Section 5.

7.2 Compliance with ANR Stormwater Regulations

As part of the SWMP, the following procedures were developed to ensure compliance with ANR Stormwater regulations by identifying projects that require an operational stormwater discharge permit, and reporting these projects to the Secretary of ANR. All documents required for these procedures are contained in Appendix B.

1. Complete Post-Construction Site Runoff Control Project Summary Form

2. Select flowchart based on the Receiving Water for the project.

3. Determine if permit coverage is required from the selected flowchart using the information on the Summary Form.

4. If permit coverage is required, send the Post-Construction Site Runoff Control Project Summary Letter with the Summary Form and shaded plan sheets attached to the ANR Regional Environmental Analyst requesting determination of permit coverage required. Note that completion of the Summary Form will auto-fill values to be included in the Summary Letter.

Failure to properly report projects that require an operational stormwater discharge permit may lead to enforcement actions against BTV.

7.3 Best Management Practices for Projects that do not Require Permit Coverage

For all projects disturbing one (1) acre of land or more, but do not require an operational stormwater permit, nonstructural and vegetative best management

practices shall be employed in conformance with Section 5.0 of the "Burlington Guidelines for Stormwater Pollutant Reduction".

7.4 Stormwater Management System Certification

Specification D-755: Permitted Stormwater Management System Certification shall be included in all construction contracts that have permit coverage for operational stormwater management systems. This specification requires that a Professional Engineer inspect the stormwater management system to ensure compliance with the contract plans and specifications and the stormwater discharge permit issued for the project.

Appendix C contains Technical Specification D-755.

7.5 Inspection and Maintenance of Long Term Structural Best Management Practices

All permitted long-term structural best management practices (BMPs) at BTV will be inspected in accordance with the terms of the permit. All permits issued to BTV are contained in Appendix E. A master schedule summarizing inspection, maintenance and reporting requirements is also included as the first page of Appendix E. An operations and maintenance manual along with inspection, maintenance and reporting procedures are included for each permit. Operations and Maintenance Manuals are contained in Appendix F. Failure to comply with the inspection, maintenance and reporting schedule and procedures may lead to enforcement action against BTV.

7.6 Proper Disposal of Removed Waste

See Section 6.3.

7.7 Storm Sewer System Mapping

A comprehensive storm sewer system map of the airport was developed that shows locations of all outfalls and names and locations of receiving waters. The original comprehensive map is contained in Volume 3 - Stormwater Management Study, December 2004.

This mapping has been updated to include new development at the airport through June, 2013. Electronic files of the mapping are maintained to be compatible with Geographic Information System (GIS) software. The files will be updated once a year to include new developments or information. Appendix D contains a hard copy of the updated mapping. Electronic files are available upon request.

8 Pollution Prevention and Good Housekeeping Plan (Minimum Measure #6)

As a permit condition, each MS4 must develop, implement and enforce a Stormwater Management Program (SWMP) designed to reduce the discharge of pollutants from the MS4. This section of the SWMP consists of a plan to ensure pollution prevention and good housekeeping.

8.1 Operations/Maintenance for Pollution Prevention and Reduction

See Section 7.1.

8.2 Inspection and Maintenance of Long Term Structural Best Management Practices

8.2.1 Existing Best Management Practices

Operations and Maintenance Manuals contained in Section F are to be used to inspect, maintain and operate the structural BMPs on site that are listed in Volume 2 – Stormwater Pollution Prevention Plan, Section 5.5.

Inspection and maintenance procedures are included in the O&M manual for each BMP. A master schedule of inspection and reporting to ANR for each BMP in accordance with applicable permit conditions has been included as Appendix E of this SWMP. Failure to conduct scheduled inspections and report inspection results to ANR may lead to enforcement action against BTV.

Source protection, area specific and site-wide BMPs and procedures for spill response and vehicle/equipment washing are included in Volume 2 – Stormwater Pollution Prevention Plan, Section 5.

8.2.2 Future Best Management Practices

Operations and maintenance manuals must be provided by the design engineer for all future structural long-term BMPs constructed at BTV. The design engineer shall also be responsible for updating the master inspection and reporting schedule to include inspection/reporting requirements for the new BMP.

8.3 Proper Disposal of Removed Waste

Procedures for proper disposal of removed waste are included in Volume 2 - Stormwater Pollution Prevention Plan.

8.4 Staff and Tenant Training

See Section 5.5.

8.5 Storm Sewer System Mapping

See Section 7.7.

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Appendix A Construction Site Runoff Control Policy Documentation

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A.1 *Preliminary Reporting Documentation*

The documents contained in this section of the appendix shall be used to satisfy the requirements of the Preliminary Reporting Procedures contained in Section 6.1.2 of this document.

EPSC Project Summary Form
Burlington International Airport (BTV)

This form shall be completed for any earth disturbance activity at the Burlington International Airport. This form is necessary to meet the reporting requirements set forth in the MS4 General Permit. Once completed, please sign this form, attach to the EPSC Project Summary Letter, and submit to the BTV Engineer for review and signature.

Project Name _____

Description of Earth Disturbance _____

EPSC Project Summary (to check answer, double click on check boxes and select checked in pop-up window)

1. Is the earth disturbance a normal part of the long-term use or maintenance of airport property (e.g. pipe and structure repairs, dirt road regrading, routine road and/or runway resurfacing)?

☐ **Yes** – the project type is non-jurisdictional. Follow Construction Site Runoff Control Procedures for Non-Jurisdictional Projects (Stormwater Management Program, Volume 1 - Section 5.1.3.1).

☐ **No** – the project type is jurisdictional. Complete Appendix A of CGP-3-9020 to determine risk.

2. (Skip if answered "Yes" to question 1) Based on the completed Appendix A, what risk category does the project fall under?

☐ **Low** – follow Low-Risk Construction Site Runoff Control Procedures for Jurisdictional Projects, (Stormwater Management Program, Volume 1 - Section 5.1.3.2).

☐ **Moderate** – follow Moderate-Risk Construction Site Runoff Control Procedures for Jurisdictional Projects (Stormwater Management Program, Volume 1 - Section 5.1.3.2).

☐ **High** – follow Individual Construction Permit Construction Site Runoff Control Procedures for Jurisdictional Projects (Stormwater Management Program, Volume 1 - Section 5.1.3.2).

3. Sign below and submit to the BTV Engineer for review and signature. This form shall be filed in the records of the Burlington International Airport. For jurisdictional projects (answered "no" in question 1), a copy of the signed and approved form shall be attached to the EPSC Project Summary Letter and sent to Vermont Agency of Natural Resources – Water Quality Division.

Signature_____ Date_____
EPSC Project Summary Form Preparer

Signature_____ Date_____
BTV Engineer

Created on: May 23, 2007
Revised:

April 12, 2007

Vermont Department of Environmental Conservation
Water Quality Division
103 South Main Street
Building 10 North
Waterbury, Vermont 05671-0408

Reference: Burlington International Airport –

As a requirement of the Municipal Separate Storm Sewer System (MS4) General Permit, the Vermont Agency of Natural Resources is hereby notified that the above referenced project is required to seek coverage under CGP-3-9020 (2008). The work associated with the above referenced project has been evaluated using Appendix A of CGP-3-9020, and has been categorized as **low**-risk. The attached EPSC summary form provides a description of the project, and will be used to ensure that development and construction of the project follows BTV's Construction Site Runoff Control Policy.

A **Notice of Intent** and all necessary attachments will be submitted to the Water Quality Division. No earth disturbance will occur until authorization has been received by the Water Quality Division. If the scope of the work changes from that proposed in the attached EPSC Project Summary Form, the project will be re-evaluated to determine permit coverage requirements. If you have any questions, or require additional information please contact me.

Sincerely,

Burlington International Airport

Heather Kendrew, P.E.

Tel: (802) 863-2874
Fax: (802) 863-7947
hkendrew@btv.aero

Attachment: EPSC Project Summary Form

c.

Created on: May 23, 2007
Revised:

A.2 *Construction Site Runoff Control Procedures*

The documents referenced in the following links shall be used to satisfy the requirements of the Construction Site Runoff Control Procedures contained in Section 6.1.3 of this document. In the event the following links are no longer valid, contact the Vermont Agency of Natural Resources Department of Environmental Conversation – Water Quality Division to obtain the correct links to or hard copies of the documents.

Construction General Permit 3-9020(2006) as Amended February, 2008
http://www.watershedmanagement.vt.gov/stormwater/docs/construction/sw_cgp_amended_final.pdf

Risk Evaluation (Appendix A of CGP 3-9020)
http://www.watershedmanagement.vt.gov/stormwater/docs/construction/sw_appendix_a_cgp_9020.pdf

Low-Risk Projects

The Low Risk Site Handbook for Erosion Prevention and Sediment Control
http://www.watershedmanagement.vt.gov/stormwater/docs/construction/sw_low_risk_site_handbook.pdf

Notice of Intent Form
http://www.watershedmanagement.vt.gov/stormwater/docs/construction/Low/sw_Low_Risk_NOI_2_2013_Fillable.pdf

Notice of Addition of Co-Permittee
http://www.watershedmanagement.vt.gov/stormwater/docs/construction/sw_CopermitteeNOA.pdf

Discharge Report
http://www.watershedmanagement.vt.gov/stormwater/docs/construction/sw_discharge_report_low_risk.pdf

Moderate Risk Projects

The Vermont Standards and Specifications for Erosion Prevention & Sediment Control
http://www.watershedmanagement.vt.gov/stormwater/htm/documents/sw_vt_standards_and_specifications_2006_updated_2_20_2008.pdf

Notice of Intent Form
http://www.watershedmanagement.vt.gov/stormwater/docs/construction/Moderate/sw_Moderate_Risk_NOI_2_2013-fillable.pdf

EPSC Plan Summary Forms
http://www.watershedmanagement.vt.gov/stormwater/docs/construction/sw_EPSC_plan_summary_form-4.2011-fillable.pdf

Notice of Addition of Co-Permittee
http://www.watershedmanagement.vt.gov/stormwater/docs/construction/sw_CopermitteeNOA.pdf

Notice of Termination of Co-Permittee
http://www.watershedmanagement.vt.gov/stormwater/docs/construction/sw_CopermitteeNOT.pdf

Notice of Termination for Portions of On-Going Project
http://www.watershedmanagement.vt.gov/stormwater/docs/construction/sw_NOT_for_portions_of_ongoing_project.pdf

Notice of Termination for Entire Project
http://www.watershedmanagement.vt.gov/stormwater/docs/construction/sw_NOT_for_entire_projects.pdf

Notice of Winter Construction
http://www.watershedmanagement.vt.gov/stormwater/docs/construction/sw_notice_of_winter_construction.pdf

Notification of On-Site Plan Coordinator
http://www.watershedmanagement.vt.gov/stormwater/docs/construction/sw_Notification%20of%20OSPC.pdf

Minor Amendment Record
http://www.watershedmanagement.vt.gov/stormwater/docs/construction/sw_minor_amendment_record.pdf

Inspection Record
http://www.watershedmanagement.vt.gov/stormwater/docs/construction/sw_moderate_risk_inspection.pdf

Discharge Report for Moderate Risk Projects
http://www.watershedmanagement.vt.gov/stormwater/docs/construction/sw_moderate_risk_discharge_report.pdf

Individual Construction Permit

Permit Application Form / NOI
http://www.watershedmanagement.vt.gov/stormwater/docs/INDC/sw_INDC_NOI-Revised%20June%202012-Reader.pdf

Contractor Request for Co-Permittee Status
http://www.vtwaterquality.org/stormwater/docs/construction/sw_individual-copermittee.pdf

Notice of Termination
http://www.vtwaterquality.org/stormwater/docs/construction/sw_individual-not.pdf

Appendix B Post-Construction Runoff Control Plan Documentation

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May 21, 2013

Vermont Department of Environmental Conservation
Water Quality Division
103 South Main Street
Building 10 North
Waterbury, Vermont 05671-0408

Reference: Burlington International Airport –

As a requirement of the Municipal Separate Storm Sewer System (MS4) General Permit, the Vermont Agency of Natural Resources is hereby notified that the above referenced project at the Burlington International Airport is proposed for construction. The project will consist of 0 acres (0 square feet) of expanded impervious area, 0 acres of redeveloped impervious area, and 0.00 acres of total impervious area. The project is located in the watershed. The attached Project Summary Form provides a brief description of the project, and summarizes the project impervious areas that were used to determine permit coverage requirements.

Please advise on the need for either a General or Individual Discharge Permit for this project. If a permit is required, the appropriate Notice of Intent form and all necessary supporting documentation will be submitted to the Water Quality Division. Construction will not occur until authorization has been received by the Water Quality Division. If you have any questions or require additional information, please contact me.

Sincerely,

Burlington International Airport

Heather Kendrew, P.E.

Tel: (802) 863-2874
Fax: (802) 863-7947
hkendrew@btv.aero

Attachment: Project Summary Form

c.

Created on: April 13, 2007
Revised:

Post-Construction Site Runoff Control
Project Summary Form

Date: May 21, 2013

Project:

A. What is the name of the receiving water(s)?

B. When was the Existing Impervious Surface created? (mm/dd/yyyy)

C. What is the Total Cumulative expansion of Existing Impervious Surface after June 1, 2002?

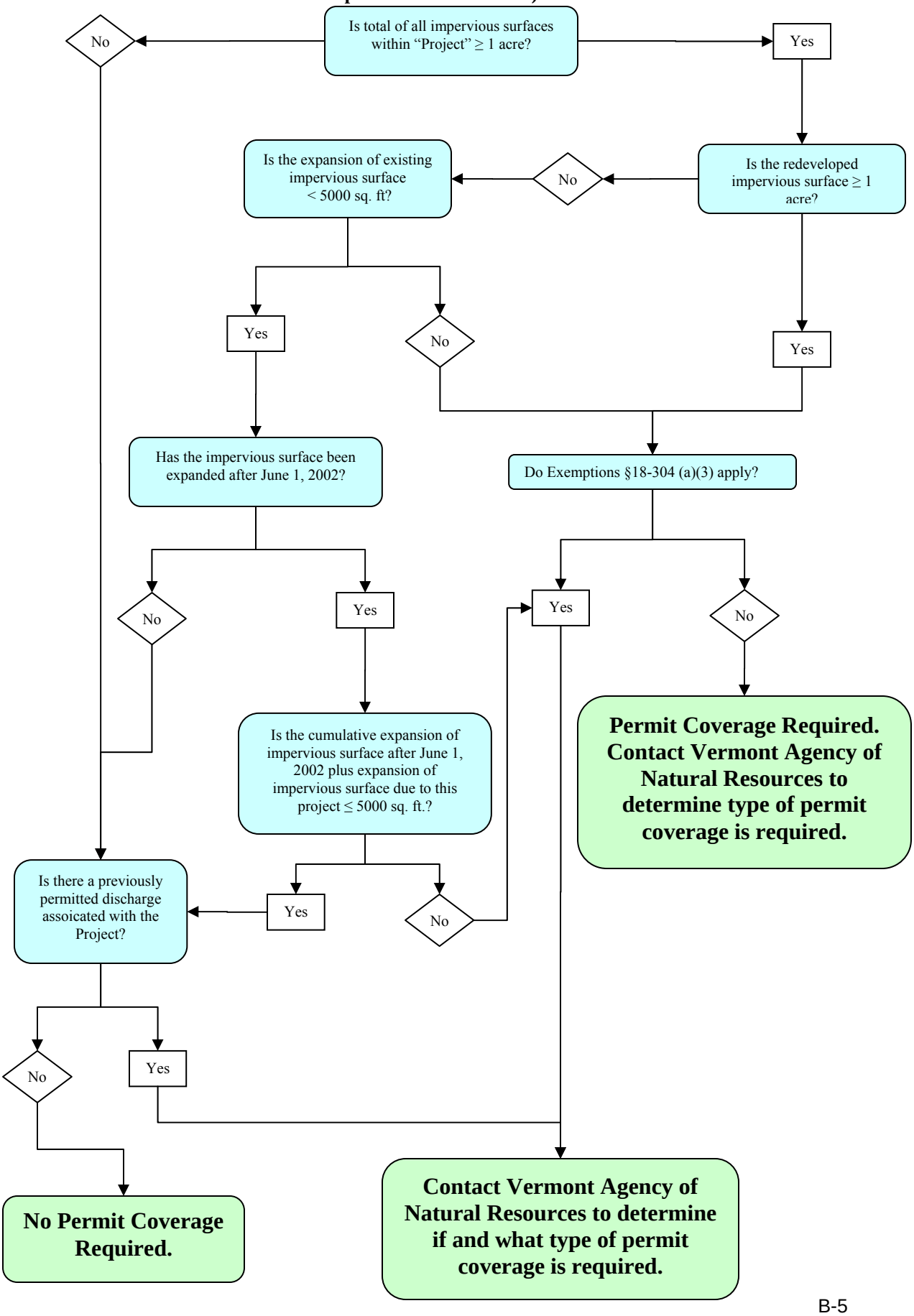
sq. ft

D. Calculate types of resulting post-construction impervious surface within the Project **(provide shaded plan sheet depicting areas below)**;

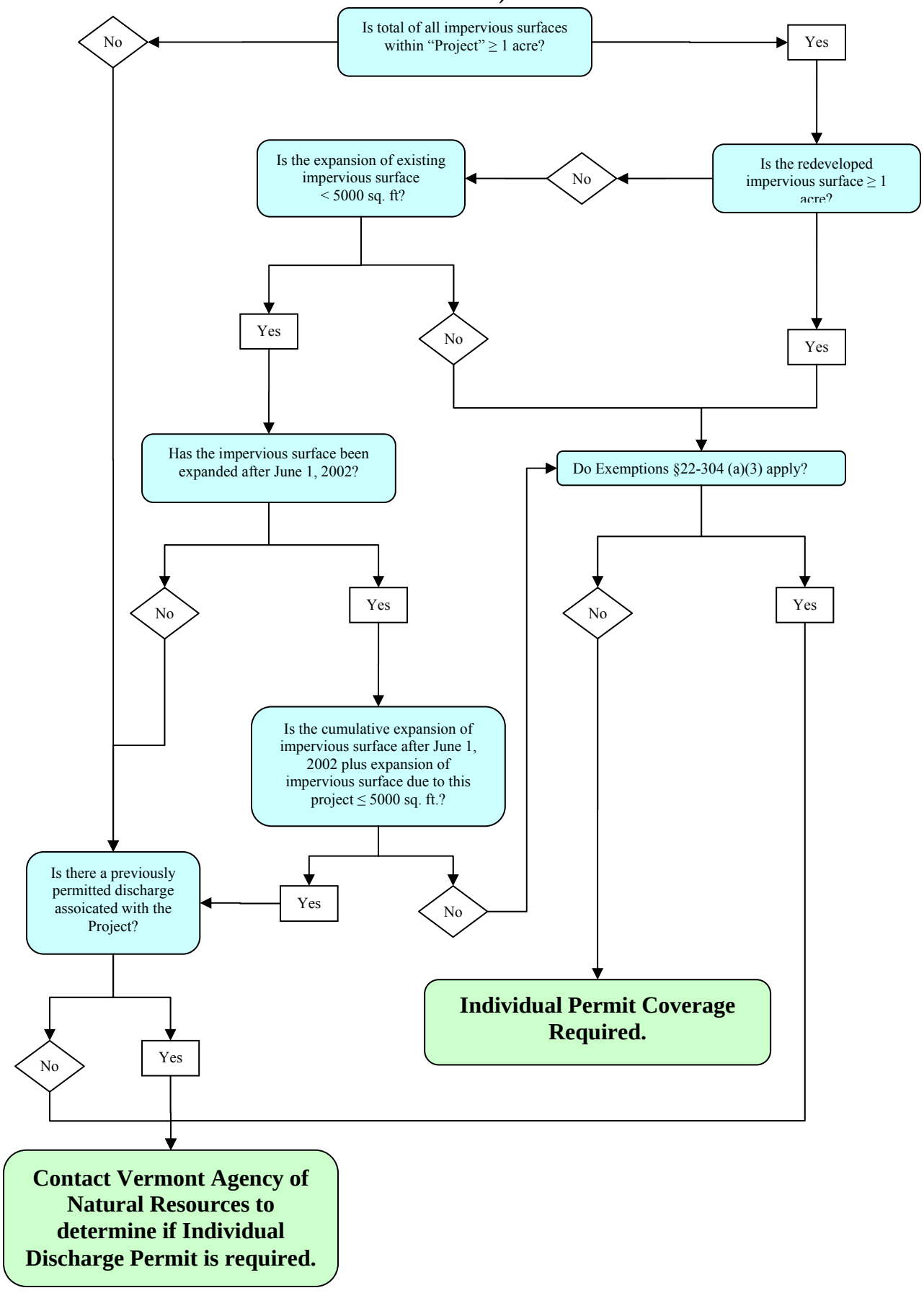
E.1 Expansion of Existing Impervious Surface	_____ acres
E.2 Redevelopment of Existing Impervious Surface	_____ acres
E.3 Impervious surface that is not expansion or redevelopment	_____ acres
E.4 Total of all impervious surfaces	0.00 acres

Created on: April 13, 2007
Revised:

Flowchart for Determining Need for Stormwater Discharge Permit Coverage for Projects Discharging to the Unnamed Tributary to the Winooski River Watersheds (Post-Construction Operational Stormwater)



Flowchart for Determining Need for Stormwater Discharge Permit Coverage for Projects Discharging to Muddy Brook or Potash Brook Watersheds (Post-Construction Operational Stormwater)



Appendix C Technical Specifications P-156 and D-755

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ITEM P-156 TEMPORARY EROSION PREVENTION AND SEDIMENT CONTROL

DESCRIPTION

156-1.1 This item shall consist of temporary control measures as shown on the Contract Erosion Prevention and Sediment Control (EPSC) Plan or as ordered by the Engineer during the life of a contract to control water pollution, soil erosion, and siltation through the use of berms, dikes, dams, sediment basins, fiber mats, gravel, mulches, grasses, slope drains, and other approved erosion control devices or methods.

Temporary EPSC may include work outside the construction limits such as borrow pit operations, equipment and material storage sites, waste areas, and temporary plant sites.

The temporary EPSC measures contained herein shall be coordinated with the permanent erosion control measures specified as part of this contract to the extent practical to assure economical, effective, and continuous erosion control throughout the construction period.

This item shall also consist of all work required to maintain compliance with the Vermont Agency of Natural Resources (ANR) Authorization for this project including, but not limited to, modifications to and maintenance of the EPSC Plan, preparation of a Winter EPSC Plan, inspection and maintenance of EPSC measures, re-evaluation of site risk when necessary, and preparing and submitting permit amendments.

MATERIALS

156-2.1 GENERAL. All materials shall conform to those shown on the plans and details and the latest edition of the Vermont Standard Specifications for Erosion Prevention and Sediment Control. Materials shall be approved by the Engineer before being constructed.

156-2.2 TEMPORARY GRASS. Grass that will not compete with the grasses sown later for permanent cover shall be a quick-growing species (such as ryegrass, Italian ryegrass, or cereal grasses) suitable to the area providing a temporary cover.

156-2.3 MULCHES. Mulches may be hay, straw, fiber mats, netting, bark, wood chips, or other suitable material reasonably clean and free of noxious weeds and deleterious materials.

156-2.4 FERTILIZER. Fertilizer shall be a standard commercial grade and shall conform to all Federal and state regulations and to the standards of the Association of Official Agricultural Chemists.

156-2.5 SLOPE DRAINS. Slope drains may be constructed of pipe, fiber mats, rubble, portland cement concrete, bituminous concrete, or other materials that will adequately control erosion.

156-2.6 ROLLED EROSION CONTROL PRODUCT. Rolled erosion control product (RECP) shall be composed of a straw fiber matrix sewn between two photo-degradable nets, such as S150 Erosion Control Blanket manufactured by North American Green or approved equal.

156-2.7 SILT FENCE. The silt fence shall consist of a woven, polypropylene geotextile fabric that is inert to biological degradation and naturally encountered chemicals, alkalies, and acids. Posts shall be a minimum of 1 inch by 1 inch and 4 feet in length. Installation shall occur in the following manner:

a. Excavate a 6 inch by 6 inch deep trench and set posts a minimum depth of 12 inches immediately downgradient of the trench. Angle the posts 10 degrees upslope for stability and self cleaning. Spacing of the posts should be completed per the manufacturer's specifications.

b. Staple the filter fabric directly to the posts, placing the bottom flap of the fabric into the trench.

c. Backfill the trench and compact so that the toe of the fabric is completely buried and firmly held by the soil.

d. No gaps shall exist in the fence. At joints in the fence, the two sections of fence shall be overlapped and stapled to two posts.

e. Sediment shall be removed once it has reached one-half the height of the barrier. Removed sediment shall be taken to an upland area and stabilized, or removed from the project site and disposed of properly.

156-2.8 PROJECT DEMARCATION FENCE. The Project Demarcation Fence shall be 1" x 1" x 4' hardwood stakes linked together by one strand of 3" wide, 3 mil thickness fluorescent orange or yellow polyethylene barricade tape. The posts shall be embedded a minimum one foot into the ground with the tape attached at the top. The posts shall be spaced at 10 feet on center with each post marked "PDF" (Project Demarcation Fence).

156-2.9 STONE CHECK DAM. Stone for check dams shall meet the following gradation requirements:

Sieve Designation	Percentage by Weight Passing Square Mesh Sieves
4 inch	80 to 100
3 inch	40 to 60
2 inch	0 to 20

For filtering, the face of the stone check dam shall be lined with ¾ inch stone meeting the following gradation requirements:

Sieve Designation	Percentage by Weight Passing Square Mesh Sieves
1 inch	100
3/4 inch	90 to 100
3/8 inch	20 to 55
No. 4	0 to 10
No. 8	0 to 5

156-2.10 STORM DRAIN INLET FILTER. Storm drain inlet filters shall consist of a wood frame constructed from 2"x4" wood surrounded by filter fabric. The frame shall be staked into the ground with standard 2"x4" wood or equivalent metal with a minimum length of 3 feet. Stakes shall be spaced evenly around the inlet 3 feet apart and driven a minimum of 18" deep. Spans greater than 3 feet may be bridged with the use of wire mesh behind the filter fabric for support. The filter fabric shall be embedded 1 foot minimum below ground and backfilled, and shall be securely fastened to the stakes and frame. A 2"x4" wood frame shall be constructed around the crest of the fabric for overflow stability.

If the contractor opts to use stone for storm drain inlet filters, 1 ½" stone shall be used that meets the following gradation requirements:

Sieve Designation	Percentage by Weight Passing Square Mesh Sieves
1 3/4 inch	100
1 1/2 inch	90 to 100
1 inch	20 to 55
3/4 inch	0 to 15
3/8 inch	0 to 5

Stone meeting the gradation requirements for ¾ inch stone will placed against the face of the 1 ½" stone.

156-2.11 STABILIZED CONSTRUCTION ENTRANCE. Stone for Stabilized Construction Entrances shall meet the following gradation requirements:

Sieve Designation	Percentage by Weight Passing Square Mesh Sieves
4 inch	80 to 100
3 inch	40 to 60
2 inch	0 to 20

156-2.12 CONTAINMENT DIKE/SWALE. The containment dike shall be constructed out the material excavated to construct the swale. The contractor may use excavated materials on-site or borrow material to raise the elevation of the dike as necessary.

CONSTRUCTION REQUIREMENTS

156-3.1 GENERAL. In the event of conflict between these requirements and pollution control laws, rules, or regulations of other Federal, state, or local agencies, the more restrictive laws, rules, or regulations shall apply.

156-3.2 AUTHORITY OF ENGINEER. The Engineer has the authority to limit the surface area of erodible earth material exposed by clearing and grubbing, to limit the surface area of erodible earth material exposed by excavation, borrow and fill operations, and to direct the Contractor to provide immediate permanent or temporary pollution control measures to minimize contamination of adjacent streams or other watercourses, lakes, ponds, or other areas of water impoundment, and to ensure compliance with the terms of the Vermont Agency of Natural Resources Authorization.

156-3.3 ON-SITE PLAN COORDINATOR. The Contractor shall designate a person, herein named the On-Site Plan Coordinator, who is directly responsible for the on-site implementation and maintenance of the Erosion Prevention and Sediment Control (EPSC) Plan. This person shall generally be on-site on a daily basis during active construction, and have the authority to halt construction activities if necessary. The On-Site Plan Coordinator shall have demonstrated experience in construction practices as they relate to erosion prevention and sediment control as well as a general understanding of State and Federal environmental regulations and permits pertaining to the National Pollutant Discharge Elimination System Construction Program. The On-Site Plan Coordinator shall be proficient at reading and interpreting engineering and EPSC plans. Preference will be given to a Licensed Professional Civil Engineer registered in the State of Vermont or a qualified professional in erosion prevention and sediment control, certified by CPESC, Inc. or equivalent. The qualifications of the On-Site Plan Coordinator shall be included in the EPSC Plan. The Engineer, if not satisfied with the performance of the On-Site Plan Coordinator, may at any time request a replacement.

156-3.4 EROSION PREVENTION AND SEDIMENT CONTROL PLAN. For Moderate or High Risk projects, the Contractor shall use the Erosion Prevention and Sediment Control (EPSC) Plan included in the Contract documents. For Low Risk projects, as determined from the Risk Evaluation (Appendix A of Construction General Permit-3-9020(2008)), the Contractor shall use *The Low Risk Site Handbook for Erosion Prevention and Sediment Control* as the EPSC Plan.

The Contractor shall use the EPSC Plan included in the Contract and, at the onset of construction as well as throughout the duration of the project, modify it to describe changing conditions and illustrate how the criteria of the Risk Evaluation will be upheld. Modifications to the EPSC Plan shall be conducted in accordance with CGP-3-9020(2008) Parts 4 through 6. If necessary to convey the sequential nature and phases of construction activities and associated erosion prevention and sediment control measures, several plan sheets showing successive site conditions is recommended.

If a modification to the project or the EPSC Plan alters any criteria of the Risk Evaluation, an updated Risk Evaluation form shall be prepared. If upon updating the Risk Evaluation, the risk category shifts from low to moderate, or moderate to high, the Contractor shall submit all necessary permit amendments and modifications to the EPSC Plan to the Engineer for review. The Contractor shall then submit all necessary documents to ANR.

Construction activities for EPSC Plan modifications that do not require Authorization from the ANR, as defined in Part 5 of CGP-3-9020(2008), shall commence only after the modifications have been approved by the Engineer. Construction activities for EPSC Plan modifications that do require Authorization from the ANR shall commence only after that Authorization has been granted.

If the Contractor will work in disturbed areas during the winter months (October 15th to April 15th), the Contractor shall prepare a Winter Erosion Prevention and Sediment Control Plan and submit plan to the Vermont Agency of Natural Resources as an amendment to the Authorization to Discharge. Construction during winter months shall not occur until a Winter EPSC Plan has been approved by ANR.

156-3.5 SUBMITTALS AND SCHEDULE. After award of the Contract but not later than the Pre-Construction Conference, the Contractor shall submit to the Engineer any necessary modifications to the EPSC Plan, Risk Evaluation, and Notice of Intent, and schedules for accomplishment of temporary and permanent erosion control work, as are applicable for clearing and grubbing; grading; construction; paving; and structures at watercourses. The Contractor shall also submit a proposed method of erosion and dust control on haul roads and borrow pits and a plan for disposal of waste materials. Work shall not be started until the erosion control schedules and methods of operation for the applicable construction have been accepted by the Engineer. If an amendment to the ANR Authorization issued for the Contract EPSC Plan is required, or if additional Authorizations are required for the off-site waste, borrow, staging, and haul areas, the Contractor shall be responsible for preparing and submitting all necessary documentation required by ANR to receive these amendments or Authorizations.

The On-Site Coordinator shall be responsible for assuring compliance with the EPSC Plan to the extent that construction practices, construction operations, and construction work are involved.

156-3.6 MONITORING EROSION PREVENTION AND SEDIMENT CONTROL PLAN. During active construction and periods of inactivity, the On-Site Plan Coordinator shall be responsible for inspections and reporting.

a) Active Construction. Inspections shall occur once every seven calendar days and within 24 hours of the end of a storm event that results in a discharge of stormwater from the site. During the winter construction season (October 15 – April 15), inspections at all active sites shall occur daily.

At those sites determined to be Low Risk, inspections shall be conducted using the *Low Risk Site Inspection Form* included in this Specification. At those sites determined to be Moderate Risk, inspections shall be conducted using the *Moderate Risk Site Inspection Form* included in this Specification.

Immediate action shall be taken to correct the discharges of sediment, including halting or reducing construction activities as necessary until the discharge and/or condition is fully corrected. Corrective actions shall be recorded on the monitoring reports and shown on the EPSC Plan. Each report shall be signed by the On-Site Plan Coordinator.

b) Inactive Construction. Periods such as shutdown during the winter season shall require inspection and reporting of erosion prevention and sediment control measures. The On-Site Plan Coordinator shall contact the Engineer prior to conducting any inspections, and the inspections shall be conducted at least once every 30 days, and within 24 hours of any storm or significant snow melt event that may cause stormwater runoff to leave the construction site. The Contractor shall provide, within 24 hours, the necessary personnel, equipment, and materials to repair or correct any deficiencies found during inspection. All deficiencies and corrective measures taken shall be documented on the reports.

Copies of all reports shall be submitted to the Engineer within 24 hours of inspection or corrective measures taken. Copies of all reports shall be kept on-site in the Contractor's project files.

156-3.7 MAINTENANCE OF EROSION PREVENTION AND SEDIMENT CONTROL PLAN. This work shall consist of all labor and equipment for field maintenance of erosion prevention and sediment control Contract items as well as materials for additional measures necessary to correct deficiencies that develop during construction that lessen the performance of the EPSC Plan. Erosion prevention and sediment control measures shall be maintained by the Contractor and removed when authorized by the Engineer. The Contractor shall establish vegetation in all areas disturbed during removal of the erosion prevention and sediment control measures.

Any maintenance required due to the failure of the Contractor to follow the EPSC Plan in its accepted form shall be done at the Contractor's expense.

156-3.8 CONSTRUCTION DETAILS. The Contractor will be required to incorporate all permanent erosion control features into the project at the earliest practicable time as outlined in the accepted schedule. Except where future construction operations will damage slopes, the Contractor shall perform the permanent seeding and mulching and other specified slope protection work in stages, as soon as substantial areas of exposed slopes can be made available. Temporary erosion and pollution control measures will be used to correct conditions that develop during construction that were not foreseen during

the design stage; that are needed prior to installation of permanent control features; or that are needed temporarily to control erosion that develops during normal construction practices, but are not associated with permanent control features on the project.

Where erosion is likely to be a problem, clearing and grubbing operations should be scheduled and performed so that grading operations and permanent erosion control features can follow immediately thereafter if the project conditions permit; otherwise, temporary erosion control measures may be required between successive construction stages.

The Engineer will limit the area of clearing and grubbing, excavation, borrow, and embankment operations in progress, commensurate with the Contractor's capability and progress in keeping the finish grading, mulching, seeding, and other such permanent control measures current in accordance with the accepted schedule.

In the event that temporary erosion prevention and sediment control measures are required due to the Contractor's negligence, carelessness, or failure to install permanent controls as a part of the work as scheduled, such work shall be performed by the Contractor at his/her own expense.

The Engineer may increase or decrease the area of erodible earth material to be exposed at one time as determined by analysis of project conditions.

The erosion control features installed by the Contractor shall be acceptably maintained by the Contractor during the construction period.

Whenever construction equipment must cross watercourses at frequent intervals, and such crossings will adversely affect the sediment levels, temporary structures should be provided.

Pollutants such as fuels, lubricants, bitumen, raw sewage, wash water from concrete mixing operations, and other harmful materials shall not be discharged into or near rivers, streams, and impoundments or into natural or manmade channels leading thereto.

METHOD OF MEASUREMENT

156-4.1 Temporary erosion and pollution control work required which is not attributed to the Contractor's negligence, carelessness or failure to install permanent controls will be performed as scheduled or ordered by the Engineer.

The quantity of Temporary Erosion Prevention and Sediment Control, including but not limited to berms, dikes, dams, sediment basins, gravel, mulches, temporary grasses, slope drains, and other approved erosion control devices or methods shown on the Authorized Erosion Prevention and Sediment Control Plan, to be measured for payment will be on a lump sum basis for all completed and accepted work. Temporary Erosion Prevention and Sediment Control shall be implemented in accordance with all applicable documents

including but not limited to the EPSC Plan, ANR Authorization(s), and amendments to ANR's Authorization(s).

The quantity of Temporary Erosion Prevention and Sediment Control shall not include Project Demarcation Fence, Silt Fence, and Rolled Erosion Control Product. Project Demarcation Fence, Silt Fence and Rolled Erosion Control Product shall be paid for as directed later in this specification.

The quantity of Temporary Erosion Prevention and Sediment Control shall not include permanent stabilization with Topsoiling and Seeding. Topsoiling and Seeding shall be paid for as directed in Specification T-901 Topsoiling and Seeding.

156-4.2 The quantity of Erosion Prevention and Sediment Control Plan to be measured for payment will be on a lump sum basis for all completed and accepted work. Any preparation of documents, including but not limited to updates to the Erosion Prevention and Sediment Control Plan (including preparation of a Winter EPSC Plan), Risk Evaluation, and permit amendments, required to maintain compliance with the permit issued for the project, will not be measured and paid for directly but shall be considered as subsidiary obligation of the Contractor with costs included in the contract prices bid for Erosion Prevention and Sediment Control Plan.

156-4.3 The quantity of Project Demarcation Fence will be measured on a linear foot basis for all completed and accepted work.

156-4.4 The quantity of Silt Fence will be measured on a linear foot basis for all completed and accepted work.

156-4.5 The quantity of Rolled Erosion Control Product for temporary and permanent stabilization will be measured on a square yard basis for all completed and accepted work.

156-4.6 Control work performed for protection of construction areas not included in the EPSC Plan, such as borrow and waste areas, haul roads, equipment and material storage sites, and temporary plant sites, will not be measured and paid for directly but shall be considered as a subsidiary obligation of the Contractor with costs included in the contract prices bid for Temporary Erosion Prevention and Sediment Control.

Preparation and submission of documents for borrow and waste areas, haul roads, equipment and material storage sites, and temporary plant sites, including an Erosion Prevention and Sediment Control Plan, required to obtain permit amendments and/or additional Authorizations from ANR, will not be measured and paid for directly but shall be considered as subsidiary obligation of the Contractor with costs included in the contract prices bid for Erosion Prevention and Sediment Control Plan.

BASIS OF PAYMENT

156-5.1 Accepted quantities of Temporary Erosion and Sediment Control will be paid for at the Contract lump sum price. Payment will be full compensation for furnishing, transporting, handling, and placing temporary erosion prevention and sediment control measures in accordance with the EPSC Plan, and for furnishing all labor, tools, equipment, maintenance, and incidentals necessary to complete the work and maintain compliance with the ANR Authorization. Payment will also be full compensation for inspection and maintenance of temporary erosion and sediment control measures throughout the duration of the construction. Partial payments will be made as follows:

(a) The first payment of 50 percent of the lump sum price for Temporary Erosion Prevention and Sediment Control will be paid for after implementation of all measures shown on the Pre-Construction Plan.

(b) The second payment of 35 percent of the lump sum price for Temporary Erosion Prevention and Sediment Control will be made on the first estimate following the completion of 50 percent of the project.

(c) The third payment of 15 percent of the lump sum price for Temporary Erosion Prevention and Sediment Control will be made upon final and complete stabilization of the site and when all temporary erosion prevention and sediment control measures have been removed.

156-5.2 The accepted quantity of Erosion Prevention and Sediment Control Plan will be paid for at the Contract lump sum price. Payment will be full compensation for EPSC Plan modifications, submittals, record keeping and all incidentals necessary to complete the work. Subsequent modifications to the EPSC Plan required during construction, including but not limited to submissions required for winter construction, will be considered incidental to the item. Partial payments will be made as follows:

(a) The first payment of 50 percent of the lump sum price for the EPSC Plan will be paid for after preparation and submission of the EPSC Plan to ANR, and upon receiving Authorization from ANR.

(b) The second payment of 35 percent of the lump sum price for the EPSC Plan will be made on the first estimate following the completion of 50 percent of the project.

(c) The third payment of 15 percent of the lump sum price for the EPSC Plan will be made when the project is substantially complete, and ANR has recognized the Notice of Termination submitted by the Contractor.

156-5.3 The accepted quantity of Project Demarcation Fence will be paid for at the contract unit price per linear foot. Payment will be full compensation for furnishing all

materials, for preparing and placing these materials, and for all labor, equipment tools, and incidentals necessary to complete the item.

156-5.4 The accepted quantity of Silt Fence will be paid for at the contract unit price per linear foot. Payment will be full compensation for furnishing all materials, for preparing and placing these materials, and for all labor, equipment tools, and incidentals necessary to complete the item.

156-5.5 The accepted quantity of Rolled Erosion Control Product will be paid for at the contract unit price per square yard. Payment will be full compensation for furnishing all materials, for preparing and placing these materials, and for all labor, equipment tools, and incidentals necessary to complete the item.

Payment will be made under:

Item P-156-5.1	Temporary Erosion Prevention and Sediment Control per Lump Sum
Item P-156-5.2	Erosion Prevention and Sediment Control Plan per Lump Sum
Item P-156-5.3	Project Demarcation Fence per Linear Foot
Item P-156-5.4	Silt Fence per Linear Foot
Item P-156-5.5	Rolled Erosion Control Product per Square Yard

END OF ITEM P-156

ITEM D-755 PERMITTED STORMWATER MANAGEMENT SYSTEM CERTIFICATION

DESCRIPTION

755-1.1 This item shall consist of work required to certify that permitted stormwater management systems are constructed in accordance with the contract plans and specifications and the conditions outlined in the stormwater discharge permit issued by the Vermont Agency of Natural Resources.

DEFINITIONS

755-2.1 Permitted stormwater management system shall mean a system that has been authorized by the Vermont Agency of Natural Resources (VANR) to collect, convey, treat and detain stormwater, including but not limited to drainage pipes, inlets, ponds, wetlands, open channels, underground storage/infiltration/filtering facilities, etc.

755-2.2 Professional Engineer shall mean an individual who is licensed to practice engineering in the State of Vermont.

REQUIREMENTS

755-3.1 Inspection. Upon final stabilization of the construction site, the Contractor is responsible for ensuring that the stormwater management system constructed with this project is certified by a Professional Engineer licensed in the State of Vermont. The Professional Engineer shall inspect the system to determine if it was constructed in accordance with the contract plans and specifications and the stormwater discharge permit issued for the project.

755-3.2 Compliance. Upon completion of the inspection, the Professional Engineer shall categorize the project under one of the following categories.

> **Compliance** – the stormwater management system was constructed in compliance with the contract plans and specifications and the stormwater discharge permit issued for the project. No further action.
>
> **Conditional Compliance** – the stormwater management system was constructed in compliance with the contract plans and specifications, however routine maintenance is required to bring the system into compliance with the stormwater discharge permit issued for the project. If the system is determined to be in Conditional Compliance, the Professional Engineer shall furnish to the Contractor a punch list of routine maintenance actions required to bring the stormwater management system into compliance. The Contractor shall be responsible for completing required maintenance actions in accordance with the Professional Engineer's punch list at no cost to the Burlington International Airport. Upon completion of routine maintenance, the Professional Engineer will re-inspect the system to determine compliance. Construction of the

stormwater management system will be considered complete only after the Professional Engineer has determined that the Contractor has completed the required maintenance actions.

Non-Compliance - The stormwater management system was not built in accordance with the contract plans and specifications or has "substantially deteriorated" due to construction activities, and therefore is not currently operating in compliance with the stormwater discharge permit issued for this project. "Substantially deteriorated" means the condition of a stormwater treatment practice that would necessitate repair or reconstruction beyond that which would be considered typical, periodic maintenance for a system of similar design. If the system is determined to be in Non-Compliance, the Professional Engineer shall furnish to the Contractor a punch list of repair or reconstruction actions required to bring the stormwater management system into compliance. The Contractor shall be responsible for completing all necessary repair or reconstruction activities in accordance with the Professional Engineer's punch list at no cost to the Burlington International Airport. Upon completion of routine maintenance, the Professional Engineer will re-inspect the system to determine compliance. Construction of the stormwater management system will be considered complete only after the Professional Engineer has determined that the Contractor has completed the required repair/reconstruction actions.

755-3.3 Certification. Upon final completion of stormwater management system construction, including all necessary maintenance and repairs, the Professional Engineer shall submit a completed Stormwater Management System Certification, signed and stamped by said Professional Engineer, to the Burlington Airport Engineer. The Professional Engineer shall submit additional copies of the certification to all other required parties if directed by the stormwater discharge permit issued for the project.

METHOD OF MEASUREMENT

755-4.1 The quantity of Permitted Stormwater Management System Certification, including but not limited to inspection, routine maintenance, repairs and/or reconstruction, and certification to be measured for payment will be on a lump sum basis for all completed and accepted work.

BASIS OF PAYMENT

755-5.1 Accepted quantities of Permitted Stormwater Management System Certification will be paid for at the Contract lump sum price. Payment will be full compensation for inspection, routine maintenance, repairs, reconstruction, and certification and for furnishing all labor, tools, equipment, maintenance, and incidentals necessary to complete the work and obtain certification.

Payment will be made under:

Item D-755-5.1 Permitted Stormwater Management System Certification per Lump Sum

END OF ITEM D-755

ITEM D-755 STORMWATER MANAGEMENT SYSTEM CERTIFICATION

TO BE COMPLETED BY PROFESSIONAL ENGINEER LICENSED IN THE STATE OF VERMONT IMMEDIATELY UPON FINAL STABILIZATION OF THE PROJECT SITE

1. Name of Project:

2. Contractor:

3. Construction Completion Date:

4. Stormwater Discharge Permit Number:

5. Permit Issuance Date:

6. Professional Engineer's Certification: Check **only one** of the following:

I hereby certify that in the exercise of my reasonable professional judgement that the stormwater management system falls into the following category:

☐ **Compliance.** The stormwater management system has been built in accordance with the contract plans and specifications and is currently operating in compliance with the stormwater discharge permit issued for this project.

☐ **Conditional Compliance.** The stormwater management system has been built in accordance with the contract plans and specifications, however routine maintenance is required to bring the system into compliance with the stormwater discharge permit. Attach description of required maintenance.

☐ **Non-Compliance.** The stormwater management system has not been built in accordance with the contract plans and specifications or has "substantially deteriorated," and therefore is not currently operating in compliance with the stormwater discharge permit issued for this project. "Substantially deteriorated" means the condition of a stormwater treatment practice that would necessitate repair or reconstruction beyond that which would be considered typical, periodic maintenance for a system of similar design. Attach a description of the construction to be performed to ensure stormwater management system is constructed in accordance with the contract plans and specifications and the terms of the stormwater discharge permit issued for this project.

_____ _____

Signature Title

_____ _____

Print or Type Name and address Date of Inspection

7. Submit signed and stamped copy to Burlington International Airport Engineer for record keeping. Additional copies of the certification shall be submitted to all other required parties if directed by the stormwater discharge permit issued for the project.

Appendix D Storm Sewer System Mapping

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Stantec

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Consultants

Legend

- EIV APPROXIMATE PERIMETER BOUNDARY
- APPROXIMATE LEASE LINE(S) TO FEDERAL GOVERNMENT
- EIV APPROXIMATE RUNWAY SAFETY AREA

Notes

NOTES:

1. PROPERTY LEASE BOUNDARIES ARE FROM AIR SURVEYING AND SHALL BRIEF LANDSCAPE ELEVATIONS TO DETERMINE EXPOSED EXTENT OF THE CONTAMINATED GROUNDWATER PLUME.
2. KEY TO SOURCE DESIGNATIONS IN THE PROFESSIONAL ENGINEER CERTIFICATION FORM. SEE KEY AT THE PERIMETER, POINT SOURCES IN THE PLUME.
3. A NEW PERMIT, FROM THE AUTHORITY OF 2011, HAS BEEN ISSUED BY A GROUP OF CONSTRUCTION AND INDUSTRIAL ACTIVITIES (CGP) THAT ARE LOCATED WITHIN THE PERIMETER OF THE AIRPORT. THE PERMIT DO NOT REQUIRE AUTHORITY COVER THE AIRPORT PROPERTY. THE AIRPORT AND THE TENANTS SHARE RESPONSIBILITY FOR THE PERMIT. THE AIRPORT IS RESPONSIBLE FOR AREAS FROM WHICH STORMWATER IS TO WATER BODY AREAS.
4. THE STORMWATER SYSTEM LOCATIONS SHOWN ON THIS DRAWING ARE BASED ON AVAILABLE INFORMATION. THE SYSTEM IS LARGE AND COMPLEX AND IT IS POSSIBLE THAT SOME OF THE SYSTEM IS NOT SHOWN. IF ANY ADDITIONAL SYSTEMS ARE FOUND, THEY SHALL BE ADDED TO THE SYSTEM AND TREATED AS SUCH. IF ANY SYSTEMS SHOWN ON THIS DRAWING ARE NOT FOUND, THEY SHALL BE REMOVED FROM THE SYSTEM AND NOT TREATED. PRIORITY CHANGES TO THE SYSTEM MAY BE APPROVED.

Environmental Layout

DRAINAGE DISCHARGE POINT
- DP_ FINAL DISCHARGE TO MUDDY BROOK
- MB_ INTERNAL DISCHARGE TO MUDDY BROOK
- WB_ ALONG INTERNAL GUARD AVENUE
- PS_ TO POTABLE WATER
- C_ TO UNNAMED TRIBUTARY OR WINOOSKI RIVER
- TB_ TO EA BURLINGTON SANDPIT, DISCHARGE STORMWATER
- DA_ STORMWATER DISCHARGE DIAPLOM POINT

BMP (BEST MANAGEMENT PRACTICE)
- BMP_ STORMWATER DETENTION BASIN
- BMP_ STORMWATER INFILTRATION CHAMBER
- BMP_ OIL/GREASE SEPARATOR
- BMP_ EXPLOSIVES SAND FILTER
- BMP_ SOIL CONDITIONING BERMS

PPS (POTENTIAL POLLUTION SOURCE)
- PPS_ CONTAINMENT STORAGE
- PPS_ AIRCRAFT DE-ICING
- PPS_ GAS/FUEL PUMP OR STORAGE
- PPS_ OLD DISPOSAL STORAGE
- PPS_ MEDICAL BIOHAZARD LOCATION

35 BUILDING NUMBER, SEE TABLE 1 OF REPORT

- DRAINAGE MANHOLE
- DRAINAGE MANHOLE (NOT EIV RESPONSIBILITY)
- DITCH INLET
- DITCH INLET (NOT EIV RESPONSIBILITY)

01-040-0 DRAINAGE STRUCTURE NUMBER

DIRECTION OF FLOW

Revisions

No.	Description	Date	By	Appd.

Issued

No.	Description	Date	By	Appd.
0	Issued for Permit	2016.09.30		

Permit/Seal

Client/Project

CITY OF BURLINGTON
BURLINGTON INTERNATIONAL AIRPORT

Title

MULTI - SECTOR GENERAL PERMIT (MSGP) SITE DRAINAGE MAP

Project No.	Scale
195310744	1":200'
Drawing No.	Sheet / Revision
1	1 of 2 / 0

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Appendix E Master Inspection and Reporting Schedule for Long Term BMPs and All Previously Issued Permits

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Burlington International Airport
Stormwater Permit Inspection and Reporting Summary

PERMIT			DISCHARGE INFORMATION			DATES						OTHER
Permit Number	**Permit / Project Name**	**Project Design Information**	**Receiving Water**	**Area No. & Discharge Point**	**Manner of Discharge**	**Effective Date**	**Expiration Date**	**Reapplication Date**	**Annual Inspection**	**Annual Inspection Report**	**Restatement of Compliance**	**Notes**
3028-9010.A	City of Burlington, Burlington International Airport	BTV's Master Permit. Authorizes discharge from following systems (old permit number is in parenthesis):		See drawing "MSGP Site Map Overlaid on an Aerial Photograph" for locations of areas and dishcarge points	As Described in Permit #3028-9010.A	December 22, 2009	December 22, 2019	October 22, 2019	Between conclusion of spring snow melt and June 15th. See Operations and Maintenance Manual for Permit #3028-9015.A	April 1st following each reporting year.	Restatement of Compliance submitted on April 1, 2013.	1.Check with ANR to see if permit has been filed with City Clerk. 2. Need drawings for all systems.
		1. BTV North Outfall Improvements and Rehab. Of Oil/Water Separator w/ Vortechnics Unit (3028-9010) and BTV North Outfall and Taxiway Improvements (4-0838)	S/N 001 - Unnamed Tributary of the Winooski River: **BMP 1**	AREA 6 Q001								
		3. North End Terminal Expansion and Concrete Apron - NOTE II (3972-9015)	S/N 002 - Unnamed Tributary of the Winooski River and groundwater in Winooski River watershed: **BMP 2**	AREA 6 Q001								
		4. Terminal Roadway and Parking Project - TRAP (1-1580)	S/N 003 - Unnamed Tributary of the Winooski River	AREA 6 Q001								
			S/N 004 - Groundwater in Winooski River watershed: **BMP 6**	AREA 6 Q001								
		5. Pratt & Whitney Facility (1-1270)	S/N 005 - Wetland Tributary to Muddy Brook	AREA 9 MU02								
			S/N 006 - Wetland Tributary to Muddy Brook	AREA 9 MU02								
		6. Aviation Support Hangar - ASH (3845-9015)	S/N 007 - Wetland Tributary to Muddy Brook	AREA 9 MU02								
		7. South End Development Phase 2 - SED, Phase 2 (4026-9015)	S/N 008 - Wetland Tributary to Muddy Brook	AREA 9 MU02								
		8. Quarry Overflow Parking Project (3028-9015)	S/N 009 - Groundwater in the Muddy Brook watershed	AREA 10 GROUND								
1-1391	Burlington International Airport "South Apron Expansion"	Edwards and Kelsey, Inc plans: Sheet 13, 18, and 19 of 34 dated 8/18/99	S/N 001 - Groundwater in Potash Brook Watershed: **BMP 4**	AREA 11 PO05	S/N 001 - Infiltrates into groundwater via perforated pipes after pre-treatment in Vortechnics unit	December 9, 1999	September 30, 2004	March 31, 2004	Between conclusion of spring snow melt and June 15th. See Operations and Maintenance Manual for Permit #1-1391.	April 1st following each reporting year.	N/A	1. Missing copy of permit. 2. Missing copy of permitted plans & as-built drawings. 3. Have 3 construction plans.
1-0839	Burlington International Airport Redirect Airfield Drainage to North Outfall and Taxiway A Improvements	Hoyle Tanner and Associates 1983, August 1986, February 1989, January and March 1990, Wiemann-Lamphere, Architects (Sept. 1985)	S/N 001- Unnamed tributary to Winooski River **(no longer covered under this permit, discharge point amended to Permit #3028-9010.A)**	NO LONGER COVERED UNDER THIS PERMIT	S/N 001 - via network of catch basins and storm drains and rip rapped outlet. network includes grass swales, trench drain on terminal apron , leaching catch basins and oil water separator and section of perforated storm drain pipe.	June 11, 1990	March 31, 1995	September 30, 1994	Quarterly	April 1st following each reporting year.	N/A	1. Missing copy of permitted plans & as-built drawings.
			S/N 002 - Unnamed tributary to Potash Brook: **BMP 7**	PO01	S/N 002 - via overland flow across vegetated terrain to a network of catch basins through perforated storm drains including a series of lateral exfiltrating underdrains.				Quarterly			
			S/N 003 - Unnamed tributary to Potash Brook **(no longer covered under this permit, area was redeveloped under Permit #3028-INDS.A)**	NO LONGER COVERED UNDER THIS PERMIT	S/N 003 - via overland flow across vegetated terrain to a network of catch basins through perforated storm drains.				Quarterly			
									Quarterly			
									January 31st ANNUALLY			
		Stantec drawings. Dated 5/28/2009: 1, "Stormwater Management Plan" 16, "Grading and Drainage Plan, Sheet 1 of 2"	S/N 001 - Muddy Brook	AREA 9 MU02	SN001 - Stormwater runoff from taxiway surfaces via sheet flow over designated disconnection areas then via overland flow discharging to groundwater, closed collection system or conveyance swale, then discharging to Muddy Brook. Stormwater runoff from runway & taxiway surfaces via sheet							1. Need to file permit with City Clerk

Burlington International Airport
Stormwater Permit Inspection and Reporting Summary

PERMIT			DISCHARGE INFORMATION			DATES						OTHER
Permit Number	**Permit / Project Name**	**Project Design Information**	**Receiving Water**	**Area No. & Discharge Point**	**Manner of Discharge**	**Effective Date**	**Expiration Date**	**Reapplication Date**	**Annual Inspection**	**Annual Inspection Report**	**Restatement of Compliance**	**Notes**
3028-INDS.A	Reconstructed Taxiways 'B' and 'C', and relocated Taxiway 'J' and newly constructed Taxiway 'G'	17, Grading and Drainage Plan, Sheet 2 of 2" 19, "Drainage Details" 21, "Typical Sections" 22, "Typical Sections and Pavement Details" **Campbell & Paris drawings.** Dated 3/25/2009: SW2 & SW3, "Stormwater Management Plan" (last revised 2/2010) SW4-SW7, "Stormwater Management Plan" Dated 5/14/2009: 20 & 21, "Schedule 1 Grading and Drainage Plan" 22, "Schedule 2 Grading and Drainage Plan" 36, "Pavement and Typical Sections & Misc. Details" 20A, "Schedule IV Grading and Drainage Plan" (last revised 5/2009)			runoff from runway & taxiway surfaces via sheet flow for treatment in Grass Channels #1-4 with underdrains (dry swales), routed to a closed collection system, then discharging to Muddy Brook.	September 10, 2010	September 10, 2015	July 10, 2015	Between conclusion of spring snow melt and June 15th. See Operations and Maintenance Manual for Permit #3028-INDS.A	April 1st following each reporting year.	Every 3 years. First restatement of compliance due on September 10, 2013.	
			S/N 002 - Class 2 wetland contiguous to Potash Brook	AREA 11 PO01	S/N 002 - Stormwater runoff from taxiway surfaces via sheet flow over designated disconnection areas then via overland flow discharging to closed collection system, then Class 2 wetland contiguous to Potash Brook.							
3028-INDS.1	Burlington International Airport BTV Reconstruct, Mark & Groove Runway 15-33 AIP No. 3-50-0005-XX	**Hoyle, Tanner & Associates Drawings.** Dated March 2010: G1.3, "Phasing Plan" TS1.1, "Typical Sections Runway 15-33" TS1.2, "Typical Sections Runways 15-33, and 1-19 and Taxiway 'A' TS1.3, "Typical Sections Taxiway 'H' and Taxiway 'B' GR1.1, "Grading and Drainage Plan Sta. 93+00 to Sta. 107+00" GR1.2, "Grading and Drainage Plan Sta. 107+00 to Sta. 121+00" GR1.3, "Grading and Drainage Plan Sta. 121+00 to Sta. 135+00" GR1.4, "Grading and Drainage Plan Sta. 135+00 to Sta. 149+00" GR1.5, "Grading and Drainage Plan Sta. 149+00 to Sta. 163+00" GR1.6, "Grading and Drainage Plan Sta. 163+00 to Sta. 176+25" GR1.7, "Grading and Drainage Plan Sta. 176+25 to Sta. 188+00" GR1.8, "Grading and Drainage Plan Detention Areas 1 and 2" DR1.1, "Drainage Details" DR1.2, "Detention Area Details Area #1 and #2" DR1.3, "Detention Area Details Area #3 and #4" PD1.1, "Pre-Development Drainage" PD1.2, "Pre-Development Drainage" PD1.3, "Pre-Development Drainage"	S/N 001 - Unnamed Tributary of the Winooski River: **BMP 11**	Area 6: Q001 S1.003.8.1	S/N 001 - Stormwater runoff from taxiway and runway surfaces via disconnected sheet flow over vegetated areas, then to catch basin and pipe, closed drainage system, dischraging to an unnamed tributary of the Winooski River. - Stormwater runoff from taxiway and runway surfaces via disconnected sheet flow over vegetated areas, then overland to a dry swale (detention area #3), discharging to catch basin and pipe, closed drainage system to an unnamed tributary of the Winooski River.	May 14, 2010	May 14, 2015	February 14, 2015	Between the conclusion of spring snow melt and June 15th of each year. See Operations and Maintenance Manual for Permit #3028-INDS.1	April 1st following each reporting year.	Every 3 years. First restatement of compliance due on May 14, 2013	1. Need to file permit with City Clerk
			S/N 002 - Unnamed Tributary of the Winooski River: **BMP 12** and **13**	Area 2: NG001-P NG002-N NG003-O NG004-M	S/N 002 - Stormwater runoff from taxiway and runway surfaces via disconnected sheet flow over vegetated areas, then to catch basin and pipe, closed drainage system discharging to an unnamed tributary of the Winooski River. - Stormwater runoff from taxiway and runway surfaces via disconnected sheet flow over vegetated areas, then overland to an undergraound detantion system (detention area #1), then to catch basin and pipe, closed drainage system discharging to an unnamed tributary of the Winooski River. - Stormwater runoff from taxiway and runway surfaces via disconnected sheet flow over vegetated areas and via channel flow, to catch basin and pipe, closed drainage system, routed to an underground detention area (detention area #2), infiltrating to groundwater, and discharging to closed drainage system to an unnamed tributary of							
			S/N 003 - Existing VTANG Stormwater System, Unnamed Tributary of the Winooski River	NOT COVERED UNDER THIS SWPPP	S/N 003 - Stormwater runoff from taxiway and runway surfaces via disconnected sheet flow over vegetated areas, then overland to a grass swale, routed to the Vermont Air National Guard closed drainage system, discharging to an unnamed tributary to the Winooski River.							
			S/N 004 - Infiltration into groundwater in the Muddy Brook Watershed: **BMP 8**	AREA 7 GROUND	S/N 004 - Stormwater runoff from taxiway and runway surfaces via disconnected sheet flow over vegetated areas, then overland to existing closed drainage infiltration system, discharging to groundwater in the Muddy Brook watershed.							
			S/N 005 - Direct discharge to Muddy Brook	AREA 9 DO18	S/N 005 - Stormwater runoff from taxiway and runway surfaces via disconnected sheet flow over vegetated areas, then overland to catch basin and pipe, closed drainage system, discharging to Muddy Brook.							
			S/N 006 - Infiltration into groundwater in the Muddy Brook Watershed: **BMP 10**	AREA 5 GROUND	S/N 006 - Stormwater runoff from taxiway and runway surfaces via disconnected sheet flow over vegetated areas, then overland and via channel flow to catch basin and pipe, closed drainage system, routed to an underground infiltration area (detention area #4), infiltrating to groundwater in the Muddy Brook watershed.							
			S/N 007 - Infiltration into groundwater in the	AREA 4 GROUND	S/N 007 - Although not included in the permit authorization, this area was included in the permit							

Burlington International Airport
Stormwater Permit Inspection and Reporting Summary

PERMIT			DISCHARGE INFORMATION			DATES						OTHER
Permit Number	**Permit / Project Name**	**Project Design Information**	**Receiving Water**	**Area No. & Discharge Point**	**Manner of Discharge**	**Effective Date**	**Expiration Date**	**Reapplication Date**	**Annual Inspection**	**Annual Inspection Report**	**Restatement of Compliance**	**Notes**
		PD2.1, "Post-Development Drainage" PD2.2, "Post-Development Drainage" PD2.3, "Post-Development Drainage"	Muddy Brook Watershed: **BMP 9**		application. This existing system is unaffected by the construction project. Stormwater runoff from runway surface then to catch basin pipe, closed drainage system, routed to an existing underground infiltration area, infiltrating to groundwater in the Muddy Brook watershed.							
3028-INDS.2	Burlington Aviation Technical Center & Vermont Flight Academy	Stantec Consulting Services, Inc: Dated 6/3/2011 unless otherwise noted below: Drawing No. SP1-Sheet 115, Drawing No. 1-Sheet 116 dated 1/27/2011, Drawing No. 1-Sheet 117 dated 1/27/2011, Drawing No. TS1-Sheet 118, Drawing No. TS2-Sheet 119, Drawing No. GP1-Sheet 120, Drawing No. DD1-Sheet 121, Drawing No. DD2-Sheet 122, Drawing No. DD3-Sheet 123, Drawing No. DD4-Sheet 124, Drawing No. DD5-Sheet 125, and the following site plans and detaiils prepared by Michael Lawrence Associates (Sheet 1 - Drawing 126, and Sheet 2 - Drawing 127, both dated 6/3/2011; and supporting information.	S/N 001 - Discharge to wetlands contiguous to Muddy Brook.	AREA 9 GROUND	S/N 001: All runoff in this subcatchment will flow towards two bioretention areas and receive water quality treatment by filtering through a bioretention medium. A portion existing impervious area, 0.82 AC, from Eagle Drive will flow into our proposed treatment system. The treated water, and waters greater than the 0.9" storm event will flow to a detention pond which will control the outlet flow rate. The New impervious area in this subcatchment is less than 10 acres.	December 7, 2011	December 7, 2016	No date found in permit language.	Annual inspection required between the conclusion of Spring snow melt and June 15th.	Annual inspection report is due by July 15th of each year.	No time period or date found in permit language.	The Burlington Aviation Center (formerly the Burlington Aviation Technical Center & Vermont Flight Academy) project has **NOT** been constructed to date. No inspection or annual report is required.
			S/N 001 - Discharge to wetlands contiguous to Muddy Brook.	AREA 9 GROUND	S/N 002: All runoff in this subcatchment will be collected in a catch basin and will directly outlet to the wetland. The new impervious area drainage to this point will be offset via site balancing at discharge point S/N 001. New impervious area in this subcatchment is less than 10 acres.							
			S/N 001 - Discharge to wetlands contiguous to Muddy Brook.	AREA 9 GROUND	S/N 003: All runoff in this subcatchment will sheet flow off the roadway directly into the wetland. The new impervious area drainage to this point will be offset via site balancing at discharge point S/N 001. New impervious area in this subcatchment is less than 10 acres.							
			S/N 001 - Discharge to wetlands contiguous to Muddy Brook.	AREA 9 GROUND	S/N 004: All runoff in this subcatchment will sheet flow off the detention basin access road. This impervious area will receive water quality treatment through disconnection of non-rooftop runoff. New impervious area in this subcatchment is less than 10 acres.							
3028-9015.1	Quarry Area Access Road	Stantec drawings. Dated 7/11/2012 including Sheet 1, "Existing Conditions Plan"; Sheet 2, "Site Plan"; and supporting information.	S/N 002 - Discharge to groundwater in the Muddy Brook watershed.	AREA 10 GROUND	S/N 001 - Note that S/N 001 is associated with the Quarry Overflow Parking Project (See Permit #3028-9010.A, S/N 009, formerly 3028-9015. S/N 002 - Stormwater runoff from proposed access road via overland sheet flow, disconnected in accordance with the Disconnection of Non-Rooftop Runoff Credit, discharging to groundwater in the Muddy Brook watershed.	November 20, 2012	November 20, 2022	September 20, 2022	Semi-annual inspection required; once in the spring after snowmelt and once in the fall prior to snowfall.	Semi-annual inspection reports are due on June 1st and November 1st of each year.	Every 5 years. First restatement of compliance due on November 20, 2017	The Quarry Area Access Road has **NOT** been constructed to date. No inspection or semi-annual report is required.
3845-INDS.A	Heritage Flight Aviation Campus Expansion	Stantec drawings. Dated June 13, 2008: GP-1, DD-1, DD-2; Dated October 22, 2009: SK-C-13.	S/N 001 - Class 2 wetland contiguous to Muddy Brook	AREA 9 MU02	S/N 001 - Runoff from roadways and rooftops conveyed by a closed collection system to a 36" reinforced concrete pipe which conveys flow to the	February 9, 2010	February 9, 2015	November 9, 2014	Between conclusion of spring snow melt and June 15th. See Operations and Maintenance Manual for Permit #3845-INDS.A	July 15th	Every 3 years. First restatement of compliance due on February 9th, 2013.	1. Need to file permit with City Clerk
			S/N 002 - Class 2 wetland contiguous to Muddy Brook	AREA 9 MU01	S/N 002 - Runoff from rooftop areas, including green roof on Heritage Flight Hangar, is collected in a closed system and conveyed to an underground cistern which overflows into a bioretention/detention basin for treatment and attenuation of peak flows. Stormwater is discharged from the basin into a stone-lined swale that runs along Eagle Drive. The stone lined swale conveys the runoff to POI #2. From POI #2, the runoff is conveyed underneath Eagle Drive to S/N 002 via an existing 24" pipe culvert.							
UIC No. 6-0084	South End Development Phase 2 (SED Phase 2)	Stantec drawings. Dated September 2007: C1 Overall Site Plan, C2 Storage Detention Site Plan, C4 Stormwater Conveyance Details, C5 Stormwater Treatment Details.	Groundwater in the Muddy Brook watershed.	AREA 9 GROUND	Stormwater containing aircraft deicing fluid (propylene glycol) discharged into an injection well in the airfield.	March 25, 2008	December 31, 2012	6/30/2012 Permit still valid under Title 9	May 31st	June 30th	N/A	1. Sample groundwater during October or November (currently being completed by VHB) 2. Sample groundwater during April or May (currently being completed by VHB)

Burlington International Airport
Stormwater Permit Inspection and Reporting Summary

PERMIT			DISCHARGE INFORMATION			DATES						OTHER
Permit Number	**Permit / Project Name**	**Project Design Information**	**Receiving Water**	**Area No. & Discharge Point**	**Manner of Discharge**	**Effective Date**	**Expiration Date**	**Reapplication Date**	**Annual Inspection**	**Annual Inspection Report**	**Restatement of Compliance**	**Notes**
UIC No. 6-0075	Aircraft De-icing Fluid Treatment Facility (ADF)	Campbell & Paris drawings. Dated 9/6/2006: Sheet 4 of 6 ADF Site Plan, Sheet 5 of 6 ADF Infiltration System Details	Groundwater in Winooski River watershed	AREA 6 GROUND	Stormwater containing aircraft deicing fluid (propylene glycol) discharged into two injection wells (Main Apron and NOTE 2).	February 9, 2007	December 31, 2011	6/30/2011 Permit still valid under Title 9	May 31st	June 30th	N/A	1. Sample groundwater during October or November (currently being completed by VHB) 2. Sample groundwater during April or May (currently being completed by VHB)
UIC No. 6-0117	Aircraft Deicing Fluid Treatment System, 890 Ramp	Stantec drawings. Dated September 29, 2010: Construct Aircraft Deicing Fluid Treatment System, 890 Ramp.	Groundwater in the Muddy Brook watershed.	AREA 9 GROUND	Stormwater containing aircraft deicing fluid (propylene glycol) discharged from the 890 Air Cargo Ramp into one Class V injection well located in the in-field near the FAA's Radar Facility.	August 10, 2012	March 31, 2017	September 30, 2016	May 31st	June 30th	N/A	1. Sample wastewater from pump ststion sump during October/November and April/May (currently being completed by VHB) 2. Sample groundwater during October or November (currently being completed by VHB) 3. Sample groundwater during April or May (currently being completed by VHB)
3-9003 MSGP	Vermont Multi-Sector General Permit for Stormwater Discharges Associated With Industrial Activity (NPDES No. VTR050001)	All stormwater runoff collection and treatment systems associated wit BMP's and PPS's.	All of the above noted Receiving Waters.	AREA Nos. 1 to 15	All of the above noted manners of Discharge.	August 4, 2011	August 4, 2016		Annual Comprehensive Site Evaluation, Monthly inspection of BMP's during deicing season, Monthly inspection of PPS's year round, and stormwater monitoring.	April 1st following each reporting year.	N/A	
3-9014 MS4	Vermont Municipal Separate Storm Sewer System General permit for Stormwater Discharges from Small Municipal Separate Storm Sewer Systems (MS4)	Miscellaneous drainage systems not specifically covered in any of the above permits. Site specific sketches have been prepared from aerial photography to show the areas involved.	So. Burlington Storm sys.	SW001	Stormwater from an enclosed system	February 19, 2004 NOTE: General Permit 3-9014 (2012) was re-issued on December 5, 2012	March 18, 2008	September 1, 2013	Annually	April 1st following each reporting year.	N/A	Flows to municipal system
			Below Aviatron building	PO02	Stormwater from an enclosed system							Maintenance garage area to Wetland W2
			Below Heritage T-Hangar	PO06	Stormwater from an enclosed system							Heritage West ramp area to Wetland W1
			Unknown system	PO07	Unknown source							From unknown source into Wetland W1, outside fence
			From the Valley	MU03	Stormwater from an enclosed system							From ramp, paved road, grassed area to Wetland W3
			From the Valley	MU04	Stormwater from an enclosed system							From ramp, paved road, grassed area to Wetland W3
			From Valley Road	MU05	Stormwater from an enclosed system							Along Valley Rd and adjacent parking to Wetland W3

Indicates Overdue.

Not Constructed to Date.

Permit No. 3028-9010A
BTV’s Master Permit

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VERMONT

Vermont Department of Environmental Conservation
Water Quality Division
103 South Main Street, Building 10 North
Waterbury, VT 05671-0408

Agency of Natural Resources

[phone] 802-241-3770
[fax] 802-241-3287

RECEIVED
JAN 04 2010
STANTEC
SOUTH BURLINGTON, VT

December 22, 2009

City of Burlington-Burlington International Airport
Attn: Heather Kendrew
1200 Airport Drive #1
South Burlington, VT 05403

Re: Authorization to Discharge Permit No. 3028-9010.A

Dear Ms. Kendrew:

Enclosed is your copy of an Amended Authorization to Discharge pursuant to General Permit 3-9010 Amended (May 2007), which has been signed by the Stormwater Program Manager of the Stormwater Management Section on behalf of the Commissioner of the Department of Environmental Conservation.

This authorizes the discharge of treated stormwater runoff from:

- the Burlington International Airport (BTV) north runway;
- the north end terminal expansion and concrete apron;
- parking lots, roofs and roads associated with expanded BTV parking facilities;
- the Pratt & Whitney Building;
- the Building 880 replacement;
- the South End Development Phase 2 Project; and
- the Quarry Overflow Parking Area.

The properties are located on Airport Drive, Army Guard Road, Eagle Drive and Aviation Avenue in South Burlington, Vermont and will discharge to an unnamed tributary of the Winooski River, groundwater in the Winooski River watershed, a wetland tributary to Muddy Brook, and groundwater in the Muddy Brook watershed.

Please read this authorization to discharge carefully and note the inspection and reporting requirements, and other operating conditions including payment of annual operating fees.

If you have any questions, please call me at (802) 241-1452.

Sincerely,

Vicki L. Hill, Environmental Technician
Stormwater Management Section

Enclosures
cc: Gregory Goyette, Stantec Consulting Services
Peter Keibel, Act 250 District Coordinator, Essex Junction

Permit Number 3028-9010.A
Project ID Number EJ96-0386

VERMONT DEPARTMENT OF ENVIRONMENTAL CONSERVATION
AMENDED AUTHORIZATION TO DISCHARGE UNDER
GENERAL PERMIT 3-9010 AMENDED (MAY 2007)

A determination has been made that the applicant:

City of Burlington -Burlington International Airport
1200 Airport Drive, #1
South Burlington, VT 05403
(Impervious area: 63.815 acres)

meets the criteria necessary for inclusion under General Permit 3-9010 Amended (May 2007). Here after the named applicant shall be referred to as the permittee. Subject to the conditions of General Permit No. 3-9010 Amended (May 2007), the permittee is authorized to discharge stormwater from the Burlington International Airport (BTV) facilities in South Burlington, Vermont as follows: (1) the BTV north runway to an unnamed tributary of the Winooski River previously described in General Permit Authorization 3028-9010 and Individual Permit No. 1-0839 discharge point 1 (S/N 001); (2) the north end terminal expansion and concrete apron to an unnamed tributary of the Winooski River and groundwater in the Winooski River watershed previously described in General Permit Authorization 3972-9015 (S/N 002); (3) parking lots, roofs and roads associated with expanded BTV parking facilities to an unnamed tributary of the Winooski River and groundwater in the Winooski River watershed previously described in General Permit Authorization 3028-9010 and Individual Permit No. 1-1580 (S/N 003-4); (4) the Pratt & Whitney Building located at 15 Eagle Drive to a wetland contiguous with Muddy Brook previously described in Individual Permit No. 1-1270 (S/N 005-6); (5) the Building 880 replacement located on Aviation Avenue to a wetland contiguous with Muddy Brook previously described in General Permit Authorization 3845-9015 (S/N 007); (6) the South End development Phase 2 project to a wetland contiguous with Muddy Brook previously described in General Permit Authorization 4026-9015 (S/N 008); and (7) the Quarry Overflow Parking Area to groundwater in the Muddy Brook watershed previously described in General Permit Authorization 3028-9015 (S/N 009).

Manner of Discharge:

S/N 001: Stormwater runoff from the airport runway via a network of catch basins and storm drains including grass-lined swales, a trench drain on the terminal apron, several dry wells and perforated storm drain pipe, then through a rip-rapped outlet, prior to discharge to an unnamed tributary of the Winooski River.

S/N 002: Stormwater runoff from the north end of the airport terminal and concrete apron via a closed system to a Vortechs/StormTech treatment system that discharges to groundwater, with overflow to an unnamed tributary to the

Winooski River. During periods of plane de-icing stormwater runoff will be diverted to a pump station and disposed of in an underground infiltration system

Note: infiltrated discharges are covered under the VTDEC Underground Injection Control Program.

S/N 003: Stormwater runoff from impervious surfaces associated with the deck of the new garage, rental car lot, long-term lot, loop road extension, garage exit ramps, and rental lot, via area drains, catch basins, grass swale and closed system to an unnamed tributary to the Winooski River.

S/N 004: Stormwater runoff from impervious surfaces associated with the employee and long-term parking lots (Catchment #2) via catch basins to a closed system to an exfiltrating sand filter to groundwater in the Winooski River watershed.

S/N 005: Stormwater runoff from the Pratt & Whitney building and parking area via grassed,swales to a collection system, then discharging to a wetland tributary to Muddy Brook.

S/N006: Stormwater runoff from the Pratt & Whitney access road via overland flow then discharging to a wetland tributary to Muddy Brook.

S/N007: Stormwater runoff from the BTV Building 880 replacement project eastern rooftop and paved parking areas via closed piping system, and from western rooftop and paved parking areas via grass channel to a closed piping system, discharging to a wetland tributary to Muddy Brook

S/N008: Stormwater runoff from paved parking areas and rooftops via sheet flow to grassed channels and pipes conveyed to an infiltration basin and Vortechnics underground storage vault, then discharging to a wetland tributary to Muddy Brook. Note: infiltrated discharges are covered under the VTDEC Underground Injection Control Program.

S/N009: Stormwater runoff from the expanded portion of the south end quarry (0.105 acres of new impervious) via overland sheet flow to vegetated areas for treatment in accordance with the Disconnection of Non-rooftop Runoff Credit and then conveyed via a grass channel to the existing quarry discharging to groundwater in the Muddy Brook watershed.

Compliance with General Permit 3-9010 Amended (May 2007) and this Authorization

The permittee shall comply with this authorization and all the terms and conditions of General Permit 3-9010 Amended (May 2007), including the payment of annual operating fees to the Department. A billing statement for such fees will be sent to the permittee each year. The first year's statement is enclosed. Any permit non-compliance, including a failure to pay the annual operating fee, constitutes a violation of 10 V.S.A. Chapter 47 and may be grounds for an enforcement action or revocation of this authorization to discharge.

Transferability

This authorization to discharge is not transferable to any person except in compliance with Part VI.D. of General Permit 3-9010 Amended (May 2007). A copy of General Permit 3-9010 Amended (May 2007) is available from the Department via the internet at http://www.vtwaterquality.org/stormwater/htm/sw_3-9010.htm

Changes to Permitted Development

In accordance with Part V.G. of General Permit 3-9010 Amended (May 2007), the permittee shall notify the Department of any planned development or facility expansions or changes that may result in new or increased stormwater discharges. The Department shall determine the appropriateness of continued inclusion under General Permit 3-9010 Amended (May 2007) by the modified development or facility.

Annual Inspection and Report

The stormwater collection, treatment and control system authorized herein shall be properly operated and maintained. An inspection shall be conducted between the conclusion of spring snow melt and June 15th of each year. The inspection shall evaluate the operation and maintenance and condition of the stormwater collection, treatment and control system. The permittee shall prepare an annual inspection report on a form available from the Department. The permittee shall submit an inspection report to the Department by July 15th of each year or by July 30th if performed by a utility or municipality pursuant to a duly adopted stormwater management ordinance.

Restatement of Compliance

Every 3 years, the permittee shall submit to the Department a written statement signed by a designer that the stormwater collection, treatment and control system authorized herein is properly operating and maintained. The first re-statement of compliance is due December 22, 2012. Failure to submit a designer's restatement of compliance shall constitute a violation of General Permit 3-9010 Amended (May 2007) and may result in the revocation of this authorization to discharge.

Filing of this Authorization with Local Land Records

In accordance with Part VI.N. of General Permit 3-9010 Amended (May 2007), the permittee shall file a copy of this authorization to discharge in the land records within seven (7) days of its issuance and a copy of the recording shall be provided to the Department within fourteen (14) days of the permittee's receipt of a copy of the recording from the local land records.

Rights to Appeal to the Environmental Court

Pursuant to 10 V.S.A. Chapter 220, any appeal of this decision must be filed with the clerk of the Environmental Court within 30 days of the date of the decision. The appellant must attach to the Notice of Appeal the entry fee of $250.00, payable to the state of Vermont. The Notice of Appeal must specify the parties taking the appeal and the statutory provision under which each party claims party status; must designate the act or decision appealed from; must name the Environmental Court; and must be signed by the appellant or their attorney. In addition, the appeal must give the address or location and description of the property, project or facility with which the appeal is concerned and the name of the applicant or any permit involved in the appeal. The appellant must also

serve a copy of the Notice of Appeal in accordance with Rule 5(b)(4)(B) of the Vermont Rules for Environmental Court Proceedings. For further information, see the Vermont Rules for Environmental Court Proceedings, available on line at www.vermontjudiciary.org. The address for the Environmental Court is 2418 Airport Road, Suite 1, Barre, VT 05641 (Tel. # 802-828-1660).

Effective Date and Expiration Date of this Authorization

This amended authorization to discharge shall become effective on December 22, 2009 and shall continue until December 22, 2019. The permittee shall reapply for coverage at least sixty (60) days prior to December 22, 2019.

Dated at Waterbury, VT this 22nd day of December, 2009.

Justin G. Johnson, Commissioner
Department of Environmental Conservation

By _____
Padraic Monks
Stormwater Program Manager

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Permit No. 1-1391
South Apron Expansion

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File No. 04-04
Permit No. 1-1391
PIN No. EJ96-0386

STATE OF VERMONT
AGENCY OF NATURAL RESOURCES
DEPARTMENT OF ENVIRONMENTAL CONSERVATION

DISCHARGE PERMIT
STORMWATER RUNOFF INTO DRAINAGE WELLS

In compliance with provisions of 10 V.S.A. 1263

Burlington International Airport
1200 Airport Drive #1
South Burlington, VT 05403

and in accordance with "Terms and Conditions" hereinafter specified, the above named permittee is hereby granted permission to discharge stormwater runoff from the taxiways and ramp from the Burlington International Airport 'South Apron Expansion', South Burlington, VT to groundwater via a stormwater drainage well.

1. Expiration Date: **September 30, 2004.** Note: This permit, unless revoked, shall be valid until the designated expiration date despite any intervening change in water quality, effluent, or treatment standards of the classification of the receiving waters, including groundwater. However, any such changed standard or classification shall be applied in determining whether or not to renew the permit pursuant to 10 V.S.A. 1263.

   Re-apply for a discharge permit by March 31, 2004.

2. Revocation: 10 V.S.A. 1267 provides as follows:

   "The Secretary may revoke any permit issued by him pursuant to this subchapter if he finds that the permit holder submitted false or inaccurate information in his application or has violated any requirement, restriction, or condition of the permit issued. Revocation shall be effective upon actual notice thereof to the permit holder."

3. Transfer of Permit: This permit is not transferable without prior written approval of the Secretary. The permittee shall notify the Secretary immediately, in writing, of any sale, lease, or other transfer of ownership of the property from which the discharge originates. The permittee shall provide a copy of this permit to the new owner or tenant and shall inform the new owner or tenant of his responsibility to make application for a permit which shall be issued in his name. Any failure to do so shall be considered a violation of this permit.

4. Right of Entry : The permittee shall allow the Secretary or their authorized representative, upon presentation of credentials, to enter the permittee's premises where the effluent sources authorized by this permit are located and at reasonable times to have access to copy any records required to be kept under the terms and conditions of this permit, and to inspect any treatment device, monitoring equipment, or monitoring method required in this permit, and to sample any discharge of pollutants.

5. Receiving Waters: Groundwater.

6. Manner of Discharge:
S/N 001 (infiltration basin trench): Stormwater from the South Apron expansion (ramp and taxiways) collected in catch basins and piped to a 'Vortechs' treatment unit, then discharging to an infiltration trench system which in turn infiltrates into the groundwater.

7. Wastes Permitted:
Stormwater runoff from the taxiways and ramp after treatment via 'Vortechs' treatment unit.

8. Volumes Permitted and Frequency of Discharge: Such volumes and frequency as required by the discharges specified in No. 6 above

9. Approved Project Design: Treatment as specified in No.7 above. The project shall be constructed and operated in accordance with the Edwards and Kelcey, Inc plans specified below, and supporting information:

Sheet 13, 18, and 19 of 34, dated 8/18/99

By reference the above noted plans are made a part of this permit.

10. Maintenance and Maintenance Reporting Requirements:

a. The permittee shall inspect the Vortechs unit and measure the accumulated sediment volume in the aluminum grit chamber **quarterly**.

b. The permittee shall remove the accumulated sediment and clean the Vortechs unit when the sediment depth has accumulated to within 6 inches of the dry-weather water level.

i. The permittee shall strictly follow the maintenance procedures prescribed by the manufacturer when removing sediment.

c. Any sediment removed from the swales, or sedimentation basin shall be disposed of properly and not within 100 feet of Waters of the State.

d. By **SEPTEMBER 30 OF EACH YEAR** a written report shall be submitted to the Department of Environmental Conservation, 103 South Main Street, Waterbury, VT 05671-0405. This report shall include, as a minimum:

i. the dates of inspection and sediment depth measurements for the year.

ii. the dates of sediment removal and an estimate of the volume removed.

f. Any stormwater devices used during construction for erosion control shall be inspected and cleaned to design specifications immediately after construction has been completed.

11. Personnel and Training Requirements: Such personnel and training as necessary to fulfill the requirements of #10 above.

12. Monitoring and Reporting Requirement:

a. ***By no later than September 30, 2001,*** the permittee shall submit a study to the Department documenting the efficiency of the 'Vortechs' unit. This study shall investigate the removal efficiency of the 'Vortechs' unit for total suspended solids (TSS) and total petroleum hydrocarbons (TPH) and shall include the following:

i. a minimum of six storm events shall be sampled.

ii. the study shall follow the same protocol as used in the Delorme Publishing Company, Yarmouth, ME. field study.

iii. sediment depth, system maintenance activities, etc. shall also be noted in the report and considered.

iv. the study shall be conducted by an independent entity other than the manufacturer of the treatment unit.

b. Other reporting required as specified in #10 above.

13. Other Requirements:

a. Treated stormwater runoff is the only waste authorized for disposal under the terms and conditions of this permit. The discharge for any hazardous materials or hazardous waste into the stormwater management system is prohibited.

b. The permittee shall contact the Agency of Natural Resources, Wastewater Management Division, within 24 hours or the next business day if a spill occurs and materials enter the stormwater collection system.

14. Issue Date of Permit: December 9, 1999

AGENCY OF NATURAL RESOURCES
Canute E. Dalmasse, Commissioner
Department of Environmental Conservation

By Marilyn J. Davis
Marilyn J. Davis, Director
Wastewater Management Division

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Permit No. 1-0839
Redirect Airfield Drainage to North Outfall

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STATE OF VERMONT
AGENCY OF NATURAL RESOURCES
DEPARTMENT OF ENVIRONMENTAL CONSERVATION

DISCHARGE PERMIT

File No. 04-14-052

Permit No. 1-0839

In compliance with provisions of 10 V.S.A. 1263

Burlington International Airport
Box 1 - Airport Drive
Burlington, Vermont 05401

and in accordance with "Terms and Conditions" hereinafter specified, the above named permittee is hereby granted permission to discharge stormwater runoff from the Burlington International Airport to an unnamed tributary of the Winooski River and an unnamed tributary of Potash Brook.

1. Expiration Date: March 31, 1995. Note: This permit, unless revoked, shall be valid until the designated expiration date despite any intervening change in water quality, effluent, or treatment standards or the classification of the receiving waters. However, any such changed standard or classification shall be applied in determining whether or not to renew the permit pursuant to 10 V.S.A. 1263.

   Reapply for a discharge permit by September 30, 1994.

2. Revocation: 10 V.S.A. 1267 provides as follows:

   "The Secretary may revoke any permit issued by him pursuant to this subchapter if he finds that the permit holder submitted false or inaccurate information in his application or has violated any requirement, restriction, or condition of the permit issued. Revocation shall be effective upon actual notice thereof to the permit holder."

3. Transfer of Permit: This permit is not transferable without prior written approval of the Secretary. The permittee shall notify the Secretary immediately, in writing, of any sale, lease, or other transfer of ownership of the property from which the discharge originates. The permittee shall also inform the new owner or tenant of his responsibility to make application for a permit which shall be issued in his name. Any failure to do so shall be considered a violation of this permit.

4. Receiving Waters:

S/N 001 - Unnamed tributary of the Winooski River.
S/N 002 - Unnamed tributary of Potash Brook.
S/N 003 - Unnamed tributary of Potash Brook.

5. Manner of Discharge:

S/N 001 - Via a network of catch basins and storm drains, through a rip-rapped outlet, prior to discharge to an unnamed tributary of the Winooski River. The drainage network includes grass-lined swales, a trench drain on the terminal apron, some leaching catch basins, an oil/water separator, and a section of perforated storm drain pipe.

S/N 002 - Via overland flow across vegetated terrain to a network of catch basins, through perforated storm drains, including a series of lateral exfiltrating underdrains, to a rip-rapped outlet, prior to discharge to an unnamed wetland, which discharges to a tributary of Potash Brook.

S/N 003 - Via overland flow across vegetated terrain to a network of catch basins, through perforated storm drains to a rip-rapped outlet, prior to discharge to an unnamed tributary of Potash Brook.

6. Wastes Permitted:

S/N 001 - Stormwater runoff from roofs, the airport terminal apron, paved runways, taxiways, roads and parking areas, following treatment by overland flow across vegetated terrain, in grass-lined drainage swales, and in an oil/water separator.

S/N 002 - Stormwater runoff from the southern section of taxiway A, following treatment by overland flow across vegetated terrain.

S/N 003 - Stormwater runoff from taxiway G3, following treatment by overland flow across vegetated terrain.

Note: Discharge point S/N 001 incorporates stormwater discharges from areas previously permitted by Amended Temporary Pollution Permit #2-0188.

7. Volumes Permitted: Such volumes as required by the discharge specified in #5 above.

8. Frequency of Discharge: Daily

9. Operation and Treatment: Treatment as specified in #6 above. For details on the treatment and conveyance of stormwater runoff for this project see the following plans and details:

Hoyle, Tanner and Associates (1983)
Wiemann-Lamphere, Architects (September 1985)
Hoyle, Tanner and Associates (August 1986)
Hoyle, Tanner and Associates (February 1989)
Hoyle, Tanner and Associates (January and March 1990)

10. Maintenance and Maintenance Reporting Requirements: All catch basins, grass-lined swales, sedimentation ponds, and other treatment and conveyance devices shall be maintained in good operating order at all times and shall be inspected at least quarterly and cleaned at such times as necessary to maintain design performance levels. NO LATER THAN JANUARY 31 OF EACH YEAR A WRITTEN REPORT SHALL BE SUBMITTED TO THE DEPARTMENT OF ENVIRONMENTAL CONSERVATION, NPDES PERMIT SECTION, 103 SOUTH MAIN STREET, WATERBURY, VERMONT 05676, PROVIDING THE DATES AND NATURE OF CLEANING OPERATIONS CARRIED OUT IN THE PRECEDING YEAR.

11. Personnel and Training Requirements: Such personnel and training as necessary to fulfill the requirements of #10 above.

12. Monitoring and Reporting Requirements: No monitoring required; reporting requirement as specified in #10 above.

13. Miscellaneous Requirements: Not applicable

14. Issue Date of Permit: 11 Jun 1990

Timothy J. Burke, Commissioner
Department of Environmental Conservation

By _____
Gary Schultz, Director
Permits, Compliance & Protection

_____
Prepared and Reviewed by

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Permit No. 3028-INDS.A
Taxiways B, C, J, and G

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VERMONT

mont Department of Environmental Conservation
er Quality Division
103 South Main Street, Building 10 North
Waterbury, VT 05671-0408

Agency of Natural Resources

[phone] 802-241-3770
[fax] 802-241-3287

September 13, 2010

City of Burlington, BTV International Airport
Robert McEwing / Heather Kendrew
1200 Airport Drive, #1
South Burlington, VT 05403

RECEIVED
SEP 14 2010
STANTEC
SOUTH BURLINGTON, VT

Re: Discharge Permit # 3028-INDS.A

Dear Mr. McEwing and Ms. Kendrew,

Enclosed is your copy of Discharge Permit #3028-INDS.A which has been signed by the Program Manager of the Stormwater Management Section on behalf of the Commissioner of the Department of Environmental Conservation.

The amended permit authorizes the discharge of treated stormwater runoff from reconstructed Taxiways 'B' and 'C', and relocated Taxiway 'J', and newly constructed Taxiway 'G': AIP No. 3-50-0005-XX-2009, located at the Burlington International Airport in South Burlington, to Muddy Brook and a Class 2 wetland contiguous to Potash Brook. Stormwater Discharge Permit #3028-INDS.A amends and replaces the previously issued Stormwater Discharge permit (3028-INDS) issued for this project. This amended permit incorporates a project change that resulted in an increase of 0.91 acres of impervious surface in the Muddy Brook watershed (Drainage Area S/N 001).

Please read this permit carefully and note the inspection, maintenance, and reporting requirements, and other operating conditions including operating fees. A billing statement for payment of annual operating fees will be sent at a later date.

Since we did not receive any public comments during the notice period, the final permit is unchanged from the draft that was placed on public notice.

If you have any questions, please call me at (802) 241- 1418.

Sincerely,

Environmental Analyst
Stormwater Section

Enclosures

cc: √Greg Goyette, P.E., Stantec
Peter Keibel, Act 250 District Coordinator, Essex

Permit No. 3028-INDS.A
Project ID No. EJ96-0386

STATE OF VERMONT
AGENCY OF NATURAL RESOURCES
DEPARTMENT OF ENVIRONMENTAL CONSERVATION

STORMWATER DISCHARGE PERMIT

STORMWATER RUNOFF TO WATERS OF THE STATE

In compliance with provisions of 10 V.S.A. §§1264 and 1264a, the Stormwater Management Rule for Stormwater-Impaired Waters, the Stormwater Management Rule, and in accordance with "Terms and Conditions" hereinafter specified,

City of Burlington, Burlington International Airport
1200 Airport Drive, #1
South Burlington, VT 05403
(Impervious Area: 20.33 acres)

the permittee, is hereby granted permission to discharge stormwater runoff from reconstructed Taxiways 'B' and 'C', and relocated Taxiway 'J' and newly constructed Taxiway 'G': AIP No. 3-50-0005-XX-2009, located at the Burlington International Aiport, 1200 Airport Dreive, #1, in South Burlington, Vermont. Stormwater from the project discharges to Muddy Brook and a Class 2 wetland contiguous to Potash Brook. Stormwater Discharge Permit #3028-INDS.A amends and replaces the previously issued Stormwater Discharge permit (3028-INDS) issued for this project. This amended permit incorporates a project change that resulted in an increase of 0.91 acres of impervious surface in the Muddy Brook watershed (Drainage Area S/N 001).

1. Expiration Date: Five years from issuance date of final permit. Note: This permit, unless revoked, modified or suspended, shall be valid until the designated expiration date not withstanding any intervening change in water quality, effluent, or treatment standards, or classification of the receiving waters including groundwater. However, any such changed standard or classification, and any applicable requirement in a total maximum daily load (TMDL) for the receiving water, shall be applied in determining whether or not to renew this permit, and in determining the conditions of a renewed permit.

   The permittee shall reapply for a renewed discharge permit ninety days prior to the expiration date of this permit.

2. Revocation: 10 V.S.A. §1267 provides as follows:

   The Secretary may, after notice and opportunity for a public hearing, revoke, modify or suspend this permit if it is found that the permittee submitted false or inaccurate information in its application or has violated any requirement, restrictions, or condition of this permit, or if there is any change in any condition that requires either a temporary or permanent reduction or elimination of the permitted discharge. The Secretary shall impose conditions as the Secretary deems necessary for regulating the discharges of a permittee whose permit has been revoked, modified or suspended. Revocation shall be effective upon actual notice thereof to the permittee.

3. Operating Fees: This discharge is subject to operating fees under 3 V.S.A. §2822. The

permittee shall submit the operating fees to the Agency in accordance with procedures provided by the Secretary.

4. Recording in Land Use Records: The permittee shall record a one-page notice of issuance of this discharge permit in the local land records within fourteen (14) days of issuance of this permit on the form provided by the Secretary, per §22-312 of Stormwater Management Rule For Stormwater Impaired Waters. The permittee shall provide a copy of the recording to the Secretary within fourteen (14) days of the permittee's receipt of the copy of the recording from the local land records.

5. Transfer of Permit: This permit is not transferable without prior written approval of the Secretary. Provided all applicable fees under 3 V.S.A. §2822 have been paid, a permittee may submit a notice of transfer to the Secretary. The notice shall be submitted at least five (5) days prior to the proposed date of transfer. The notice shall state that the prospective permittee has adequate funding to comply with this permit. The permittee shall provide a copy of this permit to the new owner or tenant and inform him of the responsibility to make application for a permit which shall be issued in his name. Any failure to do so shall be considered a violation of this permit.

6. Right of Entry: The permittee shall allow the Secretary, or his or her authorized representatives, at reasonable times, upon presentation of credentials, to enter upon and inspect the permitted premises, and the stormwater collection, treatment and control system and to sample any discharge to determine compliance with this permit and to have access to and inspect and copy any records required to be kept pursuant to this permit.

7. Receiving Waters: Muddy Brook (S/N 001) and a Class 2 Wetland contiguous to Potash Brook (S/N 002).

8. Manner of Discharge:

S/N 001: Stormwater runoff from taxiway surfaces via sheet flow over designated vegetated disconnection areas, then via overland flow discharging to groundwater, to a catch basin and pipe closed drainage system, or via conveyance swale, discharging to Muddy Brook.

Stormwater runoff from taxiway surfaces via sheet flow for treatment in Grass Channel #1, with underdrain, routed to a catch basin and pipe closed drainage system, discharging to Muddy Brook.

Stormwater runoff from runway and taxiway surfaces via sheet flow for treatment in Grass Channel #2, with underdrain, routed to a catch basin and pipe closed drainage system, discharging to Muddy Brook.

Stormwater runoff from runway and taxiway surfaces via sheet flow for treatment in Grass Channel #3, with underdrain, routed to a catch basin and pipe closed drainage system, discharging to Muddy Brook.

Stormwater runoff from taxiway surfaces via sheet flow for treatment in Grass Channel #4, with underdrain, routed to a catch basin and pipe closed drainage system, discharging to Muddy Brook.

Note: The VT DEC Stormwater Program's *Site Balancing Procedure for the Discharge of Stormwater Runoff from the Expansion or Redevelopment of Impervious Surfaces* was utilized to meet applicable treatment standards in drainage area S/N 001, discharging to Muddy Brook. In addition, areas of impervious surface previously authorized under Discharge Permit #1-0839, drainage area S/N 003, were redeveloped, subject to the Agency's 2002 Stormwater Management Manual, and are now covered by this discharge permit.

S/N 002: Stormwater runoff from taxiway surfaces via sheet flow over designated vegetated disconnection areas, then overland flow discharging to a catch basin and pipe closed drainage system, discharging to a Class 2 wetland contiguous to Potash Brook.

9. Wastes Permitted: Stormwater runoff from S/N 001 and S/N 002 after treatment in 4 grass channels and via sheet flow in compliance with the Disconnection of Non-Rooftop Runoff Credit.

10. Volumes Permitted and Frequency of Discharge: Such volumes and frequency as required by the discharge specified in #8 above.

11. Approved Project Design: This project shall be constructed and operated in accordance with the following site plans and details prepared by *Stantec* and by *Campbell & Paris Engineers*, and supporting information:

Stantec
Drawing No. 1, "Stormwater Management Plan," dated 5/28/2009;
Drawing No. 16, "Grading and Drainage Plan, Sheet 1 of 2," dated 5/28/2009;
Drawing No. 17, "Grading and Drainage Plan, Sheet 2 of 2," dated 5/28/2009;
Drawing No. 19, "Drainage Details," dated 5/28/2009;
Drawing No. 21, "Typical Sections," dated 5/28/2009;
Drawing No. 22, "Typical Sections and Pavement Details," dated 5/28/2009.

Campbell & Paris Engineers
Sheets SW2 and SW3, "Stormwater Management Plan," dated 3/25/2009, and last revised 02/2010;
Sheets SW4 through SW7, "Stormwater Management Plan," dated 3/25/2009;
Sheets 20 and 21, "Schedule 1 Grading & Drainage Plan," dated 5/14/2009;
Sheet 22, "Schedule 2 Grading & Drainage Plan," dated 5/14/2009;
Sheet 36, "Pavement and Typical Sections & Misc. Details," dated 5/14/2009;
Sheet 20A, "Schedule IV Grading & Drainage Plan," dated 5/14/2009, and last revised 5/2009.

By reference, the above noted plans are made a part of this permit.

12. Maintenance and Maintenance Reporting Requirements:

a. The basins, swales, and related stormwater collection, treatment and control system shall be maintained in good operating condition at all times and **shall be inspected annually and cleaned as necessary to maintain design specifications. The inspections shall be conducted between the conclusion of spring snow melt and June 15th of each year.**

b. Any sediment removed from the swales or basins shall be disposed of properly in accordance with state and federal statutes and regulations.

c. **By July 15 of each year the permittee shall submit a written report** to the Department of Environmental Conservation, Water Quality Division, Building 10 North, 103 South Main Street, Waterbury, Vermont 05671-0408. This report shall include, at a minimum:

i. for the first report, an inspection and verification that the project was built in compliance with the Approved Project Design per #11 above;

ii. the dates and details of any cleaning and maintenance operations carried out in the preceding year;

iii. a narrative summarizing the results of any inspections conducted in the preceding year and highlighting any stormwater related problems encountered, and all remedial steps taken in response;

d. Should any erosional problems occur, the permittee is required to immediately correct any such problems.

e. Any basins, swales, or related stormwater devices used during construction for erosion control shall be inspected and cleaned to design specifications immediately after construction has been completed.

13. Description of Required Offset: In order to meet the statutory standard for new discharges set forth in 10 V.S.A. §1264a and the Stormwater Management Rule for Stormwater Impaired Waters, the permittee has demonstrated that the project area located in the Potash Brook watershed will not increase the pollutant load over existing conditions. This has been accomplished by treating runoff from existing impervious surfaces within the Potash Brook watershed project limits. This portion of the project achieves a net reduction in sediment loading to Potash Brook of 3,466 pounds per year .

14. Personnel and Training Requirements: Such personnel and training as necessary to fulfill the requirements of #12 above.

15. Monitoring and Reporting Requirement: No monitoring required; reporting requirement as specified in #12 above.

16. Other Requirements:

a. Treated stormwater runoff is the only waste authorized for disposal under the terms and conditions of this permit. The discharge of any hazardous materials or hazardous waste into the stormwater management system is prohibited.

b. The issuance of this permit does not relieve the permittee from the responsibility to obtain any other local, state or federal permits required by law.

17. Secretary's Determination: The Secretary has determined that this project meets the requirements of the Agency's 2002 Stormwater Management Manual and does not increase the

sediment or hydrologic load of the receiving stormwater-impaired waters. The Secretary has determined that the proposed discharge will not reduce the quality of the receiving waters below the classification established for them.

18. Right to Appeal to the Environmental Court: Pursuant to 10 V.S.A. Chapter 220, any appeal of this decision must be filed with the clerk of the Environmental Court within 30 days of the date of the decision. The appellant must attach to the Notice of Appeal the entry fee of $250.00, payable to the state of Vermont. The Notice of Appeal must specify the parties taking the appeal and the statutory provision under which each party claims party status; must designate the act or decision appealed from; must name the Environmental Court; and must be signed by the appellant or their attorney. In addition, the appeal must give the address or location and description of the property, project or facility with which the appeal is concerned and the name of the applicant or any permit involved in the appeal. The appellant must also serve a copy of the Notice of Appeal in accordance with Rule 5(b)(4)(B) of the Vermont Rules for Environmental Court Proceedings. For further information, see the Vermont Rules for Environmental Court Proceedings, available on line at www.vermontjudiciary.org. address for the Environmental Court is 2418 Airport Road, Suite 1, Barre, VT 05641 (Tel. # 802-828-1660).

19. Dated at Waterbury, VT this 13th day of September, 2010

Justin G. Johnson, Commissioner
Department of Environmental Conservation

By _____
Padraic Monks
Stormwater Program Manager
Water Quality Division

AGENCY OF NATURAL RESOURCES
STORMWATER MANAGEMENT PROGRAM

APPLICATION FOR TRANSFER

An individual stormwater discharge permit or authorization to discharge under a general stormwater discharge permit is not transferable without the prior written approval of the Secretary of the Agency of Natural Resources. This Application for Transfer must be submitted at least five (5) days prior to the proposed date of transfer. All applicable fees under 3 V.S.A. §2822 must be paid before the Secretary will approve any transfer.

Please provide the following information:

1. Stormwater Discharge Permit No. or Notice of Intent No. (for proposed transfer of an Authorization to Discharge under a General Permit): _____

2. Name, Address and Phone Number of Current Permittee(s):

3. Name, Address and Phone Number of Prospective Permittee(s):

4. Proposed date of transfer: _____

5. Provide a statement signed by the prospective permittee(s) that:

   a. the conditions of the facility operation that contribute to, or affect, the stormwater discharge will not be materially different under the new ownership;

   b. the prospective permittee has read and is familiar with the terms of the individual stormwater discharge permit or the authorization to discharge and general permit, and agrees to comply with all of the terms and conditions of the individual stormwater discharge permit or the authorization to discharge and general permit, whichever is applicable;

   c. the prospective permittee(s) has adequate funding or other means to effect compliance with the terms and conditions of the individual stormwater discharge permit or the authorization to discharge and general permit, whichever is applicable.

6. Signatures:

Name of Current Permittee(s): _____

Signature and Title of Authorized Representative(s) _____

Date _____

Name of Prospective Permittee(s): _____

Signature and Title of Authorized Representative(s) _____

Date _____

This Application for Transfer is hereby approved by the Secretary of the Agency of Natural Resources.

Signature: _____

Title: _____

Date: _____

Permit No. 3028-INDS.1
Reconstruct, Mark, and Groove Runway 15-33

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VERMONT

Vermont Department of Environmental Conservation
Water Quality Division
103 South Main Street, Building 10 North
Waterbury, VT 05671-0408

Agency of Natural Resources

[phone] 802-241-3770
[fax] 802-241-3287

RECEIVED
MAY 17 2010
STANTEC
SOUTH BURLINGTON, VT

May 14, 2010

Heather Kendrew
City of Burlington
Burlington International Airport
1200 Airport Drive, #1
South Burlington, VT 05403

Re: Discharge Permit # 3028-INDS.1

Dear Heather:

Enclosed is your copy of Discharge Permit # 3028-INDS.1 which has been signed by the Director of Water Quality Division on behalf of the Commissioner of the Department of Environmental Conservation.

The permit authorizes the discharge of treated stormwater runoff from your proposed project, BTV Reconstruct, Mark & Groove Runway 15-33; AIP No. 3-50-0005-XX in South Burlington, Vermont to unnamed tributaries of the Winooski River, Muddy Brook, and to groundwater in the unnamed tributary to the Winooski River watershed and to groundwater in the Muddy Brook watershed.

Please read this permit carefully and note the inspection, maintenance, and reporting requirements, and other operating conditions including operating fees. Since we did not receive any public comments during the notice period, the final permit is unchanged from the draft that was placed on public notice.

If you have any questions, please call me at (802) 241- 1418.

Sincerely,

Kevin Burke
Environmental Analyst
Stormwater Section

Enclosures

cc: Todd F. Duguay, EIT, Stantec Consulting Services, Inc.
Peter Keibel, Act 250 District Coordinator, Essex

Permit No. 3028-INDS.1
Project ID No. EJ96-0386

STATE OF VERMONT
AGENCY OF NATURAL RESOURCES
DEPARTMENT OF ENVIRONMENTAL CONSERVATION

STORMWATER DISCHARGE PERMIT

STORMWATER RUNOFF TO WATERS OF THE STATE

In compliance with provisions of 10 V.S.A. §1264 and the Stormwater Management Rule and in accordance with "Terms and Conditions" hereinafter specified,

City of Burlington, Burlington International Airport
1200 Airport Drive, #1
South Burlington, VT 05403

the permittee, is hereby granted permission to discharge stormwater runoff from the Burlington International Airport; BTV Reconstruct, Mark & Groove Runway 15-33; AIP No. 3-50-0005-XX, located in South Burlington, Vermont. Stormwater from the project discharges to unnamed tributaries of the Winooski River, Muddy Brook, and to groundwater in the unnamed tributary to the Winooski River watershed and to groundwater in the Muddy Brook watershed.

1. Expiration Date: Five years from issuance date of final permit. Note: This permit, unless revoked, modified or suspended, shall be valid until the designated expiration date not withstanding any intervening change in water quality, effluent, or treatment standards, or classification of the receiving waters including groundwater. However, any such changed standard or classification, and any applicable requirement in a total maximum daily load (TMDL) for the receiving water, shall be applied in determining whether or not to renew this permit, and in determining the conditions of a renewed permit.

   The permittee shall reapply for a renewed discharge permit ninety days prior to the expiration date of this permit.

2. Revocation: 10 V.S.A. §1267 provides as follows:

   The Secretary may, after notice and opportunity for a public hearing, revoke, modify or suspend this permit if it is found that the permittee submitted false or inaccurate information in its application or has violated any requirement, restrictions, or condition of this permit, or if there is any change in any condition that requires either a temporary or permanent reduction or elimination of the permitted discharge. The Secretary shall impose conditions as the Secretary deems necessary for regulating the discharges of a permittee whose permit has been revoked, modified or suspended. Revocation shall be effective upon actual notice thereof to the permittee.

3. Operating Fees: This discharge is subject to operating fees under 3 V.S.A. §2822. The permittee shall submit the operating fees to the Agency in accordance with procedures provided by the Secretary.

4. Recording in Land Use Records: The permittee shall record a one-page notice of issuance of this discharge permit in the local land records within fourteen (14) days of issuance of this permit on the form provided by the Secretary, per §18-312 of Stormwater Management Rule. The permittee shall provide a copy of the recording to the Secretary within fourteen (14) days of the permittee's receipt of the copy of the recording from the local land records.

5. Transfer of Permit: This permit is not transferable without prior written approval of the Secretary. Provided all applicable fees under 3 V.S.A. §2822 have been paid, a permittee may submit a notice of transfer to the Secretary. The notice shall be submitted at least five (5) days prior to the proposed date of transfer. The notice shall state that the prospective permittee has adequate funding to comply with this permit. The permittee shall provide a copy of this permit to the new owner or tenant and inform him of the responsibility to make application for a permit which shall be issued in his name. Any failure to do so shall be considered a violation of this permit.

6. Right of Entry: The permittee shall allow the Secretary, or his or her authorized representatives, at reasonable times, upon presentation of credentials, to enter upon and inspect the permitted premises, and the stormwater collection, treatment and control system and to sample any discharge to determine compliance with this permit and to have access to and inspect and copy any records required to be kept pursuant to this permit.

7. Receiving Waters: Unnamed tributaries of the Winooski River, Muddy Brook, and to groundwater in the unnamed tributary to the Winooski River watershed and to groundwater in the Muddy Brook watershed.

8. Manner of Discharge:

S/N 001: Stormwater runoff from taxiway and runway surfaces via disconnected sheet flow over vegetated areas, then to catch basin and pipe, closed drainage system, discharging to an unnamed tributary of the Winooski River.

Stormwater runoff from taxiway and runway surfaces via disconnected sheet flow over vegetated areas, then overland to a dry swale (detention area #3), discharging to catch basin and pipe, closed drainage system to an unnamed tributary of the Winooski River.

S/N 002: Stormwater runoff from taxiway and runway surfaces via disconnected sheet flow over vegetated areas, then to catch basin and pipe, closed drainage system, discharging to an unnamed tributary of the Winooski River.

Stormwater runoff from taxiway and runway surfaces via disconnected sheet flow over vegetated areas, then overland to an underground detention system (detention area #1), then to catch basin and pipe, closed drainage system discharging to an unnamed tributary of the Winooski River.

Stormwater runoff from taxiway and runway surfaces via disconnected sheet flow over vegetated areas and via channel flow, to catch basin and pipe, closed drainage system, routed to an underground detention area (detention area #2), infiltrating to groundwater, and discharging to closed drainage system to an unnamed tributary of the Winooski River.

S/N 003: Stormwater runoff from taxiway and runway surfaces via disconnected sheet flow over vegetated areas, then overland to a grass swale, routed to the Vermont Air National Guard closed drainage system, discharging to an unnamed tributary to the Winooski River.

S/N 004: Stormwater runoff from taxiway and runway surfaces via disconnected sheet flow over vegetated areas, then overland to existing closed drainage infiltration system, discharging to groundwater in the Muddy Brook watershed.

S/N 005: Stormwater runoff from taxiway and runway surfaces via disconnected sheet flow over vegetated areas, then overland to catch basin and pipe, closed drainage system, discharging to Muddy Brook.

S/N 006: Stormwater runoff from taxiway and runway surfaces via disconnected sheet flow over vegetated areas, then overland and via channel flow to catch basin and pipe, closed drainage system, routed to an underground infiltration area (detention area #4), infiltrating to groundwater in the Muddy Brook watershed

Note: The Disconnection of Non-Rooftop Runoff Credit utilized to meet applicable stormwater treatment standards. In addition, the *Site Balancing Procedure for the Discharge of Stormwater Runoff from the Expansion or Redevelopment of Impervious Surfaces* was utilized to meet applicable stormwater treatment standards.

9. Wastes Permitted: Stormwater runoff from S/N 001 through S/N 006 after treatment via disconnected overland flow, dry swale, and underground detention/infiltration areas.

10. Volumes Permitted and Frequency of Discharge: Such volumes and frequency as required by the discharge specified in #8 above.

11. Approved Project Design: This project shall be constructed and operated in accordance with the following site plans and details prepared by Stantec Consulting Services, Inc. and plans drawn by Hoyle, Tanner & Associates, Inc.: (Sheets G1.3, TS1.1, TS1.2, TS1.3, GR1.1, GR1.2, GR1.3, GR1.4, GR1.5, GR1.6, GR1.7, GR1.8, DR1.1, DR1.2, DR1.3, PD1.1, PD1.2, PD1.3, PD2.1, PD2.2, PD2.3, all dated March 2010; and all supporting information).

By reference, the above noted plans are made a part of this permit.

12. Maintenance and Maintenance Reporting Requirements:

a. The detention/infiltration areas, swales, disconnection areas, and related stormwater collection, treatment and control system shall be maintained in good operating condition at all times and **shall be inspected annually and cleaned as necessary to maintain design specifications. The inspections shall be conducted between the conclusion of spring snow melt and June 15th of each year.**

b. Any sediment removed from the detention/infiltration areas, swales, disconnection areas, and related stormwater collection, treatment and control system, shall be disposed of properly in accordance with state and federal statutes and regulations.

c. **By July 15 of each year the permittee shall submit a written report** to the Department of Environmental Conservation, Water Quality Division, Building 10 North, 103 South Main Street, Waterbury, Vermont 05671-0408. This report shall include, at a minimum:

i. for the first report, an inspection and verification that the project was built in compliance with the Approved Project Design per #11 above;

ii. the dates and details of any cleaning and maintenance operations carried out in the preceding year;

iii. a narrative summarizing the results of any inspections conducted in the preceding year and highlighting any stormwater related problems encountered, and all remedial steps taken in response;

d. Should any erosional problems occur, the permittee is required to immediately correct any such problems.

e. Any detention areas, basins, swales, or related stormwater devices used during construction for erosion control shall be inspected and cleaned to design specifications immediately after construction has been completed.

13. Personnel and Training Requirements: Such personnel and training as necessary to fulfill the requirements of #12 above.

14. Monitoring and Reporting Requirement: No monitoring required; reporting requirement as specified in #12 above.

15. Other Requirements:

a. Treated stormwater runoff is the only waste authorized for disposal under the terms and conditions of this permit. The discharge of any hazardous materials or hazardous waste into the stormwater management system is prohibited.

b. The issuance of this permit does not relieve the permittee from the responsibility to obtain any other local, state or federal permits required by law.

16. Right to Appeal to the Environmental Court: Pursuant to 10 V.S.A. Chapter 220, any appeal of this decision must be filed with the clerk of the Environmental Court within 30 days of the date of the decision. The appellant must attach to the Notice of Appeal the entry fee of $250.00, payable to the state of Vermont. The Notice of Appeal must specify the parties taking the appeal and the statutory provision under which each party claims party status; must designate the act or decision appealed from; must name the Environmental Court; and must be signed by the appellant or their attorney. In addition, the appeal must give the address or location and description of the property, project or facility with which the appeal is concerned and the name of the applicant or any permit involved in the appeal. The appellant must also serve a copy of the Notice of Appeal in accordance with Rule 5(b)(4)(B) of the Vermont Rules for Environmental Court Proceedings. For further information, see the Vermont Rules for Environmental Court Proceedings, available on line at www.vermontjudiciary.org. address for the Environmental Court is 2418 Airport Road, Suite 1, Barre, VT 05641 (Tel. # 802-828-1660).

17. Dated at Waterbury, VT this 14th day of May, 2010

Justin G. Johnson, Commissioner
Department of Environmental Conservation

By _____
Peter LaFlamme, Director
Water Quality Division

AGENCY OF NATURAL RESOURCES
STORMWATER MANAGEMENT PROGRAM

APPLICATION FOR TRANSFER

An individual stormwater discharge permit or authorization to discharge under a general stormwater discharge permit is not transferable without the prior written approval of the Secretary of the Agency of Natural Resources. This Application for Transfer must be submitted at least five (5) days prior to the proposed date of transfer. All applicable fees under 3 V.S.A. §2822 must be paid before the Secretary will approve any transfer.

Please provide the following information:

1. Stormwater Discharge Permit No. or Notice of Intent No. (for proposed transfer of an Authorization to Discharge under a General Permit): _____

2. Name, Address and Phone Number of Current Permittee(s):

3. Name, Address and Phone Number of Prospective Permittee(s):

4. Proposed date of transfer: _____

5. Provide a statement signed by the prospective permittee(s) that:

   a. the conditions of the facility operation that contribute to, or affect, the stormwater discharge will not be materially different under the new ownership;

   b. the prospective permittee has read and is familiar with the terms of the individual stormwater discharge permit or the authorization to discharge and general permit, and agrees to comply with all of the terms and conditions of the individual stormwater discharge permit or the authorization to discharge and general permit, whichever is applicable;

   c. the prospective permittee(s) has adequate funding or other means to effect compliance with the terms and conditions of the individual stormwater discharge permit or the authorization to discharge and general permit, whichever is applicable.

6. Signatures:

Name of Current Permittee(s): _____

Signature and Title of Authorized Representative(s) _____

Date _____

Name of Prospective Permittee(s): _____

Signature and Title of Authorized Representative(s) _____

Date _____

This Application for Transfer is hereby approved by the Secretary of the Agency of Natural Resources.

Signature: _____

Title: _____

Date: _____

Permit No. 3845-INDS.A
Heritage Flight

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VERMONT

Vermont Department of Environmental Conservation
Water Quality Division
103 South Main Street, Building 10 North
Waterbury, VT 05671-0408

Agency of Natural Resources

[phone] 802-241-3770
[fax] 802-241-3287

February 9, 2010

Heritage Flight
c/o Christopher Hill
265 Aviation Avenue
South Burlington, VT 05403

Re: Discharge Permit # 3845-INDS.A

Dear Mr. Hill:

Enclosed is your copy of Discharge Permit # 3845-INDS.A which has been signed by the Director of Water Quality Division on behalf of the Commissioner of the Department of Environmental Conservation.

The permit authorizes the discharge of treated stormwater runoff from your proposed project, the Heritage Flight Aviation Campus Expansion project located at Burlington International Airport in South Burlington, Vermont. Stormwater from the project discharges to a class 2 wetland contiguous with Muddy Brook. This permit amends and replaces previously issued discharge permit 3845-INDS. The amended permit accounts for permit coverage of an additional 0.12 acres of new impervious surface associated with a fuel farm and ADF tank pad expansion at the same Heritage Flight Aviation Campus at the Burlington International Airport.

Please read this permit carefully and note the inspection, maintenance, and reporting requirements, and other operating conditions including operating fees.

Since we did not receive any public comments during the notice period, the final permit is unchanged from the draft that was placed on public notice.

If you have any questions, please call me at (802) 241-1418.

Sincerely,

Kevin Burke
Environmental Analyst
Stormwater Section

Enclosures

cc: Greg Goyette, Stantec, Inc.
Peter Keibel, Act 250 District Coordinator, Essex

Permit No. 3845-INDS.A
Project ID No. EJ96-0386

STATE OF VERMONT
AGENCY OF NATURAL RESOURCES
DEPARTMENT OF ENVIRONMENTAL CONSERVATION

STORMWATER DISCHARGE PERMIT

STORMWATER RUNOFF TO WATERS OF THE STATE

In compliance with provisions of 10 V.S.A. §1264 and the Stormwater Management Rule and in accordance with "Terms and Conditions" hereinafter specified,

Heritage Flight
265 Aviation Avenue
South Burlington, VT 05403
(Impervious area: 2.03 acres)

the permittee, is hereby granted permission to discharge stormwater runoff from the Heritage Flight Aviation Campus Expansion project located at Burlington International Airport in South Burlington, Vermont. Stormwater from the project discharges to a class 2 wetland contiguous with Muddy Brook. This permit amends and replaces previously issued discharge permit 3845-INDS. The amended permit accounts for permit coverage of an additional 0.12 acres of impervious surface associated with a fuel farm and ADF tank pad expansion at the same Heritage Flight Aviation Campus at the Burlington International Airport.

1. Expiration Date: Five years from issuance date of final permit. Note: This permit, unless revoked, modified or suspended, shall be valid until the designated expiration date not withstanding any intervening change in water quality, effluent, or treatment standards, or classification of the receiving waters including groundwater. However, any such changed standard or classification, and any applicable requirement in a total maximum daily load (TMDL) for the receiving water, shall be applied in determining whether or not to renew this permit, and in determining the conditions of a renewed permit.

   The permittee shall reapply for a renewed discharge permit ninety days prior to the expiration date of this permit.

2. Revocation: 10 V.S.A. §1267 provides as follows:

   The Secretary may, after notice and opportunity for a public hearing, revoke, modify or suspend this permit if it is found that the permittee submitted false or inaccurate information in its application or has violated any requirement, restrictions, or condition of this permit, or if there is any change in any condition that requires either a temporary or permanent reduction or elimination of the permitted discharge. The Secretary shall impose conditions as the Secretary deems necessary for regulating the discharges of a permittee whose permit has been revoked, modified or suspended. Revocation shall be effective upon actual notice thereof to the permittee.

3. Operating Fees: This discharge is subject to operating fees under 3 V.S.A. §2822. The

permittee shall submit the operating fees to the Agency in accordance with procedures provided by the Secretary.

4. Recording in Land Use Records: The permittee shall record a one-page notice of issuance of this discharge permit in the local land records within fourteen (14) days of issuance of this permit on the form provided by the Secretary, per §18-312 of Stormwater Management Rule. The permittee shall provide a copy of the recording to the Secretary within fourteen (14) days of the permittee's receipt of the copy of the recording from the local land records.

5. Transfer of Permit: This permit is not transferable without prior written approval of the Secretary. Provided all applicable fees under 3 V.S.A. §2822 have been paid, a permittee may submit a notice of transfer to the Secretary. The notice shall be submitted at least five (5) days prior to the proposed date of transfer. The notice shall state that the prospective permittee has adequate funding to comply with this permit. The permittee shall provide a copy of this permit to the new owner or tenant and inform him of the responsibility to make application for a permit which shall be issued in his name. Any failure to do so shall be considered a violation of this permit.

6. Right of Entry: The permittee shall allow the Secretary, or his or her authorized representatives, at reasonable times, upon presentation of credentials, to enter upon and inspect the permitted premises, and the stormwater collection, treatment and control system and to sample any discharge to determine compliance with this permit and to have access to and inspect and copy any records required to be kept pursuant to this permit.

7. Receiving Waters: Class 2 wetland contiguous with Muddy Brook.

8. Manner of Discharge:

S/N 001: Runoff from roadways and rooftops is conveyed by a closed collection system to a 36" reinforced concrete pipe which conveys the flow to the wetland contiguous with Muddy Brook.

S/N 002: Runoff from rooftop areas, including a green roof on Heritage Flight Hangar, is collected in a closed system and conveyed to a bioretention/detention basin for treatment and attenuation of peak flows. Stormwater is discharged from the basin into a stone-lined swale that runs along Eagle Drive. The stone lined swale conveys the runoff to POI #2. From POI #2, the runoff is conveyed underneath Eagle Drive to S/N 002 via an existing 24" pipe culvert.

The *Stormwater Site Balancing Procedure* was utilized to meet applicable treatment standards for this drainage area as follows: Runoff from additional existing impervious areas are provided treatment and detention to balance new impervious areas that discharge to S/N 001 and S/N 002 without treatment and detention.

9. Wastes Permitted: Stormwater runoff from S/N 001 through S/N 002 of the Heritage Flight Aviation Campus Expansion project after treatment from bioretention and dry detention basins in accordance with the manner of discharge specified in #8 above.

10. Volumes Permitted and Frequency of Discharge: Such volumes and frequency as required by the discharge specified in #8 above.

11. Approved Project Design: This project shall be constructed and operated in accordance with the following site plans and details prepared by Stantec, Inc. and drawn by Truexcullins: (Sheet GP1, dated June 13, 2008; Sheet DD-1, dated June 13, 2008; Sheet DD-2, dated June 13, 2008; Sheet SK-C-13 (LP-1), dated October 22, 2009; and all supporting information).

    By reference, the above noted plans are made a part of this permit.

12. Maintenance and Maintenance Reporting Requirements:

    a. The stormwater collection, treatment and control system shall be maintained in good operating condition at all times and **shall be inspected annually and cleaned as necessary to maintain design specifications. The inspections shall be conducted between the conclusion of spring snow melt and June 15th of each year.**

    b. Any sediment removed from the bioretention system, basins, or related stormwater collection, treatment, and control system shall be disposed of properly in accordance with state and federal statutes and regulations.

    c. **By July 15 of each year the permittee shall submit a written report** to the Department of Environmental Conservation, Water Quality Division, Building 10 North, 103 South Main Street, Waterbury, Vermont 05671-0408. This report shall include, at a minimum:

        i. for the first report, an inspection and verification that the project was built in compliance with the Approved Project Design per #11 above;

        ii. the dates and details of any cleaning and maintenance operations carried out in the preceding year;

        ii. a narrative summarizing the results of any inspections conducted in the preceding year and highlighting any stormwater related problems encountered, and all remedial steps taken in response;

    d. Should any erosional problems occur, the permittee is required to immediately correct any such problems.

    e. Any basins, grass channels, or related stormwater devices used during construction for erosion control shall be inspected and cleaned to design specifications immediately after construction has been completed.

13. Personnel and Training Requirements: Such personnel and training as necessary to fulfill the requirements of #12 above.

14. Monitoring and Reporting Requirement: No monitoring required; reporting requirement as specified in #12 above.

15. Other Requirements:

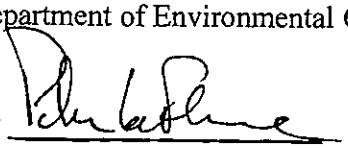
a. Treated stormwater runoff is the only waste authorized for disposal under the terms and conditions of this permit. The discharge of any hazardous materials or hazardous waste into the stormwater management system is prohibited.

b. The issuance of this permit does not relieve the permittee from the responsibility to obtain any other local, state or federal permits required by law.

16. Right to Appeal to the Environmental Court: Pursuant to 10 V.S.A. Chapter 220, any appeal of this decision must be filed with the clerk of the Environmental Court within 30 days of the date of the decision. The appellant must attach to the Notice of Appeal the entry fee of $250.00, payable to the state of Vermont. The Notice of Appeal must specify the parties taking the appeal and the statutory provision under which each party claims party status; must designate the act or decision appealed from; must name the Environmental Court; and must be signed by the appellant or their attorney. In addition, the appeal must give the address or location and description of the property, project or facility with which the appeal is concerned and the name of the applicant or any permit involved in the appeal. The appellant must also serve a copy of the Notice of Appeal in accordance with Rule 5(b)(4)(B) of the Vermont Rules for Environmental Court Proceedings. For further information, see the Vermont Rules for Environmental Court Proceedings, available on line at www.vermontjudiciary.org. address for the Environmental Court is 2418 Airport Road, Suite 1, Barre, VT 05641 (Tel. # 802-828-1660).

17. Dated at Waterbury, VT this 9th day of February, 2010

Justin G. Johnson, Commissioner
Department of Environmental Conservation

By 

Peter LaFlamme, Director
Water Quality Division

AGENCY OF NATURAL RESOURCES
STORMWATER MANAGEMENT PROGRAM

APPLICATION FOR TRANSFER

An individual stormwater discharge permit or authorization to discharge under a general stormwater discharge permit is not transferable without the prior written approval of the Secretary of the Agency of Natural Resources. This Application for Transfer must be submitted at least five (5) days prior to the proposed date of transfer. All applicable fees under 3 V.S.A. §2822 must be paid before the Secretary will approve any transfer.

Please provide the following information:

1. Stormwater Discharge Permit No. or Notice of Intent No. (for proposed transfer of an Authorization to Discharge under a General Permit): _____

2. Name, Address and Phone Number of Current Permittee(s):

3. Name, Address and Phone Number of Prospective Permittee(s):

4. Proposed date of transfer: _____

5. Provide a statement signed by the prospective permittee(s) that:

   a. the conditions of the facility operation that contribute to, or affect, the stormwater discharge will not be materially different under the new ownership;

   b. the prospective permittee has read and is familiar with the terms of the individual stormwater discharge permit or the authorization to discharge and general permit, and agrees to comply with all of the terms and conditions of the individual stormwater discharge permit or the authorization to discharge and general permit, whichever is applicable;

   c. the prospective permittee(s) has adequate funding or other means to effect compliance with the terms and conditions of the individual stormwater discharge permit or the authorization to discharge and general permit, whichever is applicable.

6. Signatures:

Name of Current Permittee(s): _____

Signature and Title of Authorized Representative(s) _____

Date _____

Name of Prospective Permittee(s): _____

Signature and Title of Authorized Representative(s) _____

Date_____

This Application for Transfer is hereby approved by the Secretary of the Agency of Natural Resources.

Signature: _____

Title: _____

Date: _____

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Permit No. 3028-INDS.2
Aviation Tech Center

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VERMONT

Vermont Department of Environmental Conservation
Water Quality Division
103 South Main Street, Building 10 North
Waterbury, VT 05671-0408

Agency of Natural Resources

[phone] 802-338-4839

December 7, 2011

RECEIVED

DEC 12 2011

STANTEC
SOUTH BURLINGTON, VT

Heather Kendrew
Burlington International Airport
1200 Airport Drive, #1
South Burlington, VT 05403

Re: Discharge Permit # 3028-INDS.2

Dear Heather:

Enclosed is your copy of Discharge Permit #3028-INDS.2. The permit authorizes the discharge of treated stormwater runoff from your proposed project, Burlington Aviation Technical Center & Vermont Flight Academy in South Burlington, Vermont, to wetlands contiguous to Muddy Brook.

Please read this permit carefully and note the inspection, maintenance, and reporting requirements, and other operating conditions including operating fees.

Since we did not receive any public comments during the notice period, the final permit is unchanged from the draft that was placed on public notice.

If you have any questions, please call me at (802) 338-4839.

Sincerely,

Kevin Burke
Environmental Analyst
Stormwater Management Program

Enclosures

cc: Todd Duguay, PE, Stantec Consulting Services, Inc.
Peter Keibel, Act 250 District Coordinator, Essex Jct.

Permit No. 3028-INDS.2
Project ID No. EJ96-0386

STATE OF VERMONT
AGENCY OF NATURAL RESOURCES
DEPARTMENT OF ENVIRONMENTAL CONSERVATION

STORMWATER DISCHARGE PERMIT

STORMWATER RUNOFF TO WATERS OF THE STATE

In compliance with provisions of 10 V.S.A. §1264 and the Stormwater Management Rule and in accordance with "Terms and Conditions" hereinafter specified,

Burlington International Airport
1200 Airport Drive, #1
South Burlington, VT 05403
(Impervious area: 2.31 acres)

the permittee, is hereby granted permission to discharge stormwater runoff from Burlington International Airport, Burlington Aviation Technical Center & Vermont Flight Academy located at Eagle Drive in South Burlington, Vermont to wetlands contiguous to Muddy Brook.

1. Expiration Date: Five years from issuance date of final permit. Note: This permit, unless revoked, modified or suspended, shall be valid until the designated expiration date not withstanding any intervening change in water quality, effluent, or treatment standards, or classification of the receiving waters including groundwater. However, any such changed standard or classification, and any applicable requirement in a total maximum daily load (TMDL) for the receiving water(s) , shall be applied in determining whether or not to renew this permit, and in determining the conditions of a renewed permit.

   The permittee shall reapply for a renewed discharge permit ninety days prior to the expiration date of this permit.

2. Revocation: 10 V.S.A. §1267 provides as follows:

   The Secretary may, after notice and opportunity for a public hearing, revoke, modify or suspend this permit if it is found that the permittee submitted false or inaccurate information in its application or has violated any requirement, restrictions, or condition of this permit, or if there is any change in any condition that requires either a temporary or permanent reduction or elimination of the permitted discharge. The Secretary shall impose conditions as the Secretary deems necessary for regulating the discharges of a permittee whose permit has been revoked, modified or suspended. Revocation shall be effective upon actual notice thereof to the permittee.

3. Operating Fees: This discharge is subject to operating fees under 3 V.S.A. §2822. The permittee shall submit the operating fees to the Agency in accordance with procedures provided by the Secretary.

4. Recording in Land Use Records: The permittee shall record a one-page notice of issuance of this discharge permit in the local land records within fourteen (14) days of issuance of this permit on the form provided by the Secretary, per §18-312 of Stormwater Management Rule. The permittee shall provide a copy of the recording to the Secretary within fourteen (14) days of the permittee's receipt of the copy of the recording from the local land records.

5. Transfer of Permit: This permit is not transferable without prior written approval of the Secretary. Provided all applicable fees under 3 V.S.A. §2822 have been paid, a permittee may submit a notice of transfer to the Secretary. The notice shall be submitted at least five (5) days prior to the proposed date of transfer. The notice shall state that the prospective permittee has adequate funding to comply with this permit. The permittee shall provide a copy of this permit to the new owner or tenant and inform him of the responsibility to make application for a permit which shall be issued in his name. Any failure to do so shall be considered a violation of this permit.

6. Right of Entry: The permittee shall allow the Secretary, or his or her authorized representatives, at reasonable times, upon presentation of credentials, to enter upon and inspect the permitted premises, and the stormwater collection, treatment and control system and to sample any discharge to determine compliance with this permit and to have access to and inspect and copy any records required to be kept pursuant to this permit.

7. Receiving Waters: Wetlands contiguous to Muddy Brook

8. Manner of Discharge:

S/N 001: All runoff in this subcatchment will flow towards two bioretention areas and receive water quality treatment by filtering through a bioretention medium. A portion existing impervious area, 0.82 AC, from Eagle Drive will flow into our proposed treatment system. The treated water, and waters greater than the 0.9" storm event will flow to a detention pond which will control the outlet flow rate. The New impervious area in this subcatchment is less than 10 acres.

S/N 002: All runoff in this subcatchment will be collected in a catchbasin and will directly outlet to the wetland. The new impervious area drainage to this point will be offset via site balancing at discharge point S/N 001. New impervious area in this subcatchment is less than 10 acres.

S/N 003: All runoff in this subcatchment will sheet flow off the roadway directly into the wetland. The new impervious area drainage to this point will be offset via site balancing at discharge point S/N 001. New impervious area in this subcatchment is less than 10 acres.

S/N 004: All runoff in this subcatchment will sheet flow off the detention basin access road. This impervious area will receive water quality treatment through disconnection of non-rooftop runoff. New impervious area in this subcatchment is less than 10 acres.

The *Site Balancing Procedure for the Discharge of Stormwater Runoff from the Expansion or Redevelopment of Impervious Surfaces* was utilized to meet applicable treatment standards for this project.

9. Wastes Permitted: Stormwater runoff from S/N 001 through S/N 004 of the Burlington International Airport, Burlington Aviation Technical Center & Vermont Flight Academy project after treatment from bioretention and detention, and through disconnection.

10. Volumes Permitted and Frequency of Discharge: Such volumes and frequency as required by the discharge specified in #8 above.

11. Approved Project Design: This project shall be constructed and operated in accordance with the following site plans and details prepared by Stantec Consulting Services Inc. (Drawing No. SP1-Sheet 115, dated 6/03/11; Drawing No. 1-Sheet 116, dated 01/27/11; Drawing No. 1-Sheet 117, dated 01/27/11; Drawing No. TS1-Sheet 118, dated 6/03/11; Drawing No. TS2-Sheet 119, dated 6/03/11; Drawing No. GP1-Sheet 120, dated 6/03/11; Drawing No. DD1-Sheet 121, dated 6/03/11; Drawing No. DD2-Sheet 122, dated 6/03/11; Drawing No. DD3-Sheet 123, dated 6/03/11; Drawing No. DD4-Sheet 124, dated 6/03/11; Drawing No. DD5-Sheet 125, dated 6/03/11); and the following site plans and details prepared by Michael Lawrence Associates (Sheet 1-Drawing 126 and Sheet 2-Drawing 127, both dated 6/03/11) ; and supporting information).

By reference, the above noted plans are made a part of this permit.

12. Maintenance and Maintenance Reporting Requirements:

a. The basins, grass channels, and related stormwater collection, treatment and control system shall be maintained in good operating condition at all times and **shall be inspected annually and cleaned as necessary to maintain design specifications. The inspections shall be conducted between the conclusion of spring snow melt and June 15th of each year.**

b. Any sediment removed from the basins, grass channels, and related stormwater collection, treatment and control system shall be disposed of properly in accordance with state and federal statutes and regulations.

c. **By July 15 of each year the permittee shall submit a written report** to the Department of Environmental Conservation, Water Quality Division, Building 10 North, 103 South Main Street, Waterbury, Vermont 05671-0408. This report shall include, at a minimum:

i. for the first report, an inspection and verification that the project was built in compliance with the Approved Project Design per #11 above;

ii. the dates and details of any cleaning and maintenance operations carried out in the preceding year;

iii. a narrative summarizing the results of any inspections conducted in the preceding year and highlighting any stormwater related problems encountered, and all remedial steps taken in response;

d. Should any erosion problems occur, the permittee is required to immediately correct any such problems.

e. Any basins, grass channels, or related stormwater devices used during construction for erosion control shall be inspected and cleaned to design specifications immediately after construction has been completed.

13. Personnel and Training Requirements: Such personnel and training as necessary to fulfill the requirements of #12 above.

14. Monitoring and Reporting Requirement: No monitoring required; reporting requirement as specified in #12 above.

15. Other Requirements:

a. Treated stormwater runoff is the only waste authorized for disposal under the terms and conditions of this permit. The discharge of any hazardous materials or hazardous waste into the stormwater management system is prohibited.

b. The issuance of this permit does not relieve the permittee from the responsibility to obtain any other local, state or federal permits required by law.

16. Compliance with Anti-degradation and Water Quality Standards: The Secretary has determined that the permitted discharges satisfy Vermont's Anti-Degradation Policy described in the Department of Environmental Conservation's Interim Anti-Degradation Implementation Procedure, because the procedure allows a presumption of compliance for discharges that are in compliance with the Vermont Stormwater Management Manual and any additional best management practices that will be used to control the stormwater discharge as described in Section IX.D.1.d. of the Department's Interim Anti-Degradation Implementation Procedure. The Secretary has also determined that for such discharges that qualify for the presumption under IX.D.1.d, all existing uses of surface waters, and the level of water quality necessary to protect those existing uses will be maintained and protected. The Secretary has determined that if the permittee is in full compliance with all permit conditions, including approved plans, monitoring, reporting and recordkeeping conditions, and is fully implementing stormwater BMPs required by this permit, the permitted discharges will meet the requirements of the Vermont Stormwater Management Manual and qualify for the presumption described in Section IX.D.1.d. of the Department's Interim Anti-Degradation Implementation Procedure and will be presumed to comply with the Vermont Water Quality Standards, including but not limited to §1-03 (Anti-degradation Policy).

17. Right to Appeal to the Environmental Court: Pursuant to 10 V.S.A. Chapter 220, any appeal of this decision must be filed with the clerk of the Environmental Court within 30 days of the date of the decision. The appellant must attach to the Notice of Appeal the entry fee of $250.00, payable to the state of Vermont. The Notice of Appeal must specify the parties taking the appeal and the statutory provision under which each party claims party status; must designate the act or decision appealed from; must name the Environmental Court; and must be

signed by the appellant or their attorney. In addition, the appeal must give the address or location and description of the property, project or facility with which the appeal is concerned and the name of the applicant or any permit involved in the appeal. The appellant must also serve a copy of the Notice of Appeal in accordance with Rule 5(b)(4)(B) of the Vermont Rules for Environmental Court Proceedings. For further information, see the Vermont Rules for Environmental Court Proceedings, available on line at www.vermontjudiciary.org. The address for the Environmental Court is 2418 Airport Road, Suite 1, Barre, VT 05641 (Tel. #802-828-1660).

18. Dated at Winooski, VT this 7th day of December, 2011

David K. Mears, Commissioner
Department of Environmental Conservation

By Padraic Monks
Padraic Monks, Program Manager
Stormwater Management Program

Permit No. 3028-9015.1
Quarry Access Road Authorized Permit

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VERMONT

Vermont Department of Environmental Conservation
Watershed Management Division
Main Building, Second Floor
One National Life Drive
Montpelier, VT 05620-3522

Agency of Natural Resources

(phone) 802-828-1535
(fax) 802 828-1544

November 20, 2012

D. Campbell
RECEIVED
NOV 26 2012
STANTEC
SOUTH BURLINGTON, VT

City of Burlington-Burlington International Airport
c/o Heather Kendrew
1200 Airport Drive, #1
South Burlington, VT 05403

Re: Authorization to Discharge Permit No. 3028-9015.1
Quarry Area Access Road

Dear Ms. Kendrew:

Enclosed is your copy of an Authorization to Discharge pursuant to General Permit 3-9015, which has been signed by the Stormwater Program Manager of the Stormwater Management Section on behalf of the Commissioner of the Department of Environmental Conservation. This authorizes the discharge of treated stormwater runoff from impervious surfaces associated with your project.

Please read this authorization to discharge carefully and note the inspection and reporting requirements, and other operating conditions including payment of annual operating fees.

In addition, per the authorization, the permittee shall record a one page notice of issuance of this authorization in the local land records within fourteen (14) days of issuance of this authorization on the form provided. The permittee shall then provide a copy of the recording to the Stormwater Management Program, by submitting a copy of the recording from the local land records to this office within fourteen (14) days of the permittee's receipt of the recorded copy.

If you have any questions pertaining to this authorization, please contact the Stormwater Management Program's Environmental Analyst assigned to your district, or by email at stormwater@state.vt.us. Additional Stormwater Management Program contact information and stormwater permitting information is available at www.vtwaterquality.org.

Sincerely,

Stormwater Management Program

Enclosures

cc: √Douglas M. Campbell, PE, Stantec Consulting Services, Inc.
Peter Keibel, Act 250 District Coordinator, Essex Junction

Permit Number 3028-9015.1
Project ID Number EJ96-0386

VERMONT DEPARTMENT OF ENVIRONMENTAL CONSERVATION
AUTHORIZATION TO DISCHARGE UNDER
GENERAL PERMIT 3-9015

A determination has been made that the applicant:

City of Burlington, Burlington International Airport
1200 Airport Drive, #1
South Burlington, VT 05403

Impervious Area: 0.17 acres

meets the criteria necessary for inclusion under General Permit 3- 9015. Hereinafter the named applicant shall be referred to as the permittee. Subject to the conditions of General Permit No. 3-9015, the permittee is authorized to discharge stormwater from Quarry Area Access Road located on 1200 Airport Drive, #1, in South Burlington, Vermont to groundwater in the Muddy Brook watershed.

Manner of Discharge:
S/N 002: Stormwater runoff from proposed access road via overland sheet flow, disconnected in accordance with the Disconnection of Non-Rooftop Runoff Credit, discharging to groundwater in the Muddy Brook watershed.

Design: This project shall be constructed and operated in accordance with the site plans and details designed by Stantec (Sheet 1, "Existing Conditions Plan," dated 7/11/2012; Sheet 2, "Site Plan," dated 7/11/2012; Sheet 3, "; and supporting information).

By reference, the above noted plans are made part of this authorization.

Compliance with General Permit 3-9015 and this Authorization
The permittee shall comply with this authorization and all the terms and conditions of General Permit 3-9015, including the payment of annual operating fees to the Department. A billing statement for such fees will be sent to the permittee each year. The first year's statement is enclosed. Any permit non-compliance, including a failure to pay the annual operating fee, constitutes a violation of 10 V.S.A. Chapter 47 and may be grounds for an enforcement action or revocation of this authorization to discharge.

Transferability
This authorization to discharge is not transferable to any person except in compliance with Part VI.D. of General Permit 3-9015. A copy of General Permit 3-9015 is available from the Department via the internet at
http://www.anr.state.vt.us/dec/waterq/stormwater/docs/sw_3-9015-finalpermit.pdf

Changes to Permitted Development
In accordance with Part V.G. of General Permit 3-9015, the permittee shall notify the Department of any planned development or facility expansions or changes that may result in new or increased stormwater discharges. The Department shall determine the appropriateness of continued inclusion under General Permit 3-9015 by the modified development or facility.

Semi-Annual Inspection and Report
The stormwater collection, treatment and control system authorized herein shall be properly operated and maintained and shall be inspected at least twice per year, once in the spring after snowmelt and once in the fall prior to snow fall. The inspection shall evaluate the operation and maintenance and condition of the stormwater collection, treatment and control system. The permittee shall prepare a semiannual inspection report on a form available from the Department, which can be found on the Stormwater Management Program's website. The permittee shall, by November 1st and June 1st of each year, submit an inspection report to the Department.

Restatement of Compliance
An initial statement of compliance, signed by a designer, must be submitted to the Stormwater Management Program no later than 6 months following completion of construction of the stormwater management system. Then, every 5 years, the permittee shall submit to the Department a written statement signed by a designer that the stormwater collection, treatment and control system authorized herein is properly operating and maintained. The first re-statement of compliance is due November 20, 2017. Failure to submit a designer's restatement of compliance shall constitute a violation of General Permit 3-9015 and may result in the revocation of this authorization to discharge. Forms for completing this requirement are available on the Stormwater Management Program's website.

Recording in Land Records: The permittee shall record a one-page notice of issuance of this discharge permit in the local land records within fourteen (14) days of issuance of this authorization to discharge on the form provided by the Secretary, per §18-312 of Stormwater Management Rule. The permittee shall provide a copy of the recording to the Stormwater Management Program within fourteen (14) days of the permittee's receipt of the copy of the recording from the local land records.

Renewable Energy Projects – Right to Appeal to Public Service Board:
Any appeal of this decision must be filed with the clerk of the Vermont Public Service Board pursuant to 10 V.S.A. §8506 within 30 days of the date of this decision. The appellant must file with the Clerk an original and six copies of its appeal. The appellant shall provide notice of the filing of an appeal in accordance with 10 V.S.A. §8504(c)(2), and shall also serve a copy of the Notice of Appeal on the Vermont Department of Public Service. For information, see the Rules and General orders of the Public Service Board available on line at www.psb.vermont.gov. The address for the Public Service Board is 112 State Street Montpelier, Vermont 05620-2701 (Tel. #802-828-2358).

All Other Projects – Right to Appeal to the Environmental Court
Pursuant to 10 V.S.A. Chapter 220, any appeal of this decision must be filed with the clerk of the Environmental Court within 30 days of the date of the decision. The appellant must attach to the Notice of Appeal the entry fee of $250.00, payable to the state of Vermont. The Notice of Appeal must specify the parties taking the appeal and the statutory provision under which each party claims party status; must designate the act or decision appealed from; must name the Environmental Court; and must be signed by the appellant or their attorney. In addition, the appeal must give the address or location and description of the property, project or facility with which the appeal is concerned and the name of the applicant or any permit involved in the appeal. The appellant must also serve a copy of the Notice of Appeal in accordance with Rule 5(b)(4)(B) of the Vermont Rules for Environmental Court Proceedings. For further information, see the Vermont Rules for Environmental Court Proceedings, available on line at www.vermontjudiciary.org. The address for the Environmental Court is 2418 Airport Road, Suite 1, Barre, VT 05641 (Telephone #802-828-1660).

Effective Date and Expiration Date of this Authorization
This authorization to discharge shall become effective on November 20, 2012 and shall continue until November 20, 2022. The permittee shall reapply for coverage at least sixty (60) days prior to November 20, 2022.

Dated this 20th day of November, 2012.

David K. Mears, Commissioner
Department of Environmental Conservation

By Padraic Monks
Padraic Monks, Stormwater Program Manager
Stormwater Management Program

NOTICE OF ISSUANCE OF STORMWATER DISCHARGE PERMIT BY THE VERMONT DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Notice is hereby given that an individual stormwater discharge permit or an authorization to discharge pursuant to a general stormwater discharge permit has been issued by the Vermont Department of Environmental Conservation to Permittee(s) named herein for the discharge of stormwater runoff from impervious surfaces (e.g. roadways, rooftops, parking lots, walkways) pursuant to 10 V.S.A. Section 1264 for the property identified below. The permit/authorization requires treatment and control of stormwater runoff, long-term maintenance of the treatment and control structures and payment of yearly operational fees.

****

Permittee(s): _____

Permit/Authorization Number: _____

911 Address of Property: _____

Name of condominium, subdivision or planned community association (if applicable):

_____

Signature of Permittee or Authorized Representative: _____

Printed Name of Permittee or Authorized Representative: _____

Date of Signature: _____

****

Recording information: Municipal clerks - please index this document listing the State of Vermont, Department of Environmental Conservation as "Grantee". Please index this document listing the above named Permittee(s) as "Grantor(s)". Additionally, if this notice lists the name of a condominium, subdivision or planned community association, please list the named association as an additional "Grantor".

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UIC Permit No. 6-0075
BTV Main Apron and NOTE 2

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STATE OF VERMONT
AGENCY OF NATURAL RESOURCES
DEPARTMENT OF ENVIRONMENTAL CONSERVATION
WASTEWATER MANAGEMENT DIVISION
103 SOUTH MAIN STREET SEWING BUILDING
WATERBURY VERMONT 05671-0405

DATE: 2/9/07 **TOTAL # OF PAGES:** 10 (including coverpage)

PLEASE DELIVER TO:

NAME: Jeff Nelson

FIRM: Pioneer

FAX NUMBER: _____

SENT FOR:

NAME: Allison Lowry

Please feel free to contact me at (802) 241-3822, if you have questions.

COMMENTS:

BTV UIC Permit.

Please call immediately if any pages are not received: (802) 241-3822.

SENT BY: AGL

K:\Admin\FORMS\FAXSHEETFORM.doc

STATE OF VERMONT
AGENCY OF NATURAL RESOURCES
DEPARTMENT OF ENVIRONMENTAL CONSERVATION

ENVIRONMENTAL PROTECTION REGULATIONS, CHAPTER 11
UNDERGROUND INJECTION CONTROL, SUBCHAPTER UIC

FORM WR-UIC-II

UIC PERMIT TO DISCHARGE WASTES INTO AN INJECTION WELL

In compliance with the provisions of
10 V.S.A. § 1263, 1267, 1274, 1278-1280

Permit Number:	6-0075
PIN:	EJ96-0386
Responsible Person:	Heather Kendrew
Permittee(s):	Burlington International Airport (BTV) City of Burlington 1200 Airport Drive, #1 South Burlington, VT 05403-6028
Project:	Burlington International Airport
Project Location:	1200 Airport Drive, #1 South Burlington, Vermont

In accordance with all the "Terms and Conditions" hereinafter specified the above named permittee is hereby granted permission to discharge waste into an injection well within the State of Vermont.

I. Effluent Limitations:

The permittee is hereby authorized to discharge stormwater containing aircraft deicing fluid (propylene glycol) from a project referred to as the Burlington International Airport located in South Burlington, Vermont. Two injection wells (Main Apron and NOTE2) will serve the impervious surfaces containing stormwater with aircraft deicing fluid at the airport. Stormwater drainage containing deicing fluid is the only waste permitted to be disposed of into these systems. The permittee shall not use this disposal system to dispose of hazardous waste and shall not cause a violation of the State of Vermont's Drinking Water Standards or Groundwater Quality Standards, in the receiving groundwater.

II. Expiration Date: **December 31, 2011**

(1) Revocation: 10 V.S.A. § 1267 provides as follows:
"The Secretary may revoke any permit issued pursuant to this subchapter if he or she finds that the permit holder submitted false or inaccurate information in his application or

has violated any requirement, restriction or condition of the permit issued. Revocation shall be effective upon actual notice thereof to the permit holder."

(2) Transfer of Permit: This permit is not transferable without prior written approval of the Secretary. The permittee shall notify the Secretary immediately, in writing, of any sale, lease or other transfer of ownership of the property from with the discharge originates. The permittee shall also inform the new owner or tenant of his responsibility to make application for a permit which shall be issued in his name. Any failure to so notify shall be considered a violation of this permit. All application and operating fees must be paid in full prior to transfer of this permit.

(3) Conditions applicable to all permits:

(i) Duty to comply - The permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Underground Injection Control (UIC) Rule and the Safe Drinking Water Act (SDWA) and is grounds for enforcement action; for permit termination, revocation and reissuance, or modifications; or for denial of a permit renewal application;

(ii) Duty to reapply - If the permittee wishes to continue an activity regulated by this permit after the expiration date of this permit, the permittee must apply for, no later than 180 days prior to expiration, and obtain a new permit. **Apply for renewal by June 30, 2011;**

(iii) Operating Fees –The permittee shall submit operating fees in accordance with procedures provided by the Secretary. **This condition is not applicable.** (Subject to change by Legislation.)

(iv) Duty to halt or reduce activity - It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit;

(v) Duty to mitigate - The permittee shall take all reasonable steps to minimize or correct any adverse impact on the environment resulting from noncompliance with this permit;

(vi) Proper operation and maintenance - The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance includes effective performance, adequate funding, adequate operator staffing and training, and adequate laboratory and process controls, including appropriate

(vii) quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems only when necessary to achieve compliance with the conditions of the permit;

(vii) Permit actions - This permit may be modified, revoked and reissued, or terminated for cause. The filing of a request by the permittee for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance, does not stay any permit condition;

(viii) Property rights - This permit does not convey any property rights of any sort, or any exclusive privilege;

(ix) Duty to provide information -The permittee shall furnish to the Secretary, within a reasonable time, any information which the Secretary may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit, or to determine compliance with this permit. The permittee shall also furnish to the Secretary, upon request, copies of records required to be kept by this permit;

(x) Inspection and entry - The permittee shall allow the Secretary, or authorized representative, upon presentation of credentials and other documents as may be required by law, to:

(A) Enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this permit;

(B) Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;

(C) Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit; and

(D) Sample or monitor at reasonable times, for the purpose of assuring permit compliance or as otherwise authorized by the appropriate Act, any substances or parameters at any location.

(xi) Monitoring and records

(A) Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity;

(B) The permittee shall retain records of all monitoring information including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this permit, and records of all data used to complete the application for this permit, for a period of at least 3 years from the date of the sample, measurement, report or application. This period may be extended by request of the Secretary at any time;

(C) Records of monitoring information shall include:

(1) the date, exact place, and time of sampling or measurements;
(2) the individual(s) who performed the sampling or measurements;
(3) the date(s) analyses were performed;
(4) the individual(s) who performed the analyses;
(5) the analytical techniques or methods used; and
(6) the results of such analyses.

The permittee shall retain all records concerning the nature and composition of injected fluids until five years after completion of any plugging and abandonment procedures specified in the permit. The Secretary may require the owner or operator to deliver the records to the Secretary at the conclusion of the retention period.

(xii) Signatory requirement - All applications, reports, or information submitted to the Secretary shall be signed and certified (See § 13.UIC.6 of the Regulations).

(xiii) Reporting requirements

(A) Planned changes - The permittee shall give notice to the Secretary as soon as possible of any planned physical alterations or additions to the permitted facility;

(B) Anticipated noncompliance - The permittee shall give advance notice to the Secretary of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements;

(C) Transfers - This permit is not transferable to any person except after notice to the Secretary. The Secretary will require modification or revocation and reissuance of the permit to change the name of the permittee and incorporate such other requirements as may be necessary (See §13.UIC.10);

(D) Monitoring reports - Monitoring results shall be reported at the intervals specified elsewhere in this permit;

(E) Compliance schedules - Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this permit shall be submitted no later than 14 days following each schedule date;

(F) Twenty-four hour reporting - The permittee shall report any noncompliance which may violate drinking water standards, or endanger health or the environment. Any information shall be provided orally within 24 hours from the time the permittee becomes aware of the circumstances. A written submission shall also be provided within (5) days of the time the permittee becomes aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue, and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance. The following shall be included as information which must be reported with 24 hours:

(1) any monitoring or other information which indicates that any contaminant may cause an endangerment to a underground source of drinking water (USDW); and

(2) any noncompliance with a permit condition or malfunction of the injection system which may cause fluid migration into or between USDWs.

(G) Other noncompliance - The permittee shall report all instances of noncompliance not reported under paragraphs (xiii)(A)(D)(E) and (F) of this section, at the time monitoring reports are submitted. The reports shall contain the information listed in paragraph (xiii)(F) of this section;

(H) Other information - Where the permittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or in any report to the Secretary, it shall promptly submit such facts Or information.

(xiv) Pre Operation Requirements

The permittee may not commence injection into a new injection well until construction is complete, and

(A) the permittee has submitted notice of completion of construction to the Secretary; and

(1) the Secretary has inspected or otherwise reviewed the new injection well and finds it is in compliance with the conditions of the permit; or

(2) the permittee has not received notice from the Secretary of his or her intent to inspect or otherwise review the new injection well within 13 days of the date of the notice in paragraph (A)(1) of this section, in which case prior inspection or review is waived and the permittee may commence injection.

(xv) Requirements prior to conversions or abandonment

The permittee shall notify the Secretary at least 180 days before conversion or abandonment of the well. With the notice, the permittee shall submit a revised plugging and abandonment plan updated as appropriate in compliance with the conditions of the permit and Appendix II, §146.10;

(4) Additional requirements for UIC permits, when applicable:

(i) Construction requirements as set forth in Appendix II. Part 146 **are not applicable**. Existing wells shall achieve compliance with such requirements according to a compliance schedule established elsewhere in this permit as a permit condition. The owner or operator of a proposed new injection well shall submit plans for testing, drilling, and construction as part of the permit application. (See appropriate application forms.) No construction may commence until a permit has been issued containing construction requirements. New wells shall be in compliance with these requirements prior to commencing injection operations. Changes in construction plans during construction may be approved by the Secretary as minor modifications (§ 13.UIC.13). No such changes may be physically incorporated into construction of the well prior to approval of the modification by the Secretary;

The permittee shall construct the stormwater discharge system in accordance with the plans and specifications prepared by Campbell & Paris Engineers:

(A) Sheet 4 of 6, ADF Site Plan, 9/6/06, and
(B) Sheet 5 of 6, ADF Infiltration System Details and Notes, 9/6/06.

(ii) Corrective action as set forth in § 13.UIC.20 and Appendix II, § 146.7;

(iii) Operation requirements as set forth in Appendix II, Part 146 **are not applicable**. The permit shall establish any maximum injection volumes and/or pressures necessary to assure that factures are not initiated in the confining zone, that injected fluids do not migrate into any underground source of drinking water, that

formation fluids are not displaced into any underground source of drinking water, and to assure compliance with the Appendix II, Part 146 operating requirements;

(iv) Monitoring and reporting requirements as set forth in Appendix II, Part 146. The permittee shall be required to identify types of tests and methods used to generate the monitoring data;

(v) Plugging and abandonment requirements **are not applicable**. Any Class I, II or III permit shall include and any Class V permit may include, conditions to ensure that plugging and abandonment of the well will not allow the movement of fluids either into an underground source of drinking water or from one underground source of drinking water to another. Any applicant for a UIC permit shall be required to submit a plan for plugging and abandonment. Where the plan meets the requirements of this paragraph, the Secretary shall incorporate it into the permit as a condition. Where the Secretary's review of an application indicates that the permittee's plan is inadequate, the Secretary shall require the applicant to revise the plan, prescribe conditions meeting the requirements of this paragraph, or deny the application. For purposes of this paragraph, temporary intermittent cessation of injection operations is not abandonment;

(vi) Financial responsibility. The permit shall **not** require the permittee to maintain financial responsibility and resources, in the form of performance bonds or other equivalent form of financial assurance approved by the Secretary, to close, plug, and abandon the underground injection operation in a manner prescribed by the Secretary. In lieu of individual performance bonds, operators may furnish a bond or other equivalent form of financial guarantee approved by the Secretary covering all injection wells operated by the permittee in the State;

(vii) Mechanical integrity requirements **are not applicable**. A permit for any Class I, II or III well or injection program which lacks mechanical integrity shall include, and for any Class V well may include, a condition prohibiting injection operations until the permittee shows to the satisfaction of the Secretary under Appendix II, § 146.08 that the well has mechanical integrity; and

(viii) Additional conditions. The Secretary shall impose on a case-by-case basis such additional conditions as are necessary to prevent the migration of fluids into underground sources of drinking water.

(5) Schedule of Compliance

As a condition of this permit the permittee shall meet the following schedule of compliance. (See §13.UIC.15)

(6) Monitoring, Recording and Reporting Requirements

The following inspection, monitoring, recording and reporting are required as a condition of this permit.

(i) **Inspection**

The permittee shall inspect all parts of the systems, including the pump station, manholes and infiltration areas, on an annual basis. All inspections must be performed by a Professional Engineer registered in Vermont and shall include all information about the system from June 1st of one year to May 31st of the following year.

(ii) **Groundwater Monitoring:**

The groundwater monitoring will be required for both injection well areas. Groundwater quality testing will be performed at all existing and proposed on-site monitoring wells as follows:

Main Apron area:
Upgradient: MW12P (upgradient)
Downgradient: MW1, MW2, MW4, MW9P, MW10P

NOTE2 area:
Upgradient: MW11P
Downgradient: MW13P, MW14P

Samples from the monitoring wells shall be collected twice annually during October or November and April or May. The late Fall sampling shall occur during base streamflow periods as indicated by the Winooski River USGS gage, and analyzed for the following parameters:

Parameter	EPA Method	SM
BOD5	405.1	
COD	410.4	
Propylene Glycol (PG)	8015B	
Chloride	300.0	
Nitrate	300.0	
Total Dissolved Solids		2540C
Alkalinity		2320B
pH	150.1	
Conductivity	120.1 (field measurement)	
Temperature	170.1 (field measurement)	

(iii) **Recording and Reporting**

The following recording and reporting requirements are necessary to meet the terms of this permit (See Appendix II, Part 146.):

The permittee shall prepare a report on the inspection of the stormwater discharge system. The report shall include a description and date of any maintenance performed on the system during the previous year, a description of any necessary maintenance to be performed, a schedule of planned maintenance, and a description of any problems with the system. The annual inspection reports shall be submitted by **the 30th of June each year** of this permit and shall be performed by a Professional Engineer registered in Vermont.

The results of sampling of the discharge to the injection wells, groundwater monitoring wells, and any other notification required by any condition of this permit, shall be submitted to the Department at the following address:

Wastewater Management Division
Underground Injection Control (UIC) Program
103 South Main Street, The Sewing Building
Waterbury, VT 05671-0405

Reports shall be submitted by the 15th day of the month following the date of sampling or measurement.

(7) Effect of this permit:

(i) Except for Class II and III injection wells compliance with this permit during its term constitutes compliance, for purposes of enforcement, with Part C of the Safe Drinking Water Act.

(ii) The issuance of this permit does not authorize any injury to persons or property or invasion of other private rights, or any infringement of other State or local law or regulations.

(8) Additional Requirements:

No additional requirements presently exist for this permit.

Jeffrey Wennberg, Commissioner
Department of Environmental Conservation

BY: Christine Thompson Date: February 9, 2007
Christine Thompson, Director
Wastewater Management Division

Final UIC Permit
South End

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VERMONT

State of Vermont
Department of Environmental Conservation

AGENCY OF NATURAL RESOURCES

Wastewater Management Division
103 South Main Street - The Sewing Building
Waterbury VT 05671-0405
Phone: 802-241-3822
Fax: 802-241-2596

RECEIVED
MAR 28 2008
VHB Pioneer Environmental Associates
Vergennes, VT

March 21, 2008

Heather Kendrew
Burlington International Airport (BTV)
City of Burlington
1200 Airport Drive, #1
South Burlington, VT 05403-6028

SUBJECT: Final UIC Permit #6-0084 (south end development)

Dear Ms. Kendrew:

Please find enclosed the final Underground Injection Control (UIC) Permit issued to Burlington International Airport to discharge into Class V injection well in South Burlington, Vermont. The permit has been signed by Christine Thompson, Director of Wastewater Management Division, for the Secretary of the Agency of Natural Resources.

Please read the entire permit carefully and become familiar with all of the terms and conditions.

If you have any questions regarding the permit, please call me at (802) 241-4455.

Sincerely,

Allison Lowry
Principal Soil Scientist
Wastewater Management Division

Cc: Meddie Perry, Pioneer Environmental
UIC File – 6-0084

STATE OF VERMONT
AGENCY OF NATURAL RESOURCES
DEPARTMENT OF ENVIRONMENTAL CONSERVATION

ENVIRONMENTAL PROTECTION REGULATIONS, CHAPTER 11
UNDERGROUND INJECTION CONTROL, SUBCHAPTER UIC

FORM WR-UIC-II

UIC PERMIT TO DISCHARGE WASTES INTO AN INJECTION WELL

In compliance with the provisions of
10 V.S.A. § 1263, 1267, 1274, 1278-1280

Permit Number:	6-0084
PIN:	EJ 96-0386
Responsible Person:	Heather Kendrew
Permittee(s):	City of Burlington Burlington International Airport 1200 Airport Drive #1 South Burlington, VT 05403-6028
Project:	Burlington International Airport, South End Development
Project Location:	1200 Airport Drive #1 South Burlington, Vermont

In accordance with all the "Terms and Conditions" hereinafter specified the above named permittee is hereby granted permission to discharge waste into an injection well within the State of Vermont.

I. Effluent Limitations:

The permittee is hereby authorized to discharge stormwater containing aircraft deicing fluid (propylene glycol) from a project referred to as the Burlington International Airport located in South Burlington, Vermont. The injection well will serve the impervious surfaces at the south end development containing stormwater with aircraft deicing fluid at the airport. Stormwater drainage containing deicing fluid is the only waste permitted to be disposed of into these systems. The permittee shall not use this disposal system to dispose of hazardous waste and shall not cause a violation of the State of Vermont's Drinking Water Standards or Groundwater Quality Standards, in the receiving groundwater.

II. Expiration Date: **December 31, 2012**

(1) Revocation: 10 V.S.A. § 1267 provides as follows:

"The Secretary may revoke any permit issued pursuant to this subchapter if he or she finds that the permit holder submitted false or inaccurate information in his application or has violated any requirement, restriction or condition of the permit issued. Revocation shall be effective upon actual notice thereof to the permit holder."

(2) Transfer of Permit: This permit is not transferable without prior written approval of the Secretary. The permittee shall notify the Secretary immediately, in writing, of any sale, lease or other transfer of ownership of the property from with the discharge originates. The permittee shall also inform the new owner or tenant of his responsibility to make application for a permit which shall be issued in his name. Any failure to so notify shall be considered a violation of this permit. All application and operating fees must be paid in full prior to transfer of this permit.

(3) Conditions applicable to all permits:

(i) Duty to comply - The permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Underground Injection Control (UIC) Rule and the Safe Drinking Water Act (SDWA) and is grounds for enforcement action; for permit termination, revocation and reissuance, or modifications; or for denial of a permit renewal application;

(ii) Duty to reapply - If the permittee wishes to continue an activity regulated by this permit after the expiration date of this permit, the permittee must apply for, no later than 180 days prior to expiration, and obtain a new permit. **Apply for renewal by June 30, 2012**;

(iii) Operating Fees – This discharge is subject to operating fees. The permittee shall submit operating fees in accordance with procedures provided by the Secretary. **This condition is not applicable.** Subject to change by Legislation.

(iv) Duty to halt or reduce activity - It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit;

(v) Duty to mitigate - The permittee shall take all reasonable steps to minimize or correct any adverse impact on the environment resulting from noncompliance with this permit;

(vi) Proper operation and maintenance - The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the

permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance includes effective performance, adequate funding, adequate operator staffing and training, and adequate laboratory and process controls, including appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems only when necessary to achieve compliance with the conditions of the permit;

(vii) Permit actions - This permit may be modified, revoked and reissued, or terminated for cause. The filing of a request by the permittee for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance, does not stay any permit condition;

(viii) Property rights - This permit does not convey any property rights of any sort, or any exclusive privilege;

(ix) Duty to provide information -The permittee shall furnish to the Secretary, within a reasonable time, any information which the Secretary may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit, or to determine compliance with this permit. The permittee shall also furnish to the Secretary, upon request, copies of records required to be kept by this permit;

(x) Inspection and entry - The permittee shall allow the Secretary, or authorized representative, upon presentation of credentials and other documents as may be required by law, to:

(A) Enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this permit;

(B) Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;

(C) Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit; and

(D) Sample or monitor at reasonable times, for the purpose of assuring permit compliance or as otherwise authorized by the appropriate Act, any substances or parameters at any location.

(xi) <u>Monitoring and records</u>

(A) Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity;

(B) The permittee shall retain records of all monitoring information including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this permit, and records of all data used to complete the application for this permit, for a period of at least 3 years from the date of the sample, measurement, report or application. This period may be extended by request of the Secretary at any time;

(C) Records of monitoring information shall include:

(1) the date, exact place, and time of sampling or measurements;
(2) the individual(s) who performed the sampling or measurements;
(3) the date(s) analyses were performed;
(4) the individual(s) who performed the analyses;
(5) the analytical techniques or methods used; and
(6) the results of such analyses.

The permittee shall retain all records concerning the nature and composition of injected fluids until five years after completion of any plugging and abandonment procedures specified in the permit. The Secretary may require the owner or operator to deliver the records to the Secretary at the conclusion of the retention period.

(xii) Signatory requirement - All applications, reports, or information submitted to the Secretary shall be signed and certified (See § 13.UIC.6 of the Regulations).

(xiii) Reporting requirements

(A) Planned changes - The permittee shall give notice to the Secretary as soon as possible of any planned physical alternations or additions to the permitted facility;

(B) Anticipated noncompliance - The permittee shall give advance notice to the Secretary of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements;

(C) Transfers - This permit is not transferable to any person except after notice to the Secretary. The Secretary will require modification or revocation and reissuance of the permit to change

the name of the permittee and incorporate such other requirements as may be necessary (See §13.UIC.10);

(D) Monitoring reports - Monitoring results shall be reported at the intervals specified elsewhere in this permit;

(E) Compliance schedules - Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this permit shall be submitted no later than 14 days following each schedule date;

(F) Twenty-four hour reporting - The permittee shall report any noncompliance which may violate drinking water standards, or endanger health or the environment. Any information shall be provided orally within 24 hours from the time the permittee becomes aware of the circumstances. A written submission shall also be provided within (5) days of the time the permittee becomes aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue, and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance. The following shall be included as information which must be reported with 24 hours:

(1) any monitoring or other information which indicates that any contaminant may cause an endangerment to a underground source of drinking water (USDW); and

(2) any noncompliance with a permit condition or malfunction of the injection system which may cause fluid migration into or between USDWs.

(G) Other noncompliance - The permittee shall report all instances of noncompliance not reported under paragraphs (xiii)(A)(D)(E) and (F) of this section, at the time monitoring reports are submitted. The reports shall contain the information listed in paragraph (xiii)(F) of this section;

(H) Other information - Where the permittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or in any

report to the Secretary, it shall promptly submit such facts Or information.

(xiv) Pre Operation Requirements

The permittee may not commence injection into a new injection well until construction is complete, and

(A) the permittee has submitted notice of completion of construction to the Secretary; and

(1) the Secretary has inspected or otherwise reviewed the new injection well and finds it is in compliance with the conditions of the permit; or

(2) the permittee has not received notice from the Secretary of his or her intent to inspect or otherwise review the new injection well within 13 days of the date of the notice in paragraph (A)(1) of this section, in which case prior inspection or review is waived and the permittee may commence injection.

(xv) Requirements prior to conversions or abandonment

The permittee shall notify the Secretary at least 180 days before conversion or abandonment of the well. With the notice, the permittee shall submit a revised plugging and abandonment plan updated as appropriate in compliance with the conditions of the permit and Appendix II, §146.10;

(4) Additional requirements for UIC permits, when applicable:

(i) Construction requirements as set forth in Appendix II. Part 146 **are not applicable**. Existing wells shall achieve compliance with such requirements according to a compliance schedule established elsewhere in this permit as a permit condition. The owner or operator of a proposed new injection well shall submit plans for testing, drilling, and construction as part of the permit application. (See appropriate application forms.) No construction may commence until a permit has been issued containing construction requirements. New wells shall be in compliance with these requirements prior to commencing injection operations. Changes in construction plans during construction may be approved by the Secretary as minor modifications (§ 13.UIC.13). No such changes may be physically incorporated into construction of the well prior to approval of the modification by the Secretary

The permittee shall construct the stormwater discharge system in accordance with the plans and specifications prepared by Stantac Consulting Services, Inc.:

(A) Sheet C1, Overall Site Plan, September 2007 and
(B) Sheet C2, Storage Detention Site Plan, September 2007, and
(C) Sheet C4, Stormwater Conveyance Details, September 2007, and
(D) Sheet C5, Stormwater Treatment Details, September 2007.

(ii) Corrective action as set forth in § 13.UIC.20 and Appendix II, § 146.7;

(iii) Operation requirements as set forth in Appendix II, Part 146 **are not applicable**. The permit shall establish any maximum injection volumes and/or pressures necessary to assure that factures are not initiated in the confining zone, that injected fluids do not migrate into any underground source of drinking water, that formation fluids are not displaced into any underground source of drinking water, and to assure compliance with the Appendix II, Part 146 operating requirements;

(iv) Monitoring and reporting requirements as set forth in Appendix II, Part 146. The permittee shall be required to identify types of tests and methods used to generate the monitoring data;

(v) Plugging and abandonment requirements **are not applicable**. Any Class I, II or III permit shall include and any Class V permit may include, conditions to ensure that plugging and abandonment of the well will not allow the movement of fluids either into an underground source of drinking water or from one underground source of drinking water to another. Any applicant for a UIC permit shall be required to submit a plan for plugging and abandonment. Where the plan meets the requirements of this paragraph, the Secretary shall incorporate it into the permit as a condition. Where the Secretary's review of an application indicates that the permittee's plan is inadequate, the Secretary shall require the applicant to revise the plan, prescribe conditions meeting the requirements of this paragraph, or deny the application. For purposes of this paragraph, temporary intermittent cessation of injection operations is not abandonment;

(vi) Financial responsibility. The permit shall **not** require the permittee to maintain financial responsibility and resources, in the form of performance bonds or other equivalent form of financial assurance approved by the Secretary, to close, plug, and abandon the underground injection operation in a manner prescribed by the Secretary. In lieu of individual performance bonds, operators may furnish a bond or other equivalent

form of financial guarantee approved by the Secretary covering all injection wells operated by the permittee in the State;

(vii) Mechanical integrity requirements **are not applicable**. A permit for any Class I, II or III well or injection program which lacks mechanical integrity shall include, and for any Class V well may include, a condition prohibiting injection operations until the permittee shows to the satisfaction of the Secretary under Appendix II, § 146.08 that the well has mechanical integrity; and

(viii) Additional conditions. The Secretary shall impose on a case-by-case basis such additional conditions as are necessary to prevent the migration of fluids into underground sources of drinking water.

(5) Schedule of Compliance

As a condition of this permit the permittee shall meet the following schedule of compliance. (See §13.UIC.15)

(6) Monitoring, Recording and Reporting Requirements

The following inspection, monitoring, recording and reporting are required as a condition of this permit.

(i) **Inspection**

The permittee shall inspect all parts of the systems, including the pump station, manholes and infiltration areas, on an annual basis. All inspections must be performed by a Professional Engineer registered in Vermont and shall include all information about the system from June 1st of one year to May 31st of the following year.

(ii) **Groundwater Monitoring:**

Groundwater quality testing will be performed at all existing and proposed on-site monitoring wells as follows:

Upgradient:	MW-16
Infiltration system:	MW-17, MW-18, MW-19
Downgradient:	MW-21, MW-22, MW-23, MW-24

Samples from the monitoring wells shall be collected twice annually during October or November and April or May, during late Fall and Spring base streamflow periods as indicated by the Winooski River USGS gage, and analyzed for the following parameters

Parameter	EPA Method
BOD5	405.1
COD	410.2
Propylene Glycol (PG)	SW 8015B
Ethylene Glycol	SW 8015B
Chloride	325.1
Nitrate	300.0
Total Dissolved Solids	160.1
Alkalinity	310.1
pH	150.1
Conductivity	120.1 (field measurement)
Temperature	170.1 (field measurement)

If groundwater monitoring indicate BOD5 levels exceed the maximum acceptable change of 25mg/L, monitoring of Muddy Brook shall begin. Levels of Dissolved Oxygen (DO) and temperature shall be measured in the book at locations upstream and downstream from the groundwater plume.

(iii) **Recording and Reporting**

The following recording and reporting requirements are necessary to meet the terms of this permit (See Appendix II, Part 146.):

The permittee shall prepare a report on the inspection of the stormwater discharge system. The report shall include a description and date of any maintenance performed on the system during the previous year, a description of any necessary maintenance to be performed, a schedule of planned maintenance, and a description of any problems with the system. The annual inspection reports shall be submitted by **the 30th of June each year** of this permit and shall be performed by a Professional Engineer registered in Vermont.

The results of sampling of the discharge to the injection wells, groundwater monitoring wells, and any other notification required by any condition of this permit, shall be submitted to the Department at the following address:

Wastewater Management Division
Underground Injection Control (UIC) Program
103 South Main Street, The Sewing Building
Waterbury, VT 05671-0405

Reports shall be submitted by the 15th day of the month following the date of sampling or measurement.

(7) Effect of this permit:

(i) Except for Class II and III injection wells compliance with this permit during its term constitutes compliance, for purposes of enforcement, with Part C of the Safe Drinking Water Act.

(ii) The issuance of this permit does not authorize any injury to persons or property or invasion of other private rights, or any infringement of other State or local law or regulations.

(8) Additional Requirements:

No additional requirements presently exist for this permit.

Laura Q. Pelosi, Commissioner
Department of Environmental Conservation

BY: Christine Thompson Date: March 25/2008
Christine Thompson, Director
Wastewater Management Division

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Permit No. UIC6-0117
Burlington Airport Final Permit

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STATE OF VERMONT
AGENCY OF NATURAL RESOURCES
DEPARTMENT OF ENVIRONMENTAL CONSERVATION

ENVIRONMENTAL PROTECTION REGULATIONS, CHAPTER 11
UNDERGROUND INJECTION CONTROL, SUBCHAPTER UIC

FORM WR-UIC-II

UIC PERMIT TO DISCHARGE WASTES INTO AN INJECTION WELL

In compliance with the provisions of
10 V.S.A. § 1263, 1267, 1274, 1278-1280

Permit Number: 6-0117
PIN: EJ96-0386

Permittee: City of Burlington
Burlington International Airport
1200 Airport Drive #1
South Burlington, VT 05403-6028

Project: Disposal of Aircraft Deicing Fluid in Stormwater Runoff from the Air Cargo Ramp at the Burlington International Airport

Project Location: Burlington International Airport – Air Cargo Ramp
1200 Airport Drive #1
South Burlington, VT 05403-6028

Project Technical Documentation: 1. UIC Permit Application Narrative for Aircraft Deicing Fluid Runoff: Air Cargo Ramp. Burlington International Airport (BTV). South Burlington, Vermont, prepared by Vanasse Hangen, Brustlin, Inc., dated February 29, 2012; and
2. Permit Plans for Burlington International Airport, South Burlington, Vermont, CONSTRUCT AIRCRAFT DEICING FLUID TREATMENT SYSTEM, 890 RAMP, September 2010, AIP Project No. 3-50-0005-XX-2010, prepared by Stantec, dated September 29, 2010.

In accordance with all the "Terms and Conditions" hereinafter specified the above named permittee is hereby granted permission to discharge stormwater runoff containing aircraft deicing fluid from the Air Cargo Ramp into a Class V injection well, within the State of Vermont.

I. Discharge Limitations:

The permittee is hereby authorized to discharge stormwater containing aircraft deicing fluid (propylene glycol-based) from the impervious surfaces at the Air Cargo Ramp, Burlington International Airport in South Burlington, Vermont, to an injection well. Stormwater runoff

containing the aircraft deicing fluid is the only waste permitted to be disposed of in the injection well.

The permittee shall not cause a violation of the State of Vermont's Drinking Water Standards or Groundwater Quality Standards in the receiving groundwater. Adherence with the "Vermont Groundwater Public Trust Principles for Groundwater Quality" is also required.

II. Expiration Date: **March 31, 2017**

III. Conditions

(1) Revocation: 10 V.S.A. § 1267 provides as follows:

"The Secretary may revoke any permit issued pursuant to this subchapter if he or she finds that the permit holder submitted false or inaccurate information in his application or has violated any requirement, restriction or condition of the permit issued. Revocation shall be effective upon actual notice thereof to the permit holder."

(2) Transfer of Permit: This permit is not transferable without prior written approval of the Secretary. The permittee shall notify the Secretary immediately, in writing, of any sale, lease or other transfer of ownership of the property from which the discharge originates. The permittee shall also inform the new owner or tenant of his responsibility to make application for a permit which shall be issued in his name. Any failure to so notify shall be considered a violation of this permit. All application and operating fees must be paid in full prior to transfer of this permit.

(3) Conditions applicable to all permits:

(i) Duty to comply - The permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Underground Injection Control (UIC) Rule and the Safe Drinking Water Act (SDWA) and is grounds for enforcement action; for permit termination, revocation and reissuance, or modifications; or for denial of a permit renewal application;

(ii) Duty to reapply - If the permittee wishes to continue an activity regulated by this permit after the expiration date of this permit, the permittee must apply for, no later than 180 days prior to expiration, and obtain a new permit. **Application deadline for renewal of this permit is September 30, 2016**;

(iii) Operating Fees – This discharge is subject to operating fees. The permittee shall submit operating fees in accordance with procedures provided by the Secretary. **This condition is currently not applicable, however it may be subject to change by legislation**;

(iv) Duty to halt or reduce activity - It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit;

(v) Duty to mitigate - The permittee shall take all reasonable steps to minimize or correct any adverse impact on the environment resulting from noncompliance with this permit;

(vi) Proper operation and maintenance - The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance includes effective performance, adequate funding, adequate operator staffing and training, and adequate laboratory and process controls, including appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems only when necessary to achieve compliance with the conditions of the permit;

(vii) Permit actions - This permit may be modified, revoked and reissued, or terminated for cause. The filing of a request by the permittee for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance, does not stay any permit condition;

(viii) Property rights - This permit does not convey any property rights of any sort, or any exclusive privilege;

(ix) Duty to provide information -The permittee shall furnish to the Secretary, within a reasonable time, any information which the Secretary may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit, or to determine compliance with this permit. The permittee shall also furnish to the Secretary, upon request, copies of records required to be kept by this permit;

(x) Inspection and entry - The permittee shall allow the Secretary, or authorized representative, upon presentation of credentials and other documents as may be required by law, to:

(A) Enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this permit;

(B) Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;

(C) Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit; and

(D) Sample or monitor at reasonable times, for the purpose of assuring permit compliance or as otherwise authorized by the appropriate Act, any substances or parameters at any location.

(xi) Monitoring and records:

(A) Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity;

(B) The permittee shall retain records of all monitoring information including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this permit, and records of all data used to complete the application for this permit, for a period of at least three (3) years from the date of the sample, measurement, report or application. This period may be extended by request of the Secretary at any time;

(C) Records of monitoring information shall include:

(1) the date, exact place, and time of sampling or measurements;
(2) the individual(s) who performed the sampling or measurements;
(3) the date(s) analyses were performed;
(4) the individual(s) who performed the analyses;
(5) the analytical techniques or methods used; and
(6) the results of such analyses.

The permittee shall retain all records concerning the nature and composition of injected fluids until five (5) years after completion of any plugging and abandonment procedures specified in the permit. The Secretary may require the owner or operator to deliver the records to the Secretary at the conclusion of the retention period.

(xii) Signatory requirement - All applications, reports, or information submitted to the Secretary shall be signed and certified (See § 13.UIC.6);

(xiii) Reporting requirements:

(A) Planned changes - The permittee shall give notice to the Secretary as soon as possible of any planned physical alterations or additions to the permitted facility;

(B) Anticipated noncompliance - The permittee shall give advance notice to the Secretary of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements;

(C) Transfers - This permit is not transferable to any person except after notice to the Secretary. The Secretary will require modification or revocation

and reissuance of the permit to change the name of the permittee and incorporate such other requirements as may be necessary (See §13.UIC.10);

(D) Monitoring reports - Monitoring results shall be reported at the intervals specified elsewhere in this permit;

(E) Compliance schedules - Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this permit shall be submitted no later than 14 days following each schedule date;

(F) Twenty-four hour reporting - The permittee shall report any noncompliance which may violate drinking water standards, or endanger health or the environment. Any information shall be provided orally within 24 hours from the time the permittee becomes aware of the circumstances. A written submission shall also be provided within five (5) days of the time the permittee becomes aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected; the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance. The following shall be included as information which must be reported with 24 hours:

(1) Any monitoring or other information which indicates that any contaminant may cause an endangerment to a underground source of drinking water (USDW); and

(2) Any noncompliance with a permit condition or malfunction of the injection system which may cause fluid migration into or between USDWs.

(G) Other noncompliance - The permittee shall report all instances of noncompliance not reported under paragraphs (xiii)(A)(D)(E) and (F) of this section, at the time monitoring reports are submitted. The reports shall contain the information listed in paragraph (xiii)(F) of this section;

(H) Other information - Where the permittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or in any report to the Secretary, it shall promptly submit such facts or information.

(xiv) Pre Operation Requirements:

The permittee may not commence injection into a new injection well until construction is complete; and

(A) The permittee has submitted notice of completion of construction to the Secretary; and

(1) The Secretary has inspected or otherwise reviewed the new injection well and finds it is in compliance with the conditions of the permit; or

(2) the permittee has not received notice from the Secretary of his or her intent to inspect or otherwise review the new injection well within 13 days of the date of the notice in paragraph (A)(1) of this section, in which case prior inspection or review is waived and the permittee may commence injection.

(xv) Requirements prior to conversions or abandonment:

The permittee shall notify the Secretary at least 180 days before conversion or abandonment of the well. With the notice, the permittee shall submit a revised plugging and abandonment plan updated as appropriate in compliance with the conditions of the permit and Appendix II, §146.10.

(4) Additional requirements for UIC permits, when applicable:

(i) Construction requirements set forth in Appendix II, Part 146 **are not applicable**. Existing wells shall achieve compliance with such requirements according to a compliance schedule established elsewhere in this permit as a permit condition. The owner or operator of a proposed new injection well shall submit plans for testing, drilling, and construction as part of the permit application. No construction may commence until a permit has been issued containing construction requirements. New wells shall be in compliance with these requirements prior to commencing injection operations. Changes in construction plans during construction may be approved by the Secretary as minor (§ 13.UIC.13). No such changes may be physically incorporated into construction of the well prior to approval of the modification by the Secretary.

The permittee shall design and construct the stormwater collection, treatment, and disposal system in accordance with the referenced project technical documentation;

(ii) Corrective action as set forth in § 13.UIC.20 and Appendix II, § 146.7;

(iii) Operation requirements as set forth in Appendix II, Part 146 **are not applicable**. The permit shall establish any maximum injection volumes and/or pressures necessary to assure that fractures are not initiated in the confining zone; that injected fluids do not migrate into any underground sources of drinking water; that formation fluids are not displaced into underground source of drinking water; and to assure compliance with the Appendix II, Part 146 operating requirements;

(iv) Monitoring and reporting requirements as set forth in Appendix II, Part 146. The permittee shall be required to identify types of tests and methods used to generate the monitoring data;

(v) Plugging and abandonment requirements **are not applicable**. Any Class I, II, or III permit shall include and any Class V permit may include, conditions to ensure that plugging and abandonment of the well will not allow the movement of fluids either into an underground source of drinking water or from one underground source of drinking water to another. Any applicant for a UIC permit shall be required to submit a plan for plugging and abandonment. Where the plan meets the requirements of this paragraph, the Secretary shall incorporate it into the permit as a condition. Where the Secretary's review of an application indicates that the permittee's plan is inadequate, the Secretary shall require the applicant to revise the plan, prescribe conditions meeting the requirements of this paragraph, or deny the application. For purposes of this paragraph, temporary intermittent cessation of injection operations is not abandonment;

(vi) Financial responsibility: The permit shall **not** require the permittee to maintain financial responsibility and resources, in the form of performance bonds or other equivalent form of financial assurance approved by the Secretary, to close, plug, and abandon the underground injection operation in a manner prescribed by the Secretary. In lieu of individual performance bonds, operators may furnish a bond or other equivalent form of financial guarantee approved by the Secretary covering all injection wells operated by the permittee in the State;

(vii) Mechanical integrity requirements **are not applicable**. A permit for any Class I, II, or III well or injection program which lacks mechanical integrity shall include, and for any Class V well may include, a condition prohibiting injection operations until the permittee shows to the satisfaction of the Secretary under Appendix II, § 146.08 that the well has mechanical integrity;

(viii) Additional conditions: The Secretary shall impose on a case-by-case basis such additional conditions as are necessary to prevent the migration of fluids into underground sources of drinking water.

(5) Schedule of Compliance

As a condition of this permit, the permittee shall meet the following schedule of compliance (See §13.UIC.15).

(6) Inspection, Monitoring, Recording, and Reporting Requirements

The following inspection, monitoring, recording, and reporting requirements are conditions of this permit.

(i) **Inspection:**

The permittee shall inspect the stormwater collection, treatment, and disposal system, including the pump station and components (level sensors, magnetic meter, and pumps), manholes, and infiltration areas, on an annual basis. All inspections must be performed by a Professional Engineer licensed in Civil or Environmental Engineering in the State of Vermont. Operational, maintenance, and infrastructure condition issues shall be addressed for the twelve-month inspection term defined as June 1st of one year to May 31st of the following year;

(ii) **Monitoring:**

(A) Wastewater Monitoring – Flows from the collection system wet well to the infiltration system shall be measured with an in-line magnetic meter. During the first twelve months of operation, weekly flow measurements will be obtained. Subsequently, flows will be measured monthly. The physical and chemical characteristics of the wastewater, as specified in Table 1, will be analyzed with samples collected from the sump area of the pump station. Wastewater quality will be sampled twice annually, in the Fall (October/November) and Spring (April/May), concurrent with the groundwater quality sampling.

(B) Groundwater quality monitoring will be performed for all of the monitoring wells associated with this permit and the other two Burlington International Airport Underground Injection Control Permits (#'s 6-0075 and 6-0084), addressing stormwater runoff containing aircraft deicing fluid. Samples shall be collected twice annually during the Fall (October/November) and Spring (April/May) base streamflow periods, as indicated by the Winooski River USGS gauge. These samples shall be analyzed for the parameters specified in Table 1. Water levels in the monitoring wells shall also be measure, on the same date of the groundwater sampling event, to determine the groundwater gradients and flow directions. The wells proposed for monitoring of the groundwater quality associated with the stormwater runoff containing airport deicing fluid from the Air Cargo Ramp are:

- Upgradient: MW-25
- Infiltration System: MW-18R, MW-19, MW-26
- Downgradient: MW-23, MW-24, MW-27

(C) If groundwater quality monitoring results indicate BOD_5 levels exceed the Maximum Acceptable Change of 25 mg/l, monitoring of Muddy Brook shall commence. Dissolved oxygen levels and temperature shall be measured in Muddy Brook, at locations upstream and downstream from the groundwater plume.

Table 1. Wastewater & Groundwater Monitoring Program

Constituent	EPA Method
BOD_5	405.1
COD	410.2
Propylene Glycol (PG)	SW 8015B
Ethylene Glycol	SW 8015B
Chloride	325.1
Nitrate	300.0
Total Dissolved Solids	160.1
Alkalinity	310.1
pH	150.1
Conductivity	120.1 (Field Msmt.)
Temperature	170.1 (Field Msmt.)

(iii) **Recording and Reporting Requirements:**

The following recording and reporting requirements are necessary to meet the terms of this permit (See Appendix II, Part 146):

(A) Wastewater and groundwater monitoring reports shall be submitted semi-annually within 45 days of each sampling event. The monitoring reports shall include the sampling results, groundwater contour map, discussion of the stormwater collection, treatment, and discharge system operation, and assessment of regulatory compliance.

(B) The permittee shall prepare a report on the inspection of the stormwater collection, treatment, and discharge system. The report shall include: the condition of the physical infrastructure; a description and date of any maintenance and repairs performed on the system during the previous year; a description of the repair outcomes; a description of any necessary maintenance to be performed; a description of any operational and performance issues associated with the system along with recommended changes to physical infrastructure/operational regimes/maintenance practices to address these issues and the associated implementation schedule and approach to measure outcomes. The annual inspection reports shall be submitted by the **30th of June each year** of this permit and shall be reviewed and signed by the Professional Engineer licensed in Civil or Environmental Engineering in the State of Vermont, who performed the inspection.

(C) The monitoring reports, annual inspection reports, and any other notification required by any condition of this permit shall be submitted to the Department at:

Underground Injection Control Program

Drinking Water & Groundwater Protection Division
103 South Main Street, Sewing Building
Waterbury, VT 05671-0405

(7) Effect of this permit:

(i) Except for Class II and III injection wells, compliance with this permit during its term constitutes compliance, for purposes of enforcement, with Part C of the Safe Drinking Water Act;

(ii) The issuance of this permit does not authorize any injury to persons or property or invasion of other private rights, or any infringement of other State or local law or regulations

(8) Additional Requirements:

No additional requirements presently exist for this permit.

David K. Mears, Commissioner
Department of Environmental Conservation

By: Christine Thompson Date: August 10, 2012
Christine Thompson, Director
Drinking Water & Groundwater Protection Division

Appendix F Operations and Maintenance (O&M) Manuals

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ANNUAL INSPECTION REPORT FORM

NEW: As of 03/20/2013 ALL Stormwater Permits will use this form for Annual Inspections

Annual Inspections shall be completed between the conclusion of spring snow melt and June 15, and the inspection report shall be submitted by July 15th of each year (or by July 30th if performed by a utility of municipality pursuant to a duly adopted storm water management ordinance)

Please refer to the Authorization to Discharge for specific information regarding the frequency of maintenance, inspection, and reporting requirements.

Permit #: -

Project Name:

- Has ownership changed since previous authorization? ☐ N ☐ Y - *If yes, please complete a transfer application available at http://www.vtwaterquality.org/stormwater/docs/sw_transfer-ap.pdf*
- Has project name changed since previous authorization? ☐ N ☐ Y - *If yes, attach explanation*
- Has amount of impervious area changed since previous authorization? ☐ N ☐ Y - *If yes, attach explanation*

Maintenance Inspection Checklist

Please consider the items listed below:

- Are there any vegetated areas that require mowing or other maintenance? ☐ N ☐ Y - *If yes, attach an explanation and schedule for mowing or maintenance to be completed.*
- Do catch basins need maintenance or sediment removed from sumps? ☐ N ☐ Y - *If yes, attach an explanation and schedule for maintenance or cleaning to be completed.*
- To the best of your knowledge, have there been any illicit discharges to the system (illicit discharges would include dumping of oil, gas, detergent, vehicle wash water, etc)? ☐ N ☐ Y - *If yes, attach an explanation and preventative measures taken.*
- Has there been any re-routing of stormwater to avoid the system? ☐ N ☐ Y - *If yes, attach an explanation.*
- Was any erosion noted during inspection (for example in areas of exposed soil in channels, outlets, or on pond berms)? ☐ N ☐ Y - *If yes, provide explanation and schedule for repair.*
- Was any accumulation of sediment noted in the basins, ponds, or constructed wetlands? ☐ N ☐ Y - *If yes, provide an explanation and schedule for cleaning.*
- Is there any additional maintenance or repairs needed at this time? ☐ N ☐ Y - *If yes, provide an explanation and schedule for maintenance or repairs to be completed.*

Statement of Compliance (check only one below)

☐ Based on the above observations, and to the best of my knowledge, this report can serve as confirmation that the stormwater system **is** being maintained and operated in general conformance with the approved plans and the discharge permit referenced above, and that the stormwater system is in good operating condition.

☐ Based on the above observations, and to the best of my knowledge, this report can serve as notification that the stormwater system **is not** being maintained and operated in general conformance with the approved plans and the discharge permit referenced above, and that the stormwater system is **not** in good operating condition. (*If checked, attach an explanation noting any deficiencies as well as a schedule for correction of the deficiencies. Note: Any deficiencies noted during inspection shall be corrected as soon as possible, but not later than sixty (60) days after detection).*

[INCOMPLETE FORMS WILL BE RETURNED]

Inspector: ***Inspector does not need to be an Engineer, Authorized Representative is acceptable***

_____ _____

Signature of Inspector Title

_____

Print or Type Name and Address

_____

Date of Inspection

_____

Inspectors Contact Phone and/or Email

Please mail this completed form to:

DEC – Watershed Management Division
Stormwater Management Program
1 National Life Drive, Main 2
Montpelier, VT 05620-3522

Or email to: anr.wsmdstormwatergeneral@state.vt.us

Additional information can be found at:
http://www.watershedmanagement.vt.gov/
802-828-1535

SEMI-ANNUAL INSPECTION REPORT FORM

Please refer to the Authorization to Discharge for specific information regarding the frequency of maintenance, inspection, and reporting requirements.

Permit #: -
Project Name:
Permittee Name:
Address:

Phone Number:
Authorized Representative Name (if applicable):
Address:

Phone Number:

Has ownership or project name changed since previous authorization? ☐N ☐Y - *If yes, attach explanation.*
Has amount of impervious area changed since previous authorization? ☐N ☐Y - *If yes, attach explanation.*

Maintenance Inspection Checklist

Date of Inspection:
Name of Inspector:
Please address the items listed below:

- Are there any vegetated areas that require mowing or other maintenance? ☐N ☐Y - *If yes, attach an explanation and schedule for mowing or maintenance to be completed.*
- Do catch basins need maintenance or sediment removed from sumps? ☐N ☐Y - *If yes, attach an explanation and schedule for maintenance or cleaning to be completed.*
- Have there been any illicit discharges to the system (illicit discharges would include dumping of oil, gas, detergent, vehicle washwater, etc)? ☐N ☐Y - *If yes, attach an explanation and preventative measures taken.*
- Has there been any re-routing of stormwater to avoid the system? ☐N ☐Y - *If yes, attach an explanation.*
- Was any erosion noted during inspection (for example in areas of exposed soil in channels, outlets, or on pond berms)? ☐N ☐Y - *If yes, provide explanation and schedule for repair.*
- Was any accumulation of sediment noted in the basins, ponds, or constructed wetlands? ☐N ☐Y - *If yes, provide an explanation and schedule for cleaning.*
- Are there any additional maintenance or repairs needed at this time? ☐N ☐Y - *If yes, provide an explanation and schedule for maintenance or repairs to be completed.*

Statement of Compliance

☐ Based on the above observations, this report can serve as confirmation that the stormwater system **is** being maintained and operated in general conformance with the approved plans and the discharge permit referenced above, and that the stormwater system is in good operating condition.

☐ Based on the above observations, this report can serve as notification that the stormwater system **is not** being maintained and operated in general conformance with the approved plans and the discharge permit referenced above, and that the stormwater system is **not** in good operating condition. (*If checked, attach an explanation noting any deficiencies as well as a schedule for correction of the deficiencies. Note: Any deficiencies noted during inspection shall be corrected as soon as possible, but not later than sixty (60) days after detection).*

_____
Signature Print or Type Name Date

DESIGNER'S RESTATEMENT OF COMPLIANCE
GENERAL PERMIT 3-9010

1. Permittee: _____

2. Permit Number: _____

3. Description/Name of Project: _____

4. Designer's Certification: Check only one of the following:

I hereby certify to the best of my knowledge and in the exercise of my reasonable professional judgment that:

___ The stormwater collection, treatment and control system authorized by the permit described in # 2 above is properly operating and maintained in accordance with the requirements of the permit.

____ The stormwater collection, treatment and control system authorized by the permit described in # 2 above is not operating properly and/or is not being maintained in accordance with the requirements of the permit. If so, please describe the operational and maintenance failures in detail below:

_____
_____
_____
_____

5. If you checked the second box in # 4 above, please provide a description of the steps that will be taken to bring the stormwater system back into compliance with the permit, and provide a schedule for taking such actions.

6. The failure to properly operate and maintain the stormwater collection, treatment and control system authorized in the permit described in #2 above constitutes a violation of state law and is subject to potential enforcement action by the Department of Environmental Conservation. Please take immediate steps to correct all violations.

_____ _____
Signature of Designer Title

_____ _____
Print or Type Name and Address Date of Inspection

DESIGNER'S STATEMENT OF COMPLIANCE
STATE STORWMATER DISCHARGE PERMIT

Check One Below:

☐ Initial Designer's Statement of Compliance

☐ Designer's Restatement of Compliance

1. Permit Number: _____

2. Description/Name of Project: _____

3. Designer's Certification: Please complete the applicable lines below.

I hereby certify to the best of my knowledge and in the exercise of my reasonable professional judgment that:

☐ The stormwater collection, treatment and control system authorized by the permit described in #1 above was properly constructed in accordance with the permit. **[Complete this line for Initial Designer's Statement of Compliance ONLY, in addition complete below.]**

Check ONLY one of the following boxes:

☐ The most recently issued permit described in #1 is valid and construction has not yet commenced. [If this line is checked, this form may be completed by the Owner.]

☐ The stormwater collection, treatment and control system authorized by the permit described in #1 above is properly operating and maintained in accordance with the requirements of the permit.

☐ The stormwater collection, treatment and control system authorized by the permit described in #1 above is not operating properly and/or is not being maintained in accordance with the requirements of the permit. If so, please describe the operational and maintenance failures in detail below (or in an attachment if necessary):

4. If you checked the last box in #3 above, please provide a description of the steps that will be taken to bring the stormwater system back into compliance with the permit, and provide a schedule for taking such actions.

5. The failure to properly operate and maintain the stormwater collection, treatment and control system authorized in the permit described in #1 above constitutes a violation of state law and is subject to potential enforcement action by the Department of Environmental Conservation. Please take immediate steps to correct all violations.

[INCOMPLETE FORMS WILL BE RETURNED]

_____ _____

Signature of Designer Title

_____

Print or Type Name and Address

_____

Date of Inspection

_____

Designer's Contact Phone and/or Email

Please mail this completed form to:

DEC – Watershed Management Division
Stormwater Management Program
1 National Life Drive, Main 2
Montpelier, VT 05620-3522

or email to: anr.wsmdstormwatergeneral@state.vt.us

Additional information can be found at:
http://www.watershedmanagement.vt.gov/
802-828-1535

CONTECH®
STORMWATER
SOLUTIONS INC.

Vortechs® System

Technical Design Manual

Vortechs System Contents

Design and Operation **114**
Maintenance **117**
Laboratory and Field Testing **120**

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Basic Operation

The Vortechs® System is a hydrodynamic separator designed to enhance gravitational separation of floating and settling materials from stormwater flows. Stormwater flows enter the unit tangentially to the grit chamber, which promotes a gentle swirling motion. As polluted water circles within the grit chamber, pollutants migrate toward the center of the unit where velocities are the lowest. The majority of settleable solids are left behind as stormwater exits the grit chamber through two apertures on the perimeter of the chamber. Next, buoyant debris and oil and grease are separated from water flowing under the baffle wall due to their relatively low specific gravity. As stormwater exits the System through the flow control wall and ultimately through the outlet pipe, it is relatively free of floating and settling pollutants.

Over time a conical pile tends to accumulate in the center of the unit containing sediment and associated metals, nutrients, hydrocarbons and other pollutants. Floating debris and oil and grease form a floating layer trapped in front of the baffle wall. Accumulation of these pollutants can easily be accessed through manholes over each chamber. Maintenance is typically performed through the manhole over the grit chamber.

Design Process

Each Vortechs System is custom designed based on:

- Site size
- Site runoff coefficient
- Regional precipitation intensity distribution
- Anticipated pollutant characteristics

These factors are incorporated into the Rational Rainfall Method™ to estimate net annual pollutant removal efficiency.

The Rational Rainfall Method™

Differences in local climate, topography and scale make every site hydraulically unique. It is important to take these factors into consideration when estimating the long-term performance of any stormwater treatment system. The Rational Rainfall Method™ combines site-specific information with laboratory generated performance data, and local historical precipitation records to estimate efficiencies as accurately as possible.

Short duration rain gauge records from across the United States and Canada were analyzed to determine the percent of the total annual rainfall that fell at a range of intensities. US stations' depths were totaled every 15 minutes or hourly and recorded in 0.01-inch increments. Depths were recorded hourly with 1 mm resolution at Canadian stations. One trend was consistent at all sites; the vast majority of precipitation fell at low intensities and high intensity storms contributed relatively little to the total annual depth.

These intensities, along with the total drainage area and runoff coefficient for each specific site, are translated into flow rates using the Rational Rainfall Method. Since most sites are relatively small and highly impervious, the Rational Rainfall Method is appropriate. Based on the flow rates calculated for each intensity, an operating rate within a proposed Vortechs System is determined. Finally, a removal efficiency is selected for each operating rate based on anticipated pollutant characteristics and on full scale laboratory tests. The relative removal efficiency at each operating rate is added to produce a net annual pollutant removal efficiency estimate.

CONTECH Stormwater Solutions typically selects the system that will provide an 80% annual TSS load reduction based on laboratory generated performance curves for 50-micron sediment particles,

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however the Rational Rainfall Method can accommodate other removal efficiency or particle size targets. It can also be used to estimate annual hydrocarbon load reductions.

Once a System size is established, the internal elements of the System will be designed based on information provided by the site engineer. Flow control sizes and shapes, sump depth, spill storage capacity, sediment storage volume and inlet and outlet orientation are determined for each System. In addition, bypass weir calculations are made for off-line Systems.

Flow Control Calculations

The Orifice

The lower flow control or "orifice" is typically sized to submerge the inlet pipe when the Vortechs System is operating at 20% of its' treatment capacity. The orifice is typically a Cippoletti shaped aperture defined by its flat crest and sides which incline outwardly at a slope of 1 horizontal to 4 vertical.

➡ Flow through orifice = $Q_{orf} = C_d \bullet A \bullet (2gh)^{0.5}$

Where C_d = Orifice contraction coefficient = 0.56 (based on CONTECH Stormwater Solutions laboratory testing)
A = Orifice flow area, ft^2 (calculated by CONTECH Stormwater Solutions technical staff)
h = Design head, ft (equal to the inlet pipe diameter)

The minimum orifice crest length is 3-inches and the minimum orifice height is 4-inches. If flow must be restricted beyond what can be provided by this size aperture, a Fluidic-Amp™ hydro-brake flow control will be used. The hydro-brake allows the minimum flow constriction to remain at 3-inches or greater while further reducing flow due to its unique throttling action.

The Weir

The high flow control or "weir" is sized to pass the peak System capacity minus the peak orifice flow when the water surface elevation is at the top of the weir. This flow control is also a Cippoletti type weir.

The weir flow control is sized by solving for the crest length and head in the following equation:

➡ Flow through weir = $Q_{weir} = C_d \bullet L \bullet (h)^{1.5}$

Where C_d = Cippoletti Weir coefficient = 3.37 (based on CONTECH Stormwater Solutions laboratory testing)
h = Available head, ft (height of weir)
L = Design weir crest length, ft (calculated by CONTECH Stormwater Solutions technical staff)

Bypass Calculations

In some cases, pollutant removal goals can be met without treating peak flow rates and it is most feasible to use a smaller Vortechs System configured with an external bypass. In such cases, a bypass design is recommended by CONTECH Stormwater Solutions for each off-line System. To calculate the bypass capacity, first subtract the System's treatment capacity from the peak conveyance capacity of the collection system (minimum of 10 year recurrence interval). The result is the flow rate that must be bypassed to avoid surcharging the Vortechs System. Then use the following arrangement of the Francis formula to calculate the depth of flow over the bypass weir.

➡ Flow over bypass weir = $H = (Q_{bypass}/(C_d \bullet L))^{2/3}$

Where
C_d = Discharge Coefficient = 3.3 for rectangular weir
H = Depth of flow over bypass weir crest, ft
L = Length of bypass weir crest, ft

The bypass weir crest elevation is then calculated to be the elevation at the top of the Cippoletti weir minus the depth of flow.

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Hydraulic Capacity

In the event that the peak design flow from the site is exceeded, it is important that the Vortechs System is not a constriction to runoff leaving the site. Therefore, each System is designed with enough hydraulic capacity to pass the 100-year flow rate. It is important to note that at operating rates above 100 gpm/ft^2 of the grit chamber area (peak *treatment* capacity), captured pollutants may be lost.

When the System is operating at peak *hydraulic* capacity, water will be flowing through the gap over the top of the flow control wall as well as the orifice and the weir.

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Maintenance

The Vortechs System should be inspected at regular intervals and maintained when necessary to ensure optimum performance. The rate at which the system collects pollutants will depend more heavily on site activities than the size of the unit, e.g., unstable soils or heavy winter sanding will cause the grit chamber to fill more quickly but regular sweeping will slow accumulation.

Inspection

Inspection is the key to effective maintenance and is easily performed. CONTECH Stormwater Solutions recommends ongoing quarterly inspections of the accumulated sediment. Pollutant deposition and transport may vary from year to year and quarterly inspections will help insure that systems are cleaned out at the appropriate time. Inspections should be performed more often in the winter months in climates where sanding operations may lead to rapid accumulations, or in equipment washdown areas. It is very useful to keep a record of each inspection. A simple form for doing so is provided.

The Vortechs System should be cleaned when inspection reveals that the sediment depth has accumulated to within six inches of the dry-weather water surface elevation. This determination can be made by taking 2 measurements with a stadia rod or similar measuring device; one measurement from the manhole opening to the top of the sediment pile and the other from the manhole opening to the water surface. The System should be cleaned out if the difference between the two measurements is six inches or less. Note: to avoid underestimating the volume of sediment in the chamber, the measuring device must be lowered to the top of the sediment pile carefully. Finer, silty particles at the top of the pile typically offer less resistance to the end of the rod than larger particles toward the bottom of the pile.

Cleaning

Maintaining the Vortechs system is easiest when there is no flow entering the system. For this reason, it is a good idea to schedule the cleanout during dry weather. Cleanout of the Vortechs system with a vacuum truck is generally the most effective and convenient method of excavating pollutants from the system. If such a truck is not available, a "clamshell" grab may be used, but it is difficult to remove all accumulated pollutants with such devices.

In installations where the risk of large petroleum spills is small, liquid contaminants may not accumulate as quickly as sediment. However, an oil or gasoline spill should be cleaned out immediately. Motor oil and other hydrocarbons that accumulate on a more routine basis should be removed when an appreciable layer has been captured. To remove these pollutants, it may be preferable to use adsorbent pads since they are usually cheaper to dispose of than the oil water emulsion that may be created by vacuuming the oily layer. Trash can be netted out if you wish to separate it from the other pollutants.

Accumulated sediment is typically evacuated through the manhole over the grit chamber. Simply remove the cover and insert the vacuum hose into the grit chamber. As water is evacuated, the water level outside of the grit chamber will drop to the same level as the crest of the lower aperture of the grit chamber. It will not drop below this level due to the fact that the bottom and sides of the grit chamber are sealed to the tank floor and walls. This "Water Lock" feature prevents water from migrating into the grit chamber, exposing the bottom of the baffle wall. Floating pollutants will decant into the grit chamber as the water level there is drawn down. This allows most floating material to be withdrawn from the same access point above the grit chamber.

If maintenance is not performed as recommended, sediment may accumulate outside the grit chamber. If this is the case, it may be necessary to pump out all chambers. It is a good idea to check for accumulation in all chambers during each maintenance event to prevent sediment build up there.

Manhole covers should be securely seated following cleaning activities, to ensure that surface runoff does not leak into the unit from above.

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Vortechs System Inspection & Maintenance Log – Sample

Model: 5000			Location: Smith Superstores, Detroit, MI		
Date	**Water Depth to Sediment[1]**	**Floatable Layer Thickness[2]**	**Maintenance Performed**	**Maintenance Personnel**	**Comments**
12/1/01	36"	0"	N/A	B. Johnson	Installed
3/1/02	28"	Sheen	None	B. Johnson	Swept parking lot
6/1/02	24"	Heavy Sheen	None		
9/1/02	20"'	1"	Sorbent pads deployed to remove captured oil	S. Riley	Oil spill
12/1/02	12"	Sheen	None	S. Riley	
4/1/03	6"	0.5"	Clean-out scheduled	S. Riley	Heavy floating debris
4/15/03	36"	0"	Grit Chamber evacuated	ACE Environmental Services	Cleanout completed

SAMPLE SHEET

1. The water depth to sediment is determined by taking two measurements with a stadia rod: one measurement from the manhole opening to the top of the sediment pile and the other from the manhole opening to the water surface. When the difference between the two measurements is six inches or less, the system should be cleaned out.
2. For optimum performance, the system should be cleaned out when the floating hydrocarbon layer accumulates to an appreciable thickness. In the event of a spill, the system should be cleaned immediately.

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Vortechs System Inspection & Maintenance Log

Model:			**Location:**		
Date	Water Depth to Sediment[1]	Floatable Layer Thickness [2]	Maintenance Performed	Maintenance Personnel	Comments

1. The water depth to sediment is determined by taking two measurements with a stadia rod: one measurement from the manhole opening to the top of the sediment pile and the other from the manhole opening to the water surface. When the difference between the two measurements is six inches or less, the system should be cleaned out.
2. For optimum performance, the system should be cleaned out when the floating hydrocarbon layer accumulates to an appreciable thickness. In the event of a spill, the system should be cleaned immediately.

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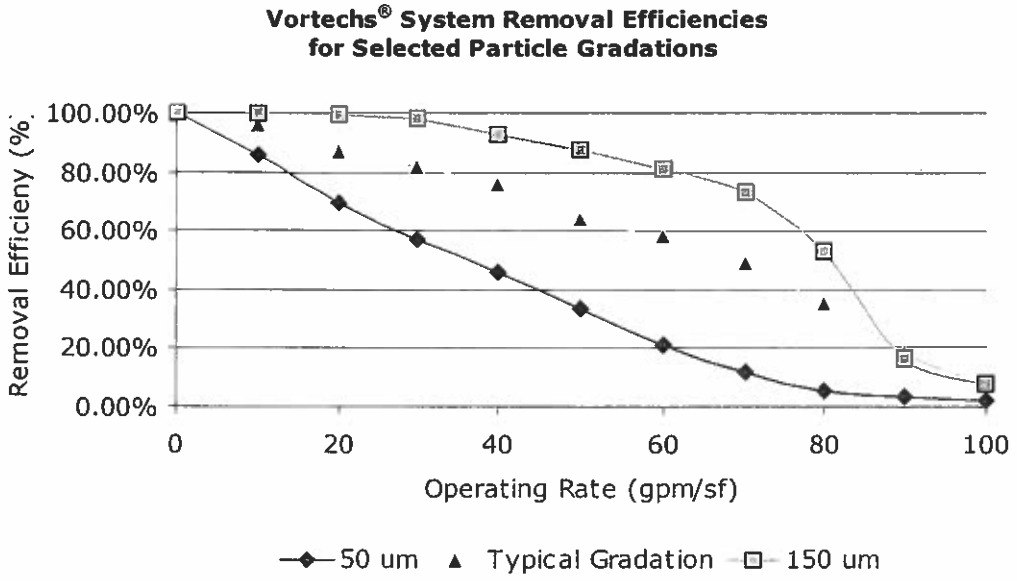
Laboratory and Field Testing

Introduction

CONTECH Stormwater Solutions is an established leader in the stormwater treatment industry, marketing the Vortechs Stormwater Treatment System as a technology capable of removing a high percentage of floating and settling pollutants from stormwater flows. Extensive testing in both the laboratory and in the field has produced a comprehensive set of data describing the relationship between flow rate, particle size, and removal efficiency.

Sections 1 and 2 contain the results of laboratory and field-testing. Section 1 shows the results of full-scale testing with a Vortechs Model 2000 at a CONTECH Stormwater Solutions laboratory in Portland, Maine. Section 2 includes long term monitoring results from several Vortechs Systems installed on typical projects.

Figure 1. Laboratory Testing - Vortechs Stormwater Treatment System Performance



These performance curves are based on laboratory tests using a full scale Vortechs Model 2000. The testing protocol used is described on the following pages. The 150-micron curve demonstrates the results of tests using particles that passed through a 100-mesh sieve and were retained on a 150-mesh sieve. The 50-micron curve is based on tests of particles passing through a 200-mesh sieve and retained on a 400-mesh sieve. A slurry representing an average stormwater sediment gradation, with the particle size gradation shown in Table 1 on page 121, was also tested in our laboratory.

As the graph clearly shows, Vortechs Systems maintain positive total suspended solids (TSS) removal efficiencies over the full range of operating rates, allowing the system to effectively treat all runoff from large infrequent design storms as well as runoff from the more frequent low intensity storms. Precast Vortechs Systems are designed to treat peak flows from 1.6 cfs up to 25 cfs without bypassing. Peak flows that exceed rated treatment capacities can be conveyed around the system with an external bypass. Internal bypasses can be configured to direct low flows from the last chamber of the Vortechs system to polishing treatment when more stringent water quality standards are imposed. In all configurations, high removal efficiencies are achieved during the lower intensity storms, which constitute the majority of annual rainfall volume.

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Laboratory Quality Control Brief

The following protocol summarizes standard operating procedures for Total Suspended Solids (TSS) testing in the CONTECH Stormwater Solutions Laboratory. These guidelines were followed in the creation of the preceding performance curves.

Sediment Source

Sediment samples are sorted according to ASTM Special Technical Publication 477 B, which establishes sieve analysis procedures. U.S. Standard Sieves in a Gilson SS-15 sieve shaker are used to separate particles to the various fractions required for our tests. To ensure uniformity of those fractions, an unsorted sample is sieved until less than 1% of that sample passes through the sieve in one minute. All sediment recovered after a test is dried and sent back through a sieve before reuse. Unless otherwise specified, mineral sediments with a density of 2.65 g/cm^3 are used.

The following table describes the particle size distribution of samples tested by CONTECH Stormwater Solutions to represent TSS Loading in typical urban runoff.

Table 1.

Particle Size Distribution	**Percentage of Sample Make-up**
< 63 mm	42%
63 – 75 mm	4%
75 – 100 mm	9%
100 – 150 mm	7%
150 – 250 mm	11%
> 250 mm	27%

Flow Calibration and Regulation

Flow calibration is accomplished by calculating the head at the baffle wall required to produce a given flow rate through the orifice and the weir in the flow control wall. Flow is regulated by a 12-inch butterfly valve located upstream of the Vortechs system. In order to simulate field conditions, flow rates are changed gradually to avoid flow surges through the system. The test flow rate is set by observing the head in the Vortechs system and adjusting the regulating valve accordingly. Before any samples are collected, the valve must remain fixed for a period equal to half of the detention time so that flow equalizes throughout the system. Each test group is planned so that flow rates increase incrementally in consecutive tests.

Sediment Metering

All sediment is injected into the inlet pipe via a ¼-inch flexible hose using a Watson Marlow 5058 peristaltic metering pump. For TSS tests, a known gradation of sediment and water are combined in approximately a 1/2 pound/gallon ratio in a holding tank and homogenized by a mixing propeller powered by a 1/3 horsepower motor. The mixer is activated at least 5 minutes before testing commences and runs continuously throughout the test. The metering pump is activated for a period of time equal to at least half of the detention time of the Vortechs system at the test flow rate, before the first influent sample is taken. The pump must run continuously until the last effluent sample is taken.

Sample Collection

All influent samples are taken from a 6-inch gate valve located upstream of the Vortechs system. A collection bin housing a 500 mL sample container is positioned beneath the valve. Five seconds before each sample is taken the valve is quickly opened and closed to eliminate any interference from particles that have settled in the low velocity region of the gate. This eliminates artificially high influent readings. The time that the influent sample was taken is recorded and the corresponding effluent

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sample is collected after a period of time equal to the detention time. Effluent grab samples are collected at the discharge pipe, by sweeping the mouth of a 500 mL bottle through the exiting flow stream. Samples are annotated and refrigerated until they can be analyzed.

Sample Analysis

TSS samples are analyzed in the CONTECH Stormwater Solutions laboratory, following EPA method 160.2, a method for the measurement of total non-filterable solids. Volume measurements are accurate to 0.6 mL using a 500 mL graduated cylinder and an Acculab V-1 analytical balance with a readability of 0.001 g is used to measure mass.

Field Testing - Vortechs System Field Monitoring Summary

CONTECH Stormwater Solutions has become a leader in the stormwater industry in large part because of the company's unwavering long-term commitment to research and development. In addition to performing their own field tests, CONTECH Stormwater Solutions has diligently pursued opportunities to work with third party organizations to test their products. In fact, the Vortechs system has been subjected to the most comprehensive third party testing in the industry. These independent studies have allowed CONTECH Stormwater Solutions to corroborate their lab and field data to ensure that actual performance of the Vortechs system matches their claims.

Following are brief summaries of the field tests completed to date. Please contact CONTECH Stormwater Solutions for the full reports. In addition, all reports are available for download on CONTECH Stormwater Solutions web site at www.contechstormwater.com.

DeLorme Mapping Company - Yarmouth, ME
CONTECH Stormwater Solutions

Prior to this premier field test of the Vortechs system, CONTECH Stormwater Solutions developed an extensive body of laboratory data to document total suspended solids (TSS) removal efficiency. CONTECH Stormwater Solutions performed this field study in order to compare the performance predicted using laboratory data to the performance of a correctly sized system in the field.

The study site was the headquarters of DeLorme Mapping in Yarmouth, Maine. The building, driveway, parking lot and ancillary facilities were constructed in 1996. A Vortechs Model 11000 was installed to treat runoff from the 300-space, 4-acre parking lot.

Testing Period	May 1999 to Dec. 1999
# of Storms Sampled	20
Mean Influent Concentration	328 mg/L
Mean Effluent Concentration	60 mg/L
Removal Efficiency	82%

The main purpose of the DeLorme study was to verify that the sizing methodology developed from our full-scale laboratory testing was valid and an accurate means of predicting field performance. The results of the study confirmed our sizing methodology.

Village Marine Drainage - Lake George, NY
New York State Department of Environmental Conservation, Division of Water

The New York State DEC used funds obtained in a Section 319 grant to initiate a study of the effectiveness of the Vortechs system to remove sediment and other pollutants transported by stormwater to Lake George, Lake George Village, New York. "Since the 1970s, when there was a rapid increase in the rate and concentration of development along the southwestern shores of Lake George, we have been concerned about the impact of stormwater discharges into the lake," said Tracy West, co-author of the study.

Testing Period	Feb. 2000 to Dec. 2000

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# of Storms Sampled	13
Mean Influent Concentration	801 mg/L
Mean Effluent Concentration	105 mg/L
Removal Efficiency	88%

The study concluded that the Village and Town of Lake George should consider installing additional Vortechs Systems in areas where sedimentation and erosion have been identified as non-point source pollution problems.

Harding Township Rest Area - Harding Township, NJ
RTP Environmental Associates

This third party evaluation was performed under a U.S. Environmental Protection Agency grant, administered by the New Jersey Department of Environmental Protection. A. Roger Greenway, principal of RTP Environmental Associates, Inc., conducted the study in conjunction with Thonet Associates, which assisted with data analysis and helped develop best management practices (BMP) recommendations.

The Vortechs Model 4000 was sized to handle a 100-year storm from the three-acre paved parking area at the Harding Rest Stop, located off the northbound lane of I-287 in Harding Township, New Jersey.

Testing Period	May 1999 to Nov. 2000
# of Storms Sampled	5
Mean Influent Concentration (TSS)	493 mg/L
Mean Effluent Concentration (TSS)	35 mg/L
Removal Efficiency (TSS)	93%
Mean Influent Concentration (TPH)	16 mg/L
Mean Effluent Concentration (TPH)	5 mg/L
Removal Efficiency (TPH)	67%

The study concluded that truck rest stops and similar parking areas would benefit from installing stormwater treatment systems to mitigate the water quality impacts associated with stormwater runoff from these sites.

Timothy Edwards Middle School - South Windsor, CT
UCONN Department of Civil & Environmental Engineering

Susan Mary Board published this study of the Vortechs system as a thesis as part of the requirements for a Master of Science degree from the University of Connecticut. Her objective was to determine how well the Vortechs system retained pollutants from parking lot runoff, including total suspended solids (TSS), nutrients, metals, and petroleum hydrocarbons.

A Vortechs Model 5000 was installed in 1998 to treat runoff from the 82-space parking lot of Timothy Edwards Middle School. The entire watershed was approximately 2 acres, and was 80% impervious.

Testing Period	July 2000 to April 2001
# of Storms Sampled	Weekly composite samples taken
Mean Influent Concentration	324 mg/L
Mean Effluent Concentration	73 mg/L
Removal Efficiency	77%

Additionally, the Vortechs system was particularly effective in removing zinc (85%), lead (46%), copper (56%), phosphorus (67%) and nitrate (54%).

The study concluded that the Vortechs Stormwater Treatment system significantly reduced effluent concentrations of many pollutants in stormwater runoff.

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SECTION 02721

STORMWATER TREATMENT SYSTEM

PART 1.00 GENERAL

1.1 DESCRIPTION

A. Work included:
The Contractor, and/or a manufacturer selected by the Contractor and approved by the Engineer, shall furnish all labor, materials, equipment and incidentals required and install all precast concrete stormwater treatment systems and appurtenances in accordance with the Drawings and these specifications.

1.2 QUALITY CONTROL INSPECTION

A. The quality of materials, the process of manufacture, and the finished sections shall be subject to inspection by the Engineer. Such inspection may be made at the place of manufacture, or on the work site after delivery, or at both places, and the sections shall be subject to rejection at any time if material conditions fail to meet any of the specification requirements, even though sample sections may have been accepted as satisfactory at the place of manufacture. Sections rejected after delivery to the site shall be marked for identification and shall be removed from the site at once. All sections which have been damaged beyond repair during delivery will be rejected and, if already installed, shall be repaired to the Engineer's acceptance level, if permitted, or removed and replaced, entirely at the Contractor's expense.

B. All sections shall be inspected for general appearance, dimensions, soundness, etc. The surface shall be dense, close textured and free of blisters, cracks, roughness and exposure of reinforcement.

C. Imperfections may be repaired, subject to the acceptance of the Engineer, after demonstration by the manufacturer that strong and permanent repairs result. Repairs shall be carefully inspected before final acceptance. Cement mortar used for repairs shall have a minimum compressive strength of 4,000 psi (28 MPa) at the end of 7 days and 5,000 psi (34 MPa) at the end of 28 days when tested in 3 inch (76 mm) diameter by 6 inch (152 mm) long cylinders stored in the standard manner. Epoxy mortar may be utilized for repairs.

1.3 SUBMITTALS

Shop Drawings

The Contractor shall be provided with dimensional drawings and, when specified, utilize these drawings as the basis for preparation of shop drawings showing details for construction, reinforcing, joints and any cast-in-place appurtenances. Shop drawings shall be annotated to indicate all materials to be used and all applicable standards for materials, required tests of materials and design assumptions for structural analysis. Shop drawings shall be prepared at a scale of not less than 3/16-inches per foot (1:75). Six (6) hard copies of said shop drawings shall be submitted to the Engineer for review and approval.

PART 2.00 PRODUCTS

2.1 MATERIALS AND DESIGN

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A. Concrete for precast stormwater treatment systems shall conform to ASTM C 857 and C 858 and meet the following additional requirements:
   1. The wall thickness shall not be less than 6 inches (152 mm) or as shown on the dimensional drawings. In all cases the wall thickness shall be no less than the minimum thickness necessary to sustain HS20-44 (MS18) loading requirements as determined by a Licensed Professional Engineer.
   2. Sections shall have tongue and groove or ship-lap joints with a butyl mastic sealant conforming to ASTM C 990.
   3. Cement shall be Type II Portland cement conforming to ASTM C 150.
   4. All sections shall be cured by an approved method. Sections shall not be shipped until the concrete has attained a compressive strength of 4,000 psi (28 MPa) or until 5 days after fabrication and/or repair, whichever is the longer.
   5. Pipe openings shall be sized to accept pipes of the specified size(s) and material(s), and shall be sealed by the Contractor with a hydraulic cement conforming to ASTM C 595M

B. Internal aluminum plate components shall be aluminum alloy 5052-H32 in accordance with ASTM B 209.

C. Sealant to be utilized at the base of the swirl chamber shall be 60 durometer extruded nitrile butadiene rubber (Buna N) and shall be provided to the concrete precaster for installation.

D. Brick or masonry used to build the manhole frame to grade shall conform to ASTM C 32 or ASTM C 139 and shall be installed in conformance with all local requirements.

E. Casting for manhole frames and covers shall be in accordance with ASTM A48, CL.30B and AASHTO M105. The manhole frame and cover shall be equivalent to Campbell Foundry Pattern #1009A or #1012D custom cast with the CONTECH Stormwater Solutions logo and (optionally) tagline.

F. A bitumen sealant in conformance with ASTM C 990 shall be utilized in the sealing of the joint between the swirl chamber and the vault at the long wall tangent points. The butyl material shall be 3/4-inch thick by 3/4-inch wide.

2.2 PERFORMANCE

Each stormwater treatment system shall adhere to the following performance specifications at the design treatment capacities, as listed below:

Table 2.

Vortechs Model	Design Treatment Capacity cfs (l/s)	Sediment Storage yd^3 (m^3)
1000	0 - 1.6 (0 - 45)	0.7 (0.54)
2000	1.6 - 2.8 (45-80)	1.2 (0.91)
3000	2.8 - 4.5 (80-125)	1.8 (1.38)
4000	4.5 - 6.0 (125-175)	2.4 (1.84)
5000	6.0 - 8.5 (175-240)	3.2 (2.45)
7000	8.5 - 11.0 (240-315)	4.0 (3.06)
9000	11.0 - 14.0 (315-400)	4.8 (3.67)
11000	14.0 - 17.5 (400-495)	5.6 (4.28)
16000	17.5 - 25.0 (495-710)	7.1 (5.43)

Each stormwater treatment system shall include a circular aluminum "swirl

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chamber" (or "grit chamber") with a tangential inlet to induce a swirling flow pattern that will accumulate and store settleable solids in a manner and a location that will prevent re-suspension of previously captured particulates.

Each stormwater treatment system shall be of a hydraulic design that includes flow controls designed and certified by a professional engineer using accepted principles of fluid mechanics that raise the water surface inside the tank to a pre-determined level in order to prevent the re-entrainment of trapped floating contaminants.

Each stormwater treatment system shall be capable of removing **80% of the net annual Total Suspended Solids (TSS)** load based on a 50-micron particle size. Annual TSS removal efficiency models shall be based on documented removal efficiency performance from full scale laboratory tests. Annual TSS removal efficiency models shall only be considered valid if they are corroborated by independent third party field testing. Said field testing shall include influent and effluent composite samples from a minimum of ten storms at one location. Individual stormwater treatment systems shall have the Design Treatment Capacity listed in Table 2 on page 125, and shall not re-suspend trapped sediments or re-entrain floating contaminants at flow rates up to and including the specified Design Treatment Capacity.

Individual stormwater treatment systems shall have usable sediment storage capacity of not less than the corresponding volume listed in Table 2. The systems shall be designed such that the pump-out volume is less than ½ of the total system volume. The systems shall be designed to not allow surcharge of the upstream piping network during dry weather conditions.

A water-lock feature shall be incorporated into the design of the stormwater treatment system to prevent the introduction of trapped oil and floatable contaminants to the downstream piping during routine maintenance and to ensure that no oil escapes the system during the ensuing rain event. Direct access shall be provided to the sediment and floatable contaminant storage chambers to facilitate maintenance. There shall be no appurtenances or restrictions within these chambers.

Stormwater treatment systems shall be completely housed within one rectangular structure.

2.3 MANUFACTURER

Each stormwater treatment system shall be of a type that has been installed and used successfully for a minimum of 5 years. The manufacturer of said system shall have been regularly engaged in the engineering design and production of systems for the physical treatment of stormwater runoff during the aforementioned period.

Each stormwater treatment system shall be a Vortechs system as manufactured by CONTECH Stormwater Solutions, a division of CONTECH Construction Products, Inc. and as protected under U.S. Patent #5,759,415.

PART 3.00 EXECUTION

3.1 INSTALLATION

A. Each Stormwater Treatment system shall be constructed according to the sizes shown on the Drawings and as specified herein. Install at elevations and locations shown on the Drawings or as otherwise directed by the Engineer.

B. Place the precast base unit on a granular subbase of minimum thickness of six inches (152 mm) after compaction or of greater thickness and compaction if specified elsewhere. The granular subbase shall be checked for level prior

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to setting and the precast base section of the trap shall be checked for level at all four corners after it is set. If the slope from any corner to any other corner exceeds 0.5% the base section shall be removed and the granular subbase material re-leveled.

C. Prior to setting subsequent sections place bitumen sealant in conformance with ASTM C 990 along the construction joint in the section that is already in place.

D. After setting the base and wall or riser sections, prepare to install the swirl chamber. Place the 3/4-inch (19 mm) thick by 3/4-inch (19 mm) wide butyl mastic seal vertically on the outside of the swirl chamber starting one inch above the bottom of the swirl chamber and continuing to a height equal to the elevation of the bottom of the upper aperture of the swirl chamber. The butyl mastic seal should abut the downstream side of the pre-drilled mounting holes that attach the swirl chamber to the long walls of the concrete vault. Next, install the extruded Buna N seal on the bottom edge of the 180 degree downstream section of the swirl chamber by first applying a bead of Sikaflex-1a polyurethane elastomeric sealant into the extruded slot then slide the seal onto the swirl chamber. The extruded seal should extend 3-inches (76 mm) upstream of the mounting holes, toward the inlet end of the vault. Set the swirl chamber into position and keep the seal approximately ½-inch (13 mm) above the floor of the concrete vault. Apply a continuous bead of Sikaflex-1a sealant under the cupped bottom of the seal. Set the circular swirl chamber on the floor of the vault and anchor it by bolting the swirl chamber to the side walls of the concrete vault at the three (3) tangent points and at the inlet tab using HILTI brand stainless steel drop-in wedge anchors or equivalent 3/8-inch (10 mm) diameter by 2-3/4 inch (70 mm) minimum length at heights of approximately three inches (3") (76 mm) off the floor and at fifteen inch (15") (381 mm) intervals to approximately the same height of the butyl mastic sealant (at locations of pre-drilled holes in aluminum components). Apply a continuous bead of Sikaflex-1a sealant to the intersection of the inside bottom edge of the extruded seal and the vault floor.

E. If the oil baffle wall (Baffle A) and flow control wall (Baffle B) are not integrally cast-in to riser/wall sections then the Baffle wall panels shall be placed in the formed keyways or between bolted-in-place angle flanges as provided by the manufacturer. Apply non-shrink grout or Sikaflex-1a sealant to each end of Baffle A and Baffle B at the upstream intersection with the side walls of the concrete vault.

F. Prior to setting the precast roof section, bitumen sealant equal to ASTM C 990 shall be placed along the top of the oil baffle wall (Baffle A), using more than one layer of mastic if necessary, to a thickness at least 1-inch (25 mm) greater than the nominal gap between the top of the baffle and the roof section. The nominal gap shall be determined either by field measurement or the shop drawings. Do not seal the top of Baffle B unless specified on the shop drawings to do so. After placement of the roof section has compressed the butyl mastic sealant in the gap over Baffle A, finish sealing the gap with an approved non-shrink grout on both sides of the gap using the butyl mastic as a backing material to which to apply the grout. If roof section is "clamshell" or "bathtub" halves, then finish sealing the ends of the Baffle walls by applying non-shrink grout or Sikaflex-1a sealant to each end of Baffle A at the upstream intersection with the side walls of the concrete vault and to each end of Baffle B at the downstream intersection with the side walls of the concrete vault.

G. After setting the precast roof section of the stormwater treatment system, set precast concrete manhole riser sections, to the height required to bring the cast iron manhole covers to grade, so that the sections are vertical and in true

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alignment with a ¼-inch (6 mm) maximum tolerance allowed. Backfill in a careful manner, bringing the fill up in 6-inch (152 mm) lifts on all sides. If leaks appear, clean the inside joints and caulk with lead wool to the satisfaction of the Engineer. Precast sections shall be set in a manner that will result in a watertight joint. In all instances, installation of Stormwater Treatment Systems shall conform to ASTM specification C 891 "Standard Practice for Installation of Underground Precast Utility Structures".

H. Holes made in the concrete sections for handling or other purposes shall be plugged with a non-shrink grout or by using grout in combination with concrete plugs.

I. Where holes must be cut in the precast sections to accommodate pipes, do all cutting before setting the sections in place to prevent any subsequent jarring which may loosen the mortar joints. The Contractor shall make all pipe connections.

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Burlington International Airport

Stormwater Treatment System Operation and Maintenance Manual

Stantec

TABLE OF CONTENTS

Section **Page No.**

Chapter 1 Introduction

1.0. Purpose of Operation and Maintenance Manual 1-1
1.1. Scope of Operation and Maintenance Manual 1-1
1.2. Manual User's Guide 1-1
1.3. Operator's Responsibility 1-1
1.3.1. Available References 1-1
1.4. Owners Responsibility 1-2
1.5. Stormwater Treatment System Description 1-2

Chapter 2 Permits and Standards

2.0. Permits and Permit Requirements 2-1
2.0.1. Maintenance Requirements 2-1
2.0.2. Maintenance Reporting 2-2

Chapter 3 Description and Operation of Stomwater Treatment System

3.0. Stormwater Treatment System Description 3-1
3.1. Stormwater Treatment System Components 3-1
3.1.1. Stormwater Collection and Conveyance System Description ... 3-1
3.1.2 Pretreatment Forebay Description 3-2
3.1.3 Attenuation Basin Description 3-3
3.1.4 Exfiltration Sand Filter Description 3-4

Chapter 4 Personnel

4.0. Manpower/Staff Requirements 4-1
4.0.1. Supervisor 4-1
4.0.2. Maintenance 4-1
4.1. Qualifications for Personnel 4-1

Chapter 5 Records

5.0. Operating Records 5-1
5.1. Annual Reports 5-1
5.2. Maintenance Records 5-1
5.3. Emergency Records 5-1

Chapter 6 Maintenance

6.0. Purpose and Scope of Recommended Maintenance System 6-1
6.1. Planning and Scheduling 6-1
6.1.1. Preventative Maintenance Schedules 6-1
6.1.2. Inspections 6-2

CHAPTER 1

INTRODUCTION

1.0 PURPOSE OF OPERATION AND MAINTENANCE MANUAL

This manual has been prepared for the Burlington International Airport, and is intended to provide information, guidance, and reference for the proper operation and maintenance of the exfiltrating sand filter treatment system. This manual describes all major components and processes within the stormwater treatment system, and is intended to be a reference to quickly locate information, as well as assist in the maintenance of the stormwater treatment system.

1.1 SCOPE OF OPERATION AND MAINTENANCE MANUAL

This manual details operation and maintenance of the Burlington International Airports Stormwater Treatment system. It details some of the maintenance requirements in the catchment areas, which includes the parking garage and the parking lots to the north of the parking garage.

1.2 MANUAL USER'S GUIDE

Within this manual, all major subjects have been divided into six chapters. Each chapter is tabbed for easy reference. All sections contain information necessary for efficient and safe operation of the stormwater treatment system. The chapters contain the following information; Permits and Standards (Chapter 2), Description and Operation of the Stormwater Treatment System (Chapter 3), Personnel (Chapter 4), Records (Chapter 5), Maintenance (Chapter 6), and Appendices.

1.3 OPERATOR'S RESPONSIBILITY

The operator is responsible for becoming and staying well informed in the following areas:

1. Knowing each component's function and how it is performed.

2. Knowing proper procedures required to maintain the function of each component.

3. Be familiar with maintenance schedules and techniques.

4. Keep management advised of any potential problems with operation and maintenance of the stormwater treatment system.

5. Keep accurate and orderly records of operations and maintenance.

6. Require that practices to assure safety of personnel and equipment be followed.

1.4. OWNER'S RESPONSIBILITY

It is the Burlington International Airport's responsibility to provide the necessary authority and financial support to keep the stormwater treatment system maintained and operating with State regulations. In addition, the Burlington International Airport is responsible for the following:

1. Establish staff requirements by preparing job description and assigning personnel to prescribed jobs.

2. Ensure operating and maintenance standards are being followed.

3. Provide good working conditions and incentives.

4. Provide sufficient funds to operate and maintain the facilities.

5. Plan for future needs.

1.5. STORMWATER MANAGEMENT DESCRIPTION

The Burlington International Airport's Stormwater Treatment System is intended to reduce pollutants that are present in stormwater. The two treatment practices that are used are a grassed channel West of the long term parking lot, and an exfiltrating sand filter bed. Both treatment practices are discussed in greater detail in Chapter 3 of this manual.

CHAPTER 2

PERMITS AND STANDARDS

2.0 PERMITS AND PERMIT REQUIREMENTS

A discharge permit for stormwater runoff into drainage wells and stormwater runoff to waters of the state was required by the State of Vermont Agency of Natural Resources. A copy of this permit can be found in Appendix D. This permit grants permission to the Burlington International Airport to discharge stormwater runoff from parking lots, roads, and roofs associated with expanded parking facilities into an unnamed tributary to the Winooski River, and groundwater.

2.0.1 Maintenance Requirements

The basins, swales, and related stormwater collection, treatment and control system shall be maintained and kept in good operating condition at all times. They shall be inspected semi-annually and cleaned as necessary to maintain design specifications. The inspections shall include one in the spring after snowmelt, and one in the fall prior to snow fall.

1. Any sediment removed from the swales or basins shall be disposed of properly in accordance with the state and federal statutes and regulations.

2. Should any erosion problems occur, the Burlington International Airport is required to immediately correct any such problems.

3. Any basins, swales, or related stormwater devices used during construction for erosion control shall be inspected and cleaned to design specifications immediately after construction has been completed.

4. Treated stormwater runoff is the only waste authorized for disposal under the terms and conditions of this permit. The discharge of any hazardous materials or hazardous waste into the stormwater management system is prohibited.

2.0.2 Maintenance Reporting

By September 30 of each year the Burlington International Airport shall submit a written report to the Department of Environmental Conservation, Water Quality Division, Building 10 North, 103 South Main Street, Waterbury, Vermont 05671-0408. This report shall include the following:

1. The dates and details of any cleaning and maintenance operations carried out in the preceding year.

2. A narrative summarizing the results of any inspections conducted in the preceding year and highlighting any stormwater related problems encountered, and all remedial steps taken in response.

The stormwater pond maintenance and management inspection checklist is found in Appendix C. This will aid in what items will need to be discussed in the report.

CHAPTER 3

DESCRIPTION AND OPERATION OF STORMWATER TREATMENT SYSTEM

3.0 STORMWATER TREATMENT SYSTEM DESCRIPTION

The Burlington International Airport's Stormwater Treatment System is designed to filter out the sediments that are present in stormwater. There are two treatment practices utilized in this treatment system, a grass channel and an exfiltrating sand filter. The stormwater that is being treated originates from four subwatersheds. A map depicting each of the four stormwater catchment areas can be found in Appendix G.

Sub-watershed area #3 uses the grass channel treatment method. This treatment method consists of a grass swale that that runs along the west side of the long term parking lot. The exfiltrating sand filter is treating the stormwater that gathers from three subwatersheds, area #1, area #2 and area #4. The system consists of a concrete cable mat sump area, a pilot channel which leads into the main concrete cable mat area, and an exfiltrating sand filter. Further description of each of the above treatment practices, and the collection system is described in greater detail in the following sections of this chapter.

3.1 STORMWATER TREATMENT SYSTEM COMPONENTS

3.1.1 Stormwater Collection And Conveyance System

Four subwatershed areas are collected for stormwater treatment. Area #1 is defined as the top deck of the newly build parking garage. Area #2 is north of the new parking garage and encompasses the employee lot and the western and northern portion of the long term parking lot. Area #3 encompasses a portion of the rental car lot and the south eastern portion of the long term lot. Area #4 mainly consists of the loop road extension, the garage exit ramps and some of the rental car lot. A map of these subwatersheds can be referenced in Appendix G of this manual.

Area #1, the Top Garage Deck, consists of a series of area drains that are combined into two "downspouts" that run vertically down the center column lines to below the level 1 deck. Here, they turn and run west to two storm manholes (DS 2.2, DS 3.5) that connect to a collection system serving area #2.

Area #2 has a series of catch basins (DS 3.0, DS 3.1, DS 3.2, DS 3.3, DS 3.4, DS 4.0, DS 4.1, DS 4.2, DS 4.3, DS 4.4, DS 4.5, DS 4.6, DS 4.7, DS E4.0) that are connected to a main trunk line that runs to the treatment system located just to the east of the Airport Drive dead end.

Area #3 is collected by a grass swale that runs north until it is collected by a catch basin (DS 5.7). This then connects to an existing system that runs parallel to the runway.

Area # 4 has two catch basins (DS 3.11, DS 3.12) and a trench drain (DS 3.13) that serve the garage exit ramp and four new catch basins (DS 3.9, DS 3.10, DS 3.13, DS 3.14) as part of the loop road extension and a new catch basin (DS 3.8) in the rental car lot.

The collection system then connects to an existing system as with Area #3 that runs north along the runway. A facet of Area #4 is that it picks up a small collection area that serves the FAA building which is connected to the Airport Drive system. Area #4 is generally served by existing or relocated pieces of the Airports collection system. Area #4 does not enter into either of the stormwater treatment areas, but was necessary in the design of the treatment areas.

To become familiar with the catch basins that are connected to this system, as-builts are attached in Appendix E. A vacuum truck shall be used to clean these catch basins once a year at a minimum, preferably in the spring time after the snow has melted. Inspection of these catch basins should be performed biannually to check for excessive build up and to visually inspect the integrity of the catch basin. The streets and parking lots should also be swept in these areas to decrease the sediment deposits that could build up in the stormwater collection system. This should be performed on a quarterly basis.

3.1.2 Pretreatment Forebay Description

The pretreatment forebay is designed with the purpose of slowing and holding the stormwater that is entering the treatment system. The concrete cable mat system was installed for that exact reason. The stormwater cannot begin to be treated if the velocity is too turbulent. The settlement will begin at this stage, segregating the larger particles at first.

The pilot channel, which is the channel that is lined with larger rip-rap, carries the stormwater to the attenuation basin. Both the pretreatment forebay and the attenuation basin are lined with a 30-mil P.V.C. geomembrane liner and a cable concrete mat system. Settlement of much smaller particles in the stormwater occurs here at the forebay.

3.1.3 Attenuation Basin Description

The attenuation basin is also designed with the purpose of slowing and holding the stormwater that is entering the sand filter. There are multistage outlets in this basin. The primary low level outflow is a 6" ductile iron pipe with 1-1/2" holes in it. This sticks up vertically along side the primary outlet structure approximately 1-1/2' and is attached to the structure with a 90 degree bend. Inside this structure the outlet of the pipe is fastened with a blind flange that has a 2" diameter hole in it. This is what controls the rate at which the stormwater may continue to the exfiltration sand filter.

The secondary outlet structure contains an overflow orifice and an overflow weir. The orifice is a 3 ½" diameter hole that is set at the maximum water surface elevation for the water quality storm. Debris is prevented from entering this hole by a galvanized steel grate. The 3 ½" orifice is designed to discharge the channel protection (1 year) design storm. The overflow weir opening is 6' wide and 1' tall and is set at the over bank volume elevation. This outlet structure is connected to the Airports collection system. Appendix F contains drawings of the pretreatment forebay and attenuation basin.

Maintenance should focus on the sediment deposits that build up on the concrete cable mat system and on the rip-rap. This shall be performed on a biannual basis and after large storm events. The other areas that require maintenance are the two outlet structures. In the primary outlet structure, the end of the 6" perforated pipe that has the 2" diameter orifice outlet should be cleaned. The sump of both the primary and secondary outlet structure shall be cleaned of all deposits.

The grass that surrounds the whole treatment area should be cut and maintained. This is critical to make sure that shrubbery or growth does not become overwhelming, and so that no such environment is created for waterfowl.

3.1.4 Exfiltration Sand Filter

The stormwater that exits the primary structure travels through the 6" ductile iron pipe and enters into the exfiltratration surface sand filter. At the end of this pipe is a 6" ductile iron tee that evenly distributes the stormwater into a 45' long concrete spreader. This spreader allows for the stormwater to be evenly dispersed into the sand filter. The filter layers consists of 6" of topsoil, 18" of sand, 12" of crushed stone which embeds five 8" PVC perforated collection pipes. A filter fabric is located in between the existing sand and the 12" of crushed stone. This is installed to insure that the existing sand does not enter into the crushed stone layer. The majority of the filtered stormwater will enter the perforated collection pipes; what does not enter these will continue down to the existing ground.

The five perforated collection pipes are equipped with underdrain clean outs at the ends for convenient maintenance. These five collection pipes all connect together and enter into a structure, which then enters into the stormdrain and into unnamed tributary of the Winooski River. The pipe that connects them together also has an underdrain clean out connected on the end. Appendix F contains drawings of the sand filter.

Inspection of the sand filter bed shall occur quarterly and following large storm events. If it appears that the sand filter is not properly functioning right, check the clean outs to see if there is any deposit build-up. Remove the deposits if this is the case. Use of the cleanout will require a vacuum pressure truck. When an obstruction occurs in the pipe, a systematic approach needs to be taken for determining its location.

CHAPTER 4

PERSONNEL

4.0. MANPOWER/STAFF RESPONSIBILITIES

4.0.1. Supervisor

1. Insure that the collection system is properly serviced, and maintained.

2. Insure that the pretreatment forebay, attenuation basin, and all associated structures are maintained.

3. Insure that the exfiltration sand filter is properly maintained.

4. Insure all maintenance and reporting requirements of the stormwater discharge permit issued by the State of Vermont are adhered to.

4.0.2. Maintenance

Maintenance crew(s) will be performing the work that is necessary for all maintenance of the stormwater collection system, the sand filter, and all of the structures associated with the treatment system.

4.1. QUALIFICATIONS FOR PERSONNEL

Qualifications for the various staff positions shall be as determined by Burlington International Airport.

CHAPTER 5

RECORDS

5.0 OPERATION AND MAINTENANCE RECORDS

The Burlington International Airport shall comply with Volume II of the Vermont Stormwater Manual. A copy of the Maintenance and Management Inspection Check list, found in Appendix D8 of the above referenced manual can be found in Appendix C of this manual.

5.1 ANNUAL REPORTS

Burlington International Airport is responsible for developing an Annual Report for the Department of Environmental Conservation by September 30 of every year. This report shall be submitted to the Department of Environmental Conservation, Water Quality Division, Building 10 North, 103 South Main Street, Waterbury, Vermont 05671-0408. This report must include the following:

1. The dates and details of any cleaning and maintenance operations carried out in the preceding year;

2. A narrative summarizing the results of any inspections conducted in the preceding year and highlighting any stormwater related problems encountered, and all remedial steps taken in response.

5.2 MAINTENANCE RECORDS

Refer to Chapter 6 for instructions on developing and keeping a maintenance record.

5.3 EMERGENCY RECORDS

A record of any emergency must be kept. Include with the emergency record any corrective measures attempted. This must be maintained for future reference.

CHAPTER 6

MAINTENANCE

6.0. PURPOSE AND SCOPE OF RECOMMENDED MAINTENANCE SYSTEM

This chapter of the manual is intended to help Burlington International Airport develop a preventive and corrective maintenance program that will serve the needs of the stormwater treatment system and associated collection system. When carried out properly, simple maintenance can prevent costly future repairs.

6.1. PLANNING AND SCHEDULING

It is Burlington International Airport's responsibility to develop proper planning and scheduling for the inspection and maintenance of the stormwater treatment system. Because there is a lengthy winter season in Vermont, it is recommended that all of maintenance be scheduled between the early spring and late fall of each year.

Maintenance planning and scheduling involves time, personnel, equipment, schedules, costs, and priorities. Unnecessary or too frequent preventive maintenance can be as wasteful as improper maintenance procedures. The maintenance personnel should monitor the operations of the stormwater treatment system to determine whether further maintenance should be performed.

6.1.1. Preventive Maintenance Schedules

A preventive maintenance schedule must be set up for all of the areas of the treatment process. This will assist the operator in the planning and scheduling of his maintenance workload. When each task is completed, a report should be written documenting the date the work was completed, the work item number, and remarks (if needed). The following is a list of maintenance items that should be performed as noted in Table 6.1.

1. Cleaning of all catch basins of debris and sediment.

2. Cleaning of all concrete structures at the stormwater treatment system of all debris and sediment.

3. Removal of sediment from forebay, (concrete cable mat system)

4. Removal of any debris from sand filter bed.

5. Keep all parking lots, roadways, and parking garage decks free of excessive build up of sediment by periodic sweeping.

Proper documentation of all work performed, and corrective measures taken during heavy storm events, will aid the airport in generating the yearly report to the state. Table 6.1 is a rough schedule of maintenance that should be performed.

Table 6.1
Inspection And Maintenance Schedule

Structure	Inspection Frequency	Cleaning Frequency	Action	Yearly Reporting
Catch Basins	Bi-annual	Annual	Check for excessive buildup and integrity	Yes
Street/Parking Lot Sweeping	Quarterly	Biannual	Check for excessive sediment deposits	Yes
Pretreatment Forebay	Quarterly/Following large storm events	Biannual/ Spring & Fall	Track annual amounts collected/removed check outflow orifices	Yes
Sand Filter Bed	Quarterly/Following large storm events	N/A	Clean outs and filter function	Yes

6.1.2. Inspections

Inspection of the stormwater treatment system is critical for assessing what type of maintenance is required. Table 6.1 is a rough schedule of inspections that should be performed on the collection system and stormwater treatment system. The checklists that are found in Appendix C are much more detailed and should be used when inspections are performed.

APPENDICES

A. Design Criteria
B. Inventory of Drainage Structures
C. Inspection and Maintenance Checklists
D. Stormwater Discharge Permit
E. Collection System Drawings
F. Treatment System Drawings
G. Stormwater Collection Area Map
H. References

APPENDIX A

DESIGN CRITIERIA

DUFRESNE-HENRY

PREPARED BY BFR DATE 1/6/03 PROJECT NO. 6320011
CALCULATIONS CHECKED BY ____ DATE ____ SHEET NO. 1 OF ____
ASSUMPTIONS / METHODS CHECKED BY ____ DATE ____
SUBJECT BTV UNIFIED SIZING ENTIRE SITE.

GOAL: UTILIZE UNIFIED SIZING CRITERIA TO CALCULATE TREATMENT REQUIREMENTS FOR ~~ENTIRE~~ TERMINAL ROAD & PARKING ~~PROJECT~~ (TRAP) PROJECT

DETERMINE: WQv_{req} FOR NEW IMPERVIOUS AREA CREATED ON-SITE.

GIVEN: SITE AREA (A_T) = 16.2 AC
EXISTING IMPERVIOUS = 8.3 AC
PROPOSED IMPERVIOUS = 11 AC
P = 0.9"

NET NEW IMPERVIOUS = PROP. IMP. − EXIST. IMP.
= 11 − 8.3
NET NEW IMP. = 2.7 AC

PERCENT IMPERVIOUS (I)

$$I = \frac{2.7}{16.2} = 0.17$$

$$I = 17\%$$

RUNOFF COEFF. (R_v)

$$R_v = [0.05 + 0.009(I)]$$

$$R_v = [0.05 + 0.009(17)]$$

$$R_v = 0.2$$

WATER QUALITY VOLUME (WQ_v) FOR NET NEW IMP. CREATED ON-SITE.

$$WQ_v = P A R_v / 12$$

$$WQ_v = \frac{0.9" (16.2 AC)(0.2)}{12}$$

$$\boxed{WQv_{req} = 0.24 \text{ AC-FT}}$$

↑ REQUIRED TREATMENT VOLUME FOR NEW IMP. SURFACE CREATED ON-SITE.

DUFRESNE-HENRY

PREPARED BY BFR DATE 1/6/03 PROJECT NO. 6320011
CALCULATIONS CHECKED BY ____ DATE ____ SHEET NO. 1 OF ____
ASSUMPTIONS / METHODS CHECKED BY ____ DATE ____
SUBJECT BTV UNIFIED SIZING ENTIRE SITE.

DETERMINE: WQ_{v_e} FOR EXISTING* IMPERVIOUS AREA ON-SITE

* ACCORDING TO DRAFT STORMWATER RULES 20% OF THE EXISTING IMPERVIOUS AREA'S WQ_v NEEDS TO BE TREATED.

GIVEN: SITE AREA (A_T) = 16.2 AC
EXISTING IMPERVIOUS = 8.3 AC
P = 0.9"

PERCENT IMPERVIOUS (I) EXISTING

$$I = \frac{8.3}{16.2} = 0.51$$

$$I = 51\%$$

RUNOFF COEFF. (R_v)

$$R_v = [0.05 + 0.009(I)]$$

$$R_v = [0.05 + 0.009(51)]$$

$$R_v = 0.51$$

WATERQUALITY VOLUME (WQ_v) FOR EXISTING IMPERVIOUS AREAS ON-SIT

$$WQ_v = PAR_v / 12$$

$$WQ_v = \frac{0.9"(16.2\ AC)(0.51)}{12}$$

$$\boxed{WQ_v = 0.62\ AC\text{-}FT}$$

BY PROPOSED RULE

$$20\%\ WQ_v = 0.2\ (0.62\ AC\text{-}FT)$$

$$WQ_{v_e} = 0.12\ AC\text{-}FT$$

DUFRESNE-HENRY

PREPARED BY BFN DATE 1/6/02 PROJECT NO. 632Q011
CALCULATIONS CHECKED BY ____ DATE ____ SHEET NO. 3 OF ____
ASSUMPTIONS / METHODS CHECKED BY ____ DATE ____
SUBJECT BTV UNIFIED SIZING ENTIRE SITE

DETERMINE: TOTAL WQ_{v_r} TO BE TREATED FOR THE SITE.

GIVEN: $WQ_{v_n} = 0.24$ AC-FT
$WQ_{v_e} = 0.12$ AC-FT

$$WQ_{v_r} = WQ_{v_n} + WQ_{v_e}$$

$$WQ_{v_r} = 0.24\ AC\cdot FT + 0.12\ AC\cdot FT$$

$$\boxed{WQ_{v_r} = 0.36\ AC\text{-}FT}$$

DETERMINE: GROUNDWATER RECHARGE VOLUME (Re_v) FOR ENTIRE SITE.

GIVEN: SOIL TYPE A
NET NEW IMPERVIOUS = 2.7 AC*
SITE AREA = 16.2 AC
RECHARGE FACTOR (F) = 0.4

* PROPOSED RULE DOES NOT SPEAK TO INCORPORATING EXISTING IMPERVIOUS INTO RECHARGE VOLUME CALCULATIONS.

PERCENT IMPERVIOUS (I)

$$I = \frac{2.7}{16.2} = 0.17$$

RECHARGE VOLUME (Re_v)

$$Re_v = \frac{FAI}{12}$$

$$Re_v = \frac{0.4\,(16.2)(0.17)}{12}$$

$$\boxed{Re_v = 0.1\ AC\cdot FT}$$

DUFRESNE-HENRY

PREPARED BY BFR DATE 1/6/03 PROJECT NO. 6320011

CALCULATIONS CHECKED BY _____ DATE _____ SHEET NO. 5 OF _____

ASSUMPTIONS / METHODS CHECKED BY _____ DATE _____

SUBJECT BTV UNIFIED SIZING CRITERIA.

DETERMINE: OVERBANK FLOOD PROTECTION (Q_{P10})

HYDROCAD SOFTWARE WAS USED TO ROUTE PRE & POST* DEVELOPMENT HYDROGRAPHS FOR THE SITE.

PEAK DISCHARGE RESULTS FOR THE 10-YR 24 HOUR EVENT.

$Q_{P10_o} = 53.01$ cfs

$Q_{P10_i} = 63.66$ cfs

$$\frac{Q_{P10_o}}{Q_{P10_i}} = \frac{53.01 \text{ cfs}}{63.66 \text{ cfs}} = 0.83$$

USING FIGURE 1.6 (NRCS, 1986)
BASED ON TYPE II RAINFALL
THE VALUE OF $V_S/V_R = 0.18$

REQUIRED STORAGE:

$$V_S = \frac{(V_S/V_R)(Q_d)(A)}{12}$$

A = 16.2 AC
Q_d = ~~63.66~~ 2.2" for 10yr post developed storm event

$$V_S = \frac{(0.18)(2.2")(16.2 \text{ AC})}{12}$$

$V_S = 0.53$ AC-FT

$V_S = 23263 \text{ FT}^3$

* POST DEVELOPMENT FOR THE PURPOSES OF THIS CALCULATION ASSUMES NO TREATMENT OR CONTROLS HAVE BEEN INSTALLED. FLOWS ARE CONVEYED THROUGH THE SYSTEM UNIMPEDED.

DUFRESNE-HENRY

PREPARED BY JTM DATE 1/20/03 PROJECT NO. 6320011

CALCULATIONS CHECKED BY _____ DATE _____ SHEET NO. ____ OF ____

ASSUMPTIONS / METHODS CHECKED BY _____ DATE _____

SUBJECT _____

CALC. CPV FOR TREATMENT AREA'S 1 & 2

D.A. #1 & #2 TO NEW TREATMENT FACILITY

COMPOSITE CN

$$4.65 \times 98 = 455.70$$
$$0.50 \times 68 = 34.-$$
$$5.15 = 489.7$$

$$CN = 95$$

$$I_a = (200/CN - 2) \cong 0.1053$$

$$I_a/P = \frac{0.1053}{2.1} = \boxed{0.05} \cong 0.1$$

∴ DETERMINE q_u FROM UNIT PEAK DISCHARGE TR-55

@ T_c = 7 MINS ≅ q_u = 975 +/- CSM/IN

FROM HARRINGTON @ q_u = 975 CSM/IN

$V_s/$

$$\therefore q_o/q_1 \cong 0.040$$

$$V_s/V_R = 0.682 - 1.43(.04) + 1.64(.04)^2 - .804(.04)^3$$

$$\frac{V_s}{V_R} = 0.63^{+/-}$$

$$V_s = C_{PV} = 0.63(1.52)(1/12)(5.15^{AC}) = \boxed{0.41\ AC\text{-}FT}\ (17{,}902\ FT^3)$$

DETERMINE AVE RELEASE RAT = $\frac{17{,}902}{(12 \times 60 \times 60)} = \boxed{0.4\ CFS}$

Attachment E

Exfiltrating Surface Sand Filter Design Callulations

DUFRESNE-HENRY

PREPARED BY BFR DATE 01/07/03 PROJECT NO. 6320011

CALCULATIONS CHECKED BY _____ DATE _____ SHEET NO. 1 OF _____

ASSUMPTIONS / METHODS CHECKED BY _____ DATE _____

SUBJECT ~~SWM #1 EXFILTRATING SURFACE SAND FILTER~~ CATCHMENT #1

BASIN
~~TREATMENT~~ AREA #1

— REFER TO SKETCH (SWM#1 EXFILTRATING SURFACE SAND FILTER)

CATCHMENT #1 — BASIN IS APPROX 2.3 AC. RUNOFF FLOWS FROM UPPER GARAGE DECK INTO GARAGE DRAINAGE SYSTEM THEN EXITS INTO TREATMENT SYSTEM SWM#1 LOCATED ~~on~~ ALONG THE WEST OF PROPOSED BUILDING.

DETERMINE: WATER QUALITY VOLUME (WQv_1) OF AREA # 1

GIVEN: $A = 2.3$ AC
$P = 0.9"$
$I = 100\%$

$R_v = [0.05 + 0.009(I)]$

$R_v = [0.05 + 0.009(100)]$

$R_v = 0.95$

$WQv_{\#1} = P A R_v / 12$

$WQv_{\#1} = 0.9" (2.3\,AC)(0.95) / 12$

$\boxed{WQv_{\#1} = 0.164 \text{ AC·FT FOR CATCHMENT AREA \# 1}}$

DETERMINE: GROUNDWATER RECHARGE VOLUME (Rev_1) OF AREA # 1

GIVEN: SOIL TYPE A
$I = 100\%$
$F = 0.4$

$Rev_f = FAI / 12$

$= 0.4 (2.3)(100) / 12$

$\boxed{Rev_1 = 0.08 \text{ AC·FT}}$

DUFRESNE-HENRY

PREPARED BY BFR DATE 1/15/03 PROJECT NO. 6320011
CALCULATIONS CHECKED BY ____ DATE ____ SHEET NO. 2 OF ____
ASSUMPTIONS / METHODS CHECKED BY ____ DATE ____
SUBJECT CATCHMENT AREA #2

CATCHMENT #2 – REFER TO ATTACHED SKETCH

- BASIN AREA IS 3.57 ACRES. RUNOFF IS COLLECTED FROM PARKING AREAS ~~AND~~ 3 TO THE NORTH OF THE PROPOSED GARAGE AS WELL AS FROM A PORTION OF THE LOOP ROAD. IT IS THEN CONVEYED TO A TREATMENT AREA LOCATED AT THE NORTH END OF AIRPORT DRIVE.

DETERMINE: WQ_{v_2}

GIVEN: $A = 3.57$ AC
$P = 0.9"$
$I = 82.4\%$

$R_v = [0.05 + 0.009(I)]$
$R_v = [0.05 + 0.009(82.4)]$
$R_v = 0.79$

$WQ_{v_2} = PAR_v / 12$
$WQ_{v_2} = (0.9")(3.57\ AC)(0.79)/12$
$\boxed{WQ_{v_2} = 0.21\ AC\cdot FT}$

DETERMINE: GROUNDWATER RECHARGE VOLUME (Re_{v_2}) OF AREA 2

GIVEN: SOILS A
$I = 82.4\%$
$F = 0.4$

$Re_{v_2} = FAI/12$
$Re_{v_2} = 0.4(3.57)(0.824)/12$

$\boxed{Re_{v_2} = \sout{0.05}\ 0.1\ AC\cdot FT}$

DUFRESNE-HENRY

PREPARED BY BFR DATE 1/16/03 PROJECT NO. 6320011
CALCULATIONS CHECKED BY _____ DATE _____ SHEET NO. 3 OF _____
ASSUMPTIONS / METHODS CHECKED BY _____ DATE _____
SUBJECT UNIFIED SIZING CRITERIA | SAND FILTER DESIGN CATCHMENTS 1 & 2

- BOTH CATCHMENT AREA 1 AND AREA 2 WILL BE COMBINED AND TREATED IN ONE LOCATION USING AN EXFILTRATING SURFACE SAND FILTER.

DETERMINE: COMBINED $WQ_{v_{1,2}}$ TO BE TREATED

$$WQ_{v_{1,2}} = WQ_{v_1} + WQ_{v_2}$$

$$WQ_{v_{1,2}} = 0.164 \text{ AC·FT} + 0.21 \text{ AC·FT}$$

$$\boxed{WQ_{v_{1,2}} = 0.374 \text{ AC·FT}}$$

DETERMINE: COMBINED RECHARGE VOLUME ($Re_{v_{1,2}}$) OF AREAS 1 & 2

$$Re_{v_{1,2}} = Re_{v_1} + Re_{v_2}$$

$$Re_{v_{1,2}} = 0.08 \text{ AC·FT} + 0.1 \text{ AC·FT}$$

$$\boxed{Re_{v_{1,2}} = 0.18 \text{ AC·FT}}$$

- SINCE SOILS ON-SITE HAVE ADEQUATE PERMEABILITY (TYPE A). RECHARGE REQUIREMENT IS MET USING AN EXFILTRATING SURFACE SAND FILTER.

DETERMINE: MODIFIED CN FOR 0.9" RAINFALL.

~~- CATCHMENT #1, ENTIRE AREA IS IMPERVIOUS SURFACE. ADJUSTING~~

* NRCS METHOD UNDERESTIMATES VOLUME & RATE OF RUNOFF FOR STORM EVENTS WITH LESS THAN 2" OF RAINFALL.

CATCHMENT #1: SINCE CATCHMENT IS ENTIRELY IMPERVIOUS ADJUSTING THE CN IS UNNECESSARY. 98 IS 98

DUFRESNE-HENRY

PREPARED BY BFR DATE 1/16/03 PROJECT NO. 6320011

CALCULATIONS CHECKED BY _____ DATE _____ SHEET NO. 4 OF _____

ASSUMPTIONS / METHODS CHECKED BY _____ DATE _____

SUBJECT _____

DETERMINE: MODIFIED CN FOR 0.9" RAINFALL (CONT'D)

CATCHMENT #2:

GIVEN: $P = 0.9"$

$WQ_{v_2} = 0.21$ AC·FT

$R_{v_2} = 0.79$

AREA = 3.57 AC

$$Q_a = \frac{WQ_{v_2}}{\text{AREA}}$$

$$Q_a = \frac{0.21 \text{ AC·FT}}{3.57 \text{ AC}}$$

$Q_a = 0.06$ FT $\rightarrow$ 0.7 IN

FIND: ADJUSTED CN

$$CN = \frac{1000}{\left[10 + 5P + 10Q_a - 10\left(Q_a^2 + 1.25\,Q_a P\right)^{1/2}\right]}$$

$$CN = \frac{1000}{\left[10 + 5(0.7) + 10(0.7) - 10\left(0.7^2 + 1.25(0.7)(0.9)\right)^{1/2}\right]}$$

CN = 98 ← USED TO COMPUTE VOLUME & RATE OF RUNOFF DURING WQ STORM OF 0.9"

PEAK DISCHARGE FOR THE COMBINED BASINS 1 & 2 WAS DETERMINED USING HYDROCAD MODELING SOFTWARE OUTPUT IS ATTACHED & IS SUMMARIZED BELOW

WQ	$Q_{0.9"}$	=
CP_v	$Q_{2.1"}$	=
Q_{P10}	$Q_{3.6"}$	=

PRETREATMENT WILL BE USED TO PROVIDE SOME CP_v & QP_{10}

DUFRESNE-HENRY

PREPARED BY BFR DATE 1/16/03 PROJECT NO. 632.0001

CALCULATIONS CHECKED BY _____ DATE _____ SHEET NO. 5 OF _____

ASSUMPTIONS / METHODS CHECKED BY _____ DATE _____

SUBJECT EXFILTRATING SURFACE SAND FILTER DESIGN

* DESIGN OF THE SAND FILTER IS SIZED USING BOTH CATCHMENT 1 & 2.

SIZE FILTRATION BED:

GIVEN: $WQ_{v,2} = 0.374$ AC·FT $\quad T_f = 40$ hrs (drain time)

$d_f = 1.5$

$K = 3.5$ FT/DAY (SAND)

$h_f = 1$

$$A_f = \frac{WQ_{v,2}(d_f)}{[k(h_f + d_f)(t_f)]}$$

$$A_f = \frac{0.374 \text{ AC·FT } (1.5 \text{ ft})}{\left[3.5 \frac{\text{FT}}{\text{DAY}} (1' + 1.5') 40 \text{hrs}\right]} \frac{1 \text{ day}}{24 \text{hrs}}$$

$$\boxed{A_f = 1675 \text{ FT}^2}$$

FILTERING PRETREATMENT:

VOLUME OF PRETREATMENT = 0.4 (COLD CLIMATE) $(WQ_{v,2})$

$V_p = 0.4(0.374 \text{ AC·FT})$

$$\boxed{V_p = 6517. \text{FT}^3}$$

SEDIMENTATION SURFACE AREA = $0.066(WQ_{v,2})$

$A_s = 0.066(0.374 \text{ AC·FT})$

$$\boxed{A_s = 1075 \text{ FT}^2}$$

VOLUME MINIMUM WITHIN PRACTICE:

$V_{MIN} = 0.75(WQ_v)$

$V_{min} = 0.75\ (0.375 \text{ AC·FT})$

$$\boxed{V_{min} = 12251 \text{ FT}^3}$$

DUFRESNE-HENRY

PREPARED BY BFR DATE 1/22/03 PROJECT NO. 6320011
CALCULATIONS CHECKED BY _____ DATE _____ SHEET NO. 7 OF _____
ASSUMPTIONS / METHODS CHECKED BY _____ DATE _____
SUBJECT _____

HYDROCAD ROUTING OF FLOWS THROUGH SEDIMENTATION RESULTED IN A WATER SURFACE ELEVATION OF ~~319.31~~ 319.48

DESIGN SECONDARY OUTLET: ~~TO~~

ELEV OF ORIFICE WILL BE SET AT ~~ELEV~~ WSE FROM WQ STORM

ELEV = ~~319.3~~ 319.5

DETERMINE SIZE ORIFICE THAT WILL RELEASE CHANNEL PROTECTION VOLUME OVER 24 HOURS

FLOW RATE = 0.4 Ft^3/s (see JTM CALCS 1/20/03) ATTACHMENT D

~~$Q = CA\sqrt{2gh}$~~

THE FLOW RATE IS THE TOTAL OF THE FLOW RELEASED ~~FROM THE~~ INTO THE FILTER AND THE FLOW FROM THE SECONDARY ORIFICE

$$Q_{CPv} = Q_p + Q_s$$

317.7 - 319.5

$$Q_p = CA\sqrt{2gh}$$

$$Q_p = 0.6\left(\pi\left(\tfrac{1}{12}\right)^2\right)\sqrt{2(32.2)(\cancel{2.125}\ 2.55)}$$

(321 - 319.5)/2

1.8 ~~1.5~~ FT + (~~1.25/2~~)(0.75)

Q_p = ~~0.15~~ 0.17 CFS — Release Rate ~~of~~ into filter during 1 YR CPv event.

$$Q_{CPv} = Q_p + Q_s$$

0.4 CFS = ~~0.15~~ 0.17 CFS + Q_s

Q_s = ~~0.25~~ 0.23 CFS → AVE. FLOW RATE RELEASED THROUGH SECONDARY ORIFICE

DUFRESNE-HENRY

PREPARED BY BFR DATE PROJECT NO. 6320011

CALCULATIONS CHECKED BY DATE SHEET NO. 9 OF

ASSUMPTIONS / METHODS CHECKED BY DATE

SUBJECT

$$Q_{PIO} = Q_{pri} + Q_{sec} + Q_{over} + Q_{grassed\ swale} + Q_{not\ treated}$$

~~CHECK: Q_{PIO}~~ DETERMINE RELEASE RATE FOR Q_{pri} & Q_{sec} DURING OVERBANK STORM 3.6" RAINFALL

$$Q_{pri} = CA\sqrt{2gh}$$

$$Q_{pri} = 0.6\left(\pi\left(\tfrac{4}{12}\right)^2\right)\sqrt{2(32.2)(3.15}$$

$$h = \left(\frac{320.7 - 317.7}{320.4 - 317.7}\right) + \left(\frac{320.4 - 320.7}{2}\right)$$

$$h = \left(\frac{3}{3}\right) + \left(\frac{0.3}{2}\right) = 3.15$$

$h = 3.15$

$Q_{pri} = 0.19$ CFS

$$Q_{sec} = CA\sqrt{2gh}$$

$$Q_{sec} = 0.6\left(\pi\left(\frac{1.75}{12}\right)^2\right)\sqrt{2(32.2)(1.4)}$$

$$h = \left(\frac{320.7 - 319.5}{320.4 - 319.3}\right) + \left(\frac{321 - 320.7/2}{320.4/2}\right)$$

$$h = \frac{1.2}{2} + 0.15$$

$h = 1.4$

$Q_{sec} = 0.38$ CFS

$$Q_{PIO} = Q_{pri} + Q_{sec} + Q_{over} + Q_{grassed\ swale} + Q_{not\ treated}$$

$$53 = 0.19 + 0.38 + Q_{over} + 6.87 + 26.7$$

$Q_{over} = 18.86$ CFS → AVE. FLOW RATE RELEASED THROUGH OVERBANK ORIFICE

Attachment F

Open Channel
Design Calulations

DUFRESNE-HENRY

PREPARED BY BFR DATE 12/27/02 PROJECT NO. 6320011
CALCULATIONS CHECKED BY _____ DATE _____ SHEET NO. 1 OF _____
ASSUMPTIONS / METHODS CHECKED BY _____ DATE _____
SUBJECT SWM #3 GRASS CHANNEL

TREATMENT AREA #3

— REFER TO SKETCH (SWM #3 GRASS CHANNEL DELINEATED BASIN) DATED 1/2/0

CATCHMENT A - BASIN IS APPROX. 1.66 AC RUNOFF FLOWS TO THE NORTHWEST CORNER OF THE BASIN.

DETERMINE: WQ_{V_A}

GIVEN: A = 1.66 AC
P = 0.9"
I = 84.8%

$R_V = [0.05 + 0.009 I]$

$R_V = [0.05 + 0.009(84.8)]$

$R_V = 0.81$

$WQ_{V_A} = P A R_V / 12$

$WQ_{V_A} = (0.9")(1.66 AC)(0.81) / 12$

$WQ_{V_A} = 0.10$ AC-FT TOTAL FOR ENTIRE CATCHMENT A.

*NOT ALL OF CATCHMENT A WILL FLOW FOR 10 MIN IN THE GRASS CHANNEL.

DETERMINE: SHORTEST CHANNEL LENGTH THAT WILL TREAT THE LARGEST WQ_V

USING DATA OBTAINED FROM HYDROCAD OUTPUT (ATTACHED)
AVE. VELOCITY = 0.3 FT/SEC
FOR - A WQ STORM 0.9" RAINFALL
- LONGITUDINAL CHANNEL SLOPE = 1%
- 3:1 SIDE SLOPES
- 5' WIDE

CHANNEL LENGTH = vt

GIVEN: V = 0.3 FT/sec
t = 10 MIN AVE. RESIDENCE TIME

$$\text{CHANNEL LENGTH} = \left(0.3 \tfrac{FT}{sec}\right)\left(10 \text{ MIN}\right)\left(\tfrac{60 \text{ sec}}{1 \text{ MIN}}\right)$$

CHANNEL LENGTH = 180 FT

DUFRESNE-HENRY

PREPARED BY BFR DATE 12/27/02 PROJECT NO. 632.0011
CALCULATIONS CHECKED BY DATE SHEET NO. 2 OF
ASSUMPTIONS / METHODS CHECKED BY DATE
SUBJECT SWM #3 GRASS CHANNEL

- SINCE WE KNOW MIN CHANNEL LENGTH WE CAN NOW IDENTIFY THE WQv THAT IS TREATED.

DETERMINE : WQv_B

- BASIN HAS BEEN DELINEATED STARTING AT A POINT 180 FT UP-STREAM FROM THE DISCHARGE POINT. DELINEATED BASIN IS SHOWN AS CATCHMENT B (REFER TO SKETCH SWM #3 1/2/03)

GIVEN: $A = 0.97$ AC
$P = 0.9"$
$I = 84.7\%$

$R_v = [0.05 + 0.009(I)]$

$R_v = [0.05 + 0.009(84.7)]$

$R_v = 0.81$

$WQv_B = P A R_v / 12$

$WQv_B = (0.9")(0.97 AC)(0.81) / 12$

$WQv_B = 0.059$ AC·FT → VOLUME TREATED USING GRASS CHANNEL

DETERMINE : WQv NOT TREATED FROM & CATCHMENT A

$WQv = WQv_A - WQv_B$

$WQv = 0.10$ AC-FT $- 0.059$ AC·FT

$WQv = 0.041$ AC·FT

DETERMINE Q_c

DUFRESNE-HENRY

PREPARED BY BFR DATE 01/09/03 PROJECT NO. 6320011

CALCULATIONS CHECKED BY _____ DATE _____ SHEET NO. 3 OF _____

ASSUMPTIONS / METHODS CHECKED BY _____ DATE _____

SUBJECT SWM #3 GRASS CHANNEL

~~TREATMENT / CONTROL OF~~

CHANNEL PRETREATMENT – SINCE CHANNEL IS NOT DIRECTLY DICHARGING DIRECTLY FROM A CONCENTRATED INFLOW POINT, NO FORMAL PRETREATMENT CHAMBER IS REQUIRED. INSTEAD, PRETREATMENT IS PROVIDED BY A 6 PEA GRAVEL DIAPHRAGM AND THE SLOPES LEADING TO THE EDGE OF THE CHANNEL.

HYDROCAD MUDELING OUT PUT IS ATTACHED SHOWING RUNOFF CHARACTERISTICS

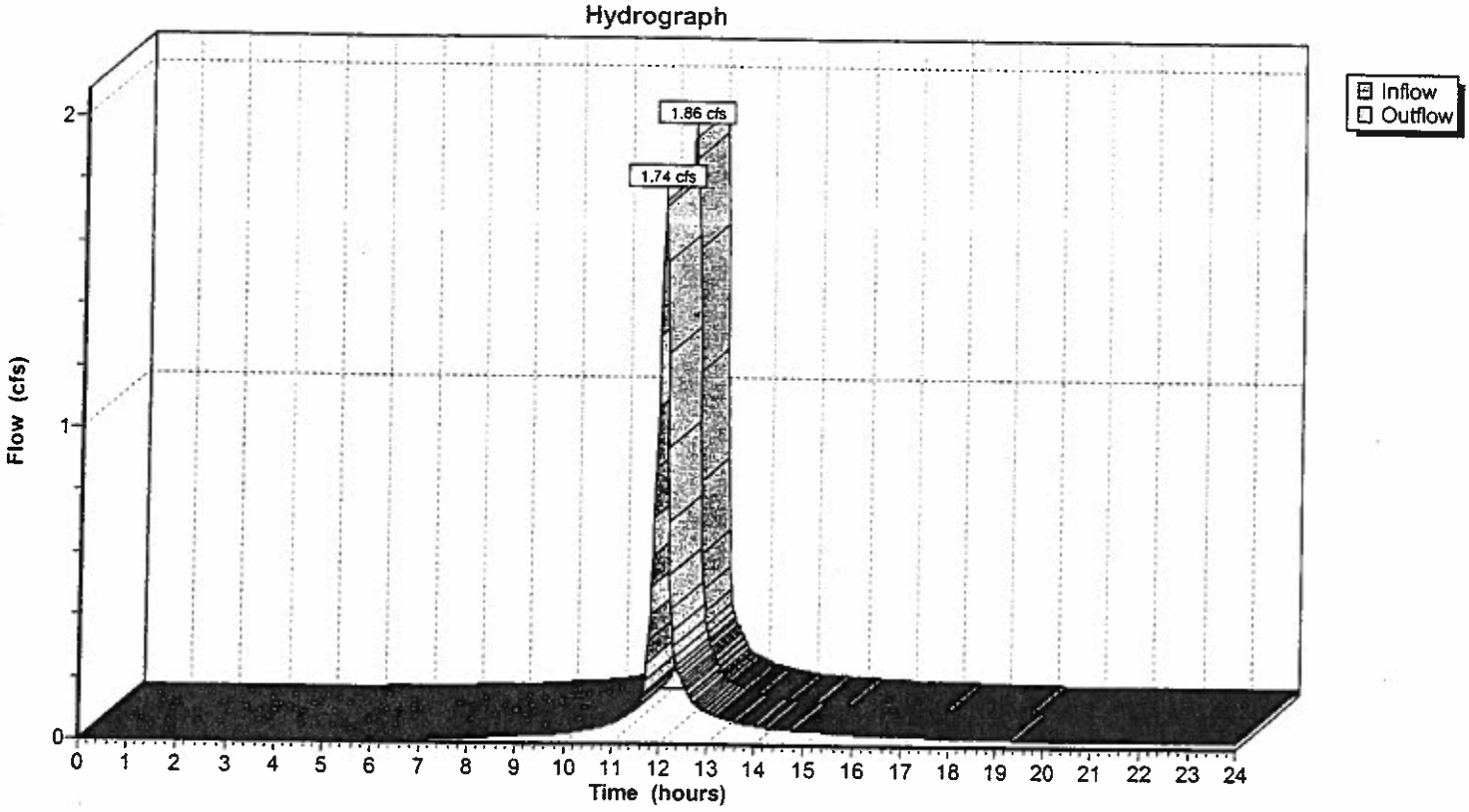
Reach 1R: grass channel

Inflow Area = 1.660 ac, Inflow Depth = 0.69"
Inflow = 1.86 cfs @ 11.98 hrs, Volume= 0.096 af
Outflow = 1.74 cfs @ 12.05 hrs, Volume= 0.096 af, Atten= 6%, Lag= 4.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.03 hrs
Max. Velocity= 1.5 fps, Min. Travel Time= 2.6 min
Avg. Velocity = 0.3 fps, Avg. Travel Time= 11.7 min

Peak Depth= 0.21'
Capacity at bank full= 29.47 cfs
Inlet Invert= 324.00', Outlet Invert= 321.60'
5.00' x 1.00' deep channel, n= 0.032 Length= 240.0' Slope= 0.0100 '/'
Side Slope Z-value= 3.0 '/'

Reach 1R: grass channel



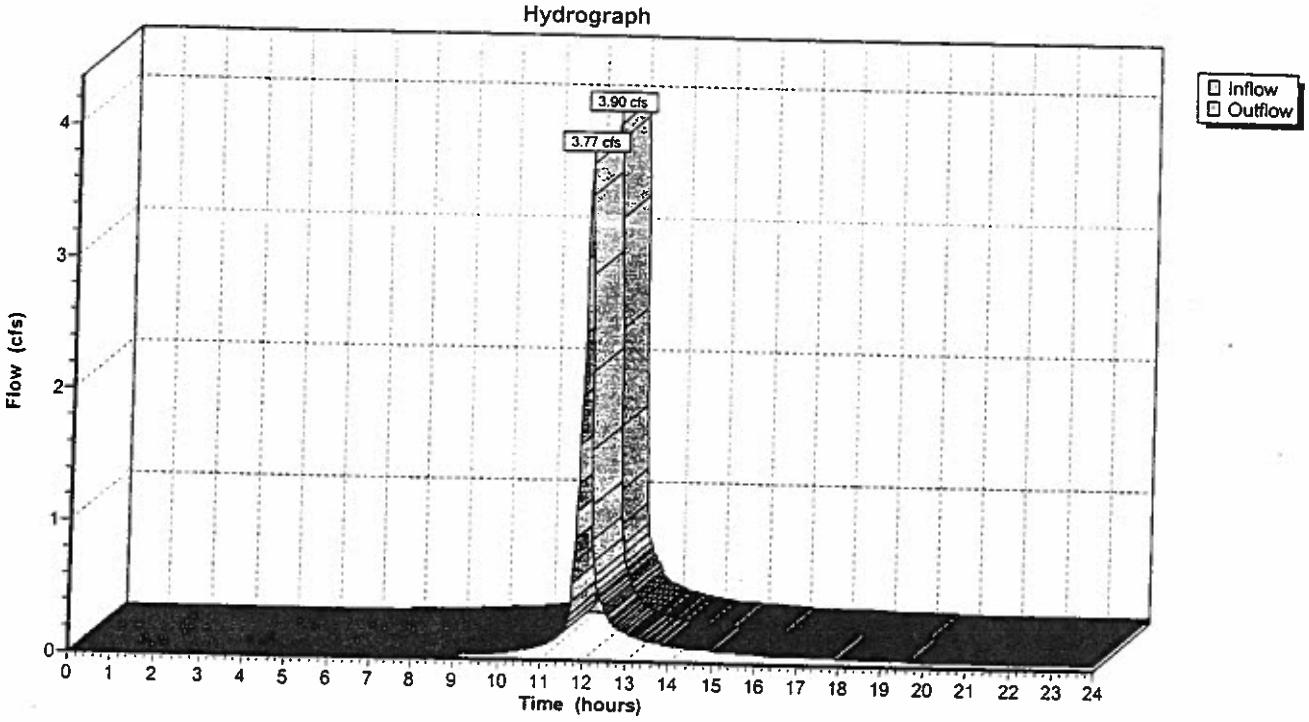
Reach 1R: grass channel

Inflow Area = 1.660 ac, Inflow Depth = 1.40"
Inflow = 3.90 cfs @ 11.98 hrs, Volume= 0.194 af
Outflow = 3.77 cfs @ 12.03 hrs, Volume= 0.194 af, Atten= 3%, Lag= 3.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.03 hrs
Max. Velocity= 2.1 fps, Min. Travel Time= 1.9 min
Avg. Velocity = 0.5 fps, Avg. Travel Time= 8.4 min

Peak Depth= 0.30'
Capacity at bank full= 4.38 cfs
Inlet Invert= 324.00', Outlet Invert= 321.00'
5.00' x 0.33' deep channel, n= 0.032 Length= 240.0' Slope= 0.0125 '/'
Side Slope Z-value= 3.0 '/'

Reach 1R: grass channel



Subcatchment 1S: north parking area

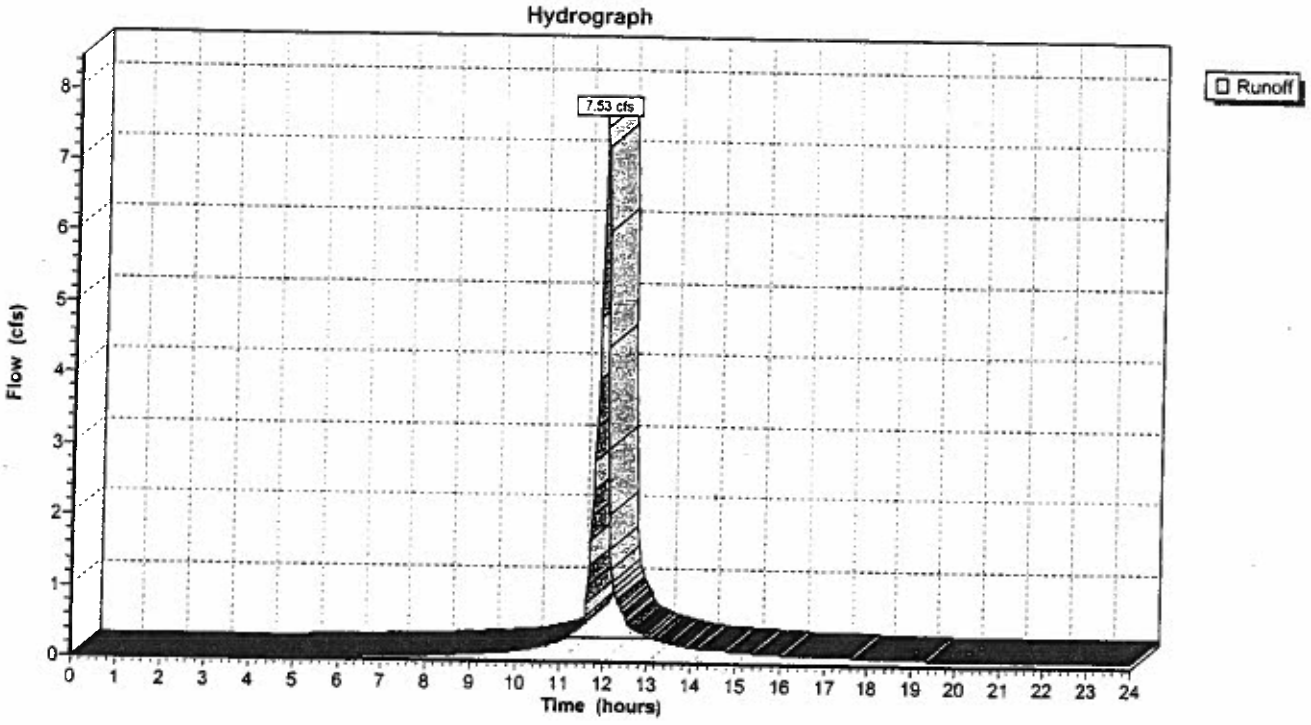
Runoff = 7.53 cfs @ 11.98 hrs, Volume= 0.391 af, Depth= 2.83"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.03 hrs
Type II 24-hr Rainfall=3.60"

Area (ac)	CN	Description
0.250	68	grass
1.410	98	paved
1.660	93	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry, SHEET INTO grass channel**
1.8	390	0.0100	3.7	29.47	**Trap/Vee/Rect Channel Flow, Grassed Channel** Bot.W=5.00' D=1.00' Z= 3.0 '/' n= 0.032
6.8	390	Total			

Subcatchment 1S: north parking area



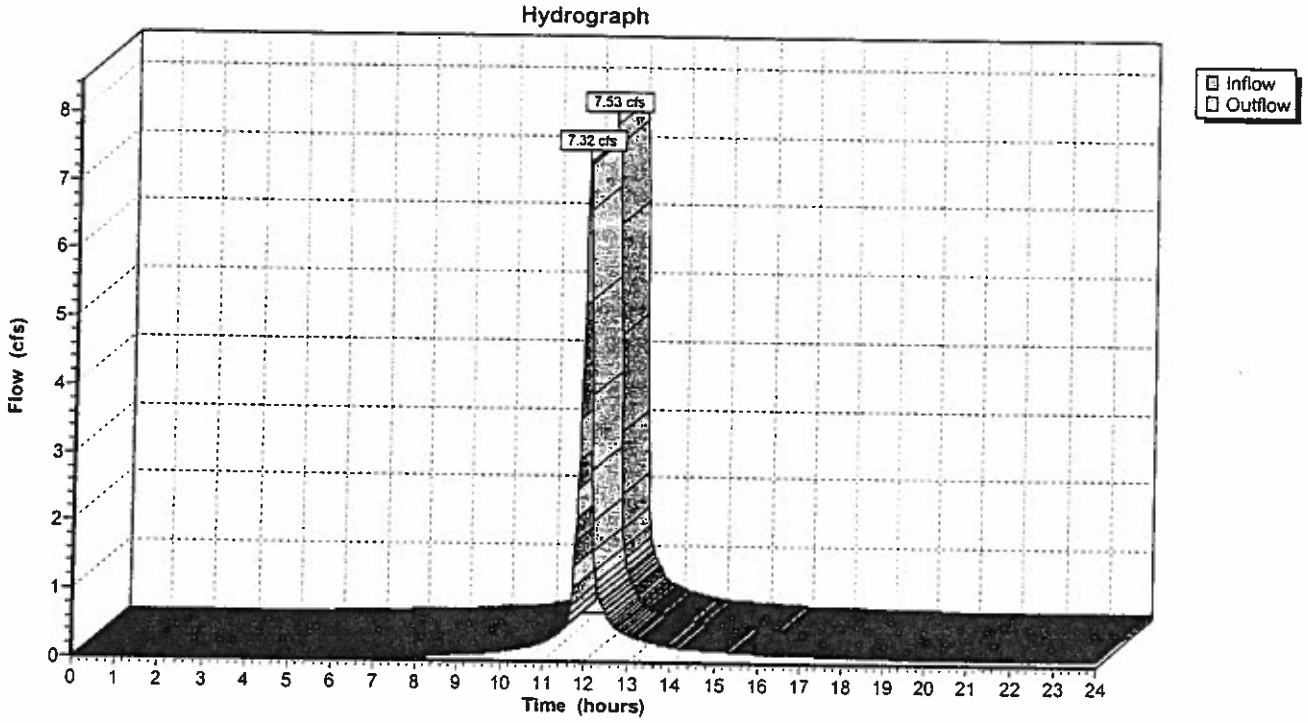
Reach 1R: grass channel

Inflow Area = 1.660 ac, Inflow Depth = 2.83"
Inflow = 7.53 cfs @ 11.98 hrs, Volume= 0.391 af
Outflow = 7.32 cfs @ 12.02 hrs, Volume= 0.390 af, Atten= 3%, Lag= 2.7 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.03 hrs
Max. Velocity= 2.4 fps, Min. Travel Time= 1.6 min
Avg. Velocity = 0.6 fps, Avg. Travel Time= 7.1 min

Peak Depth= 0.47'
Capacity at bank full= 29.47 cfs
Inlet Invert= 324.00', Outlet Invert= 321.60'
5.00' x 1.00' deep channel, n= 0.032 Length= 240.0' Slope= 0.0100 '/'
Side Slope Z-value= 3.0 '/'

Reach 1R: grass channel



CATCHMENT A

AREA = 1.66 Ac

PERVIOUS AREA = 0.25 Ac
IMPERVIOUS AREA = 1.41 Ac

PERCENT IMPERVIOUS = 84.8%

CATCHMENT B

AREA = 0.97 Ac

PERVIOUS AREA = 0.15 Ac
IMPERVIOUS AREA = 0.82 Ac

PERCENT IMPERVIOUS = 84.7%

GRAPHIC SCALE

20 0 10 20 40 80

(IN FEET)

1 inch = 40 ft. (Horizontal)

CATCHMENT AREA B
TREATED

CATCHMENT AREA A
UNTREATED

PARK & RIDE LOT

PARK AND RIDE

EMPLOYEE / SP LOT

AIRPORT

Dufresne-Henry
South Burlington, Vermont
Tel. (802) 864-0223

Burlington International Airport
Terminal Road and Parking Expansion

SWM#3 Grass Channel
Delineated Basin

South Burlington Vermont

Project No.	6320011
Proj. Mgr.	JBL
Scale:	1"=40'
Date	1/2/03

APPENDIX B

INVENTORY OF DRAINAGE STRUCTURES

Inventory of Drainage Structures

By Catchment Area

Area	Drainage Structure	Sheet number Drainage Structures can be found on
Catchment area #1		
Catchment area #2	DS 3.0, DS 3.1, DS 3.2, DS 3.3, DS 3.4, DS 4.0, DS 4.1, DS 4.2, DS 4.3, DS 4.4, DS 4.5, DS 4.6, DS 4.7, DS E4.0	UP.3, UP.4
Catchment area #3	This area all drains into the grass swale, there are no drainage structures	
Catchment area #4	DS 3.7, DS 3.8, DS 3.9, DS 3.10, DS 3.11, DS 3.12, DS 3.13, DS 3.14, DS 3.15, and drainage from toll booth roof	UP.3
Drainage structures on the west side of the garage	DS 2.2, DS 3.5	UP.2, UP.3
Drainage structures that are part of the stormwater treatment system	DS 5.1, DS 5.2, DS 5.3. DS 5.4, DS 5.5, DS 5.6 DS 5.7	UP.5
Drainage structures that are new to the parking garage project, part of the area of the design, but not connected to the stormwater treatment system	DS 4.7, DS E4.2,	UP.4

APPENDIX C

INSPECTION AND MAINTENACE CHECKLISTS

Stormwater Pond/Wetland Operation, Maintenance and Management Inspection Checklist

Project
Location:
Site Status:
Date:
Time:
Inspector:

Maintenance Item	Satisfactory/ Unsatisfactory	Comments
1. Embankment and emergency spillway (Annual, After Major Storms)		
Vegetation and ground cover adequate		
Embankment erosion		
Animal burrows		
Unauthorized planting		
Cracking, bulging, or sliding of dam		
a. Upstream face		
b. Downstream face		
c. At or beyond toe		
downstream		
upstream		
d. Emergency spillway		
Pond, toe & chimney drains clear and functioning		
Seeps/leaks on downstream face		
Slope protection or riprap failure		
Vertical/horizontal alignment of top of dam "As-Built"		
Emergency spillway clear of obstructions and debris		
Other (specify)		

Maintenance Item	Satisfactory/ Unsatisfactory	Comments
2. Riser and principal spillway (Annual) Type: Reinforced concrete _____ Corrugated pipe _____ Masonry _____		
Low flow orifice obstructed		
Low flow trash rack a. Debris removal necessary		
b. Corrosion control		
Weir trash rack maintenance a. Debris removal necessary		
b. corrosion control		
Excessive sediment accumulation insider riser		
Concrete/masonry condition riser and barrels a. cracks or displacement		
b. Minor spalling (<1")		
c. Major spalling (rebars exposed)		
d. Joint failures		
e. Water tightness		
Metal pipe condition		
Control valve a. Operational/exercised		
b. Chained and locked		
Pond drain valve a. Operational/exercised		
b. Chained and locked		
Outfall channels functioning		
Other (specify)		

Maintenance Item	Satisfactory/ Unsatisfactory	Comments
3. Permanent Pool (Wet Ponds) (Monthly)		
Undesirable vegetative growth		
Floating or floatable debris removal required		
Visible pollution		
Shoreline problem		
Other (specify)		
4. Sediment Forebays		
Sedimentation noted		
Sediment cleanout when depth < 50% design depth		
5. Dry Pond Areas		
Vegetation adequate		
Undesirable vegetative growth		
Undesirable woody vegetation		
Low flow channels clear of obstructions		
Standing water or wet spots		
Sediment and / or trash accumulation		
Other (specify)		
6. Condition of Outfalls (Annual , After Major Storms)		
Riprap failures		
Slope erosion		
Storm drain pipes		
Endwalls / Headwalls		
Other (specify)		

7. Other (Monthly)		
Encroachment on pond, wetland or easement area		
Complaints from residents		
Aesthetics a. Grass growing required		
b. Graffiti removal needed		
c. Other (specify)		
Conditions of maintenance access routes.		
Signs of hydrocarbon build-up		
Any public hazards (specify)		
8. Wetland Vegetation (Annual)		
Vegetation healthy and growing · Wetland maintaining 50% surface area coverage of wetland plants after the second growing season. (If unsatisfactory, reinforcement plantings needed)		
Dominant wetland plants: Survival of desired wetland plant species Distribution according to landscaping plan?		
Evidence of invasive species		
Maintenance of adequate water depths for desired wetland plant species		
Harvesting of emergent plantings needed		
Have sediment accumulations reduced pool volume significantly or are plants "choked" with sediment		
Eutrophication level of the wetland.		
Other (specify)		

Comments:

Actions to be Taken:

MAINTENANCE CHECKLIST

DRAINAGE STRUCTURES

Stormwater System Feature	√	Are any of these conditions present?	Problem	Recommendation
General		Yard wastes or non-degradable materials (glass, plastic, styrofoam, etc.) are blocking the front of the catch basin or grate by 10%	Accumulation of trash and debris	Remove trash and debris from front of catch basin opening or grate. Dispose of waste properly.
		Frame has separated more than ¾" from the top of the structure	Frame separation	Reset frame even with surrounding grade.
		Propane, oil, gasoline odor, offensive color or odor, or sludge is present	Accumulation of petroleum products or unknown or uncharacteristic substances	Contact a qualified hazardous waste consultant for more information.
		Catch basin has settled more than 1" or has moved more than 2" out of alignment	Basin settlement / alignment	Replace or repair catch basin to original design specifications. You may need to contact the design engineer to evaluate the structural integrity of the catch basin.
		Grate bars are broken or grate is missing	Grate is damaged or missing	Replace or repair grate to design specifications
		Catch basin has cracks wider than ½" and longer than 3"; soil is entering catch basin through the cracks	Defective catch basin	Replace or repair catch basin to original design specifications. You may need to contact the design engineer to evaluate the structural integrity of the catch basin.
Inlet/ Outlet pipes		Trash or sediment in the inlet/outlet pipe is blocking more than 1/3 of the diameter of the pipe	Trash or sediment accumulation	Remove trash and sediment from pipes. Dispose of wastes properly.
		Piping has cracks wider than ½" and longer than 1' at the joint; soil is entering the catch basin through the cracks	Cracked pipes	Replace or repair pipe to original design specifications.
		Vegetation is growing in inlet/outlet pipe joints	Overgrown vegetation	Remove vegetation from pipe joints.

MAINTENANCE CHECKLIST

PIPES

Stormwater System Feature	√	Are any of these conditions present?	Problem	Recommendation
General		Accumulated sediment or trash exceeds 20% of the diameter of the pipe	Excess accumulation of sediment or trash	Clean out sediment and trash from pipe. Methods such as a high pressure hose, vacuum suction, or other appropriate cleaning methods can be used. Contact the design engineer for information on appropriate cleaning methods for your type of drainage system.
		Vegetation is impeding water flow	Overgrown vegetation	Clean out sediment and trash from pipe. Methods such as a high pressure hose, vacuum suction, or other appropriate cleaning methods can be used. Contact the design engineer for information on appropriate cleaning methods for your type of drainage system.
		Pipe is rusted ; protective coating is damaged	Corroded pipe	Replace or repair pipe to original design specifications.
		Dent in pipe has reduced the pipe diameter by 20 %; water flow is impeded; pipe is broken	Defective pipe	Replace or repair pipe to original design specifications.
		Water is leaking from pipe	Cracked pipe	Replace or repair pipe to original design specifications.

MAINTENANCE CHECKLIST

SAND FILTER

Stormwater System Feature	√	Are any of these conditions present?	Problem	Recommendation
General		Yard wastes or non-degradable materials (glass, plastic, styrofoam, etc.) are blocking the front of the catch basin or grate by 10%	Accumulation of trash and debris	Remove trash and debris from front of catch basin opening or grate. Dispose of waste properly.
		Offensive color, odor, or sludge is present	Unknown or uncharacteristic substance	Remove substance and eliminate its source. If you don't know if the substance is hazardous, either take a sample or contact a qualified hazardous waste consultant for more information.
		Propane, oil, gasoline odor, offensive color or odor, or surface film is present	Accumulation of petroleum products or unknown or uncharacteristic substances	Contact a qualified hazardous waste consultant for more information.
		Sediment accumulation exceeds 1/2" in depth	Sediment buildup on grass layer (if applicable)	Remove sediment so that no deposits remain on the grass layer of the sand filter. Dispose of sediment properly.
		Concentrated water flow occurs over the sand filter	Clogged or damaged trough	Repair or replace parts as needed.
		Grass is taller than 6"; weeds begin to invade the filter	Overgrown vegetation or nuisance weeds	Mow grass regularly. Seek advice from Vermont Dept. of Agriculture regarding methods of controlling weeds.
		Standing water around sand filter is present	Clogged or damaged pipes	Repair or replace parts as needed.
		Slope has areas where erosion is at least 2" deep and there is potential for further erosion	Soil erosion	Eliminate causes of erosion, if possible. If it isn't possible, use acceptable erosion and sedimentation control practices.
Cable Concrete Mat System		Visible sediment accumulation is present	Excessive sediment	Remove sediment so that no deposits remain on the mat system.
		Vegetation is growing in cable system area	Overgrown vegetation or nuisance weeds	Remove vegetation so that no vegetation is remaining on the mat system.
		Standing water is present	Cable concrete mat system does not have constant pitch	Replace or repair cable concrete mat system to original design specifications.
Pilot Channel		Visible sediment accumulation is present amongst the rip-rap	Excessive sediment	Remove sediment so that no deposits remain in the rip rap.
		Vegetation is growing in rip-rap area	Overgrown vegetation or nuisance weeds	Remove vegetation so that no vegetation is remaining in rip-rap area.
Sand Filter Bed		Standing water is present after 24 hours	Clogged under drain	Clean out underdrains through the cleanouts at each end.
		Grass is taller than 6"; weeds begin to invade the filter	Overgrown vegetation or nuisance weeds	Mow grass regularly. Seek advice from Vermont Dept. of Agriculture regarding methods of controlling weeds.

MAINTENANCE CHECKLIST

SAND FILTER

Underdrain pipe		Pipe is damaged, broken, or cracked	Defective pipe	Repair or replace pipe to the design specifications.
		Sediment accumulation impedes water flow	Excessive sediment	Remove sediment from pipe and dispose of properly. Repair or replace pipe to the design specifications.
Drainage structures		Sediment accumulation exceeds 6" in the sump	Excessive sediment	Remove sediment and dispose of properly.
Trash rack		Visible debris covers the steel grate or entire trash rack is missing	Trash rack is plugged or missing	Replace steel grate, if necessary. Remove trash and debris and dispose of properly.

APPENDIX D

STORMWATER DISCHARGE PERMIT

State of Vermont

Department of Fish and Wildlife
Department of Forests, Parks and Recreation
Department of Environmental Conservation
State Geologist
RELAY SERVICE FOR THE HEARING IMPAIRED
1-800-253-0191 TDD>Voice
1-800-253-0195 Voice>TDD

APR 2 8 2003

DUFRESNE - HENRY
SOUTH BURLINGTON, VT

AGENCY OF NATURAL RESOURCES
Department of Environmental Conservation
WATER QUALITY DIVISION
103 South Main Street
Building 10 North
Waterbury, VT 05671-0408

FAX 802-241-3287
TEL 802-241-3770

April 23, 2003

TRAP

Heather Kendrew
Burlington International Airport
1200 Airport Drive, #1
South Burlington, VT 05403

Re: Discharge Permit #1-1580.0302

Dear Ms. Kendrew:

Enclosed is your copy of Discharge Permit No. 1-1580.0302 which has been signed by the Director of Water Quality Division on behalf of the Commissioner of the Department of Environmental Conservation.

The permit authorizes the discharge of treated and controlled stormwater runoff from expanded parking facilities at the Burlington International Airport to an unnamed tributary to the Winooski River, and groundwater.

Please read this permit carefully and note the inspection, maintenance, and reporting requirements, and other operating conditions including operating fees.

Since we did not receive any public comments during the notice period, the final permit is unchanged from the draft that was placed on public notice.

If you have any questions, please call me at (802) 241-1453.
Sincerely,

Padraic Monks
Environmental Analyst
Stormwater Section

Enclosures

CC John. T. Myers, III P.E., Dufresne-Henry

1-1580

File No. 04-14
Permit No. 1-1580.0302
Project ID No. EJ96-0386

STATE OF VERMONT
AGENCY OF NATURAL RESOURCES
DEPARTMENT OF ENVIRONMENTAL CONSERVATION

DISCHARGE PERMIT

STORMWATER RUNOFF INTO DRAINAGE WELLS
and
STORMWATER RUNOFF TO WATERS OF THE STATE

In compliance with provisions of 10 V.S.A. §1263 and §1264 and in accordance with "Terms and Conditions" hereinafter specified,

Burlington International Airport
1200 Airport Drive, #1
South Burlington, VT 05403

the permittee, is hereby granted permission to discharge stormwater runoff from parking lots, roads, and roofs associated with expanded parking facilities at the Burlington International Airport to an unnamed tributary to the Winooski River, and groundwater.

1. Expiration Date: Five years from issuance date of final permit. Note: This permit, unless revoked, modified or suspended, shall be valid until the designated expiration date not withstanding any intervening change in water quality, effluent, or treatment standards, or classification of the receiving waters including groundwater. However, any such changed standard or classification shall be applied in determining whether or not to renew the permit pursuant to 10 V.S.A. §1263 and §1264.

   The permittee shall reapply for a renewed discharge permit ninety days prior to the expiration date.

2. Revocation: 10 V.S.A. §1267 provides as follows:

   The Secretary may revoke, modify or suspend this permit if it is found that the permittee submitted false or inaccurate information in its application or has violated any requirement, restrictions, or condition of this permit, or if there is any change in any condition that requires either a temporary or permanent reduction or elimination of the permitted discharge. The Secretary shall impose conditions as the Secretary deems necessary for regulating the discharges of a permittee whose permit has been revoked, modified or suspended. Revocation shall be effective upon actual notice thereof to the permittee.

3. Operating Fees: This discharge is subject to operating fees under 3 V.S.A. §2822. The permittee shall submit the operating fees to the Agency in accordance with procedures provided by the Secretary.

4. Transfer of Permit: This permit is not transferable without prior written approval of the Secretary. Provided all applicable fees under 3 V.S.A. §2822 have been paid, a permittee may transfer this permit by submitting a notice of transfer to the Secretary. The notice shall be submitted at least thirty (30) days prior to the proposed date of transfer. The notice shall state that the prospective permittee has adequate funding to comply with this permit. The permittee shall provide a copy of this permit to the new owner or tenant and inform them of the responsibility to make application for a permit which shall be issued in their name. Any failure to do so shall be considered a violation of this permit.

5. Right of Entry: The permittee shall allow the Secretary, or his or her authorized representatives, at reasonable times, upon presentation of credentials, to enter upon and inspect the permitted premises and the stormwater collection, treatment and control system and to sample any discharge to determine compliance with this permit and to have access to and inspect and copy any records required to be kept pursuant to this permit.

6. Receiving Waters: Unnamed tributary to the Winooski River, and groundwater.

7. Manner of Discharge:

S/N 001: Stormwater runoff from impervious surfaces associated with the deck of the new garage, rental car lot, long-term lot, loop road extension, garage exit ramps, and rental lot, via area drains, catch basins, grass swale and closed system to an unnamed tributary to the Winooski River.

S/N 002: Stormwater runoff from impervious surfaces associated with the employee and long-term parking lots (Catchment #2) via catch basins to a closed system to an exfiltrating sand filter to groundwater.

8. Wastes Permitted: Stormwater runoff from S/N 001 and S/N 002 after treatment from a grass swale and sand filter.

9. Volumes Permitted and Frequency of Discharge: Such volumes and frequency as required by the discharge specified in #7 above.

10. Approved Project Design: This project shall be constructed and operated in accordance with the following site plans and details prepared by Dufresne-Henry, Inc.:
Sheets SG.1 through SG.5, dated 10/25/02; Sheets UP.1 through UP.5, dated 10/23/02; SWM.1 through SWM.3, dated 1/2/03.

By reference, the above noted plans are made a part of this permit.

11. [redacted]

a. The basins, swales, and related stormwater collection, treatment and control system shall be maintained in good operating condition at all times and **shall be inspected**

semi-annually and cleaned as necessary to maintain design specifications. The inspections shall include one in the spring after snowmelt, and one in the fall prior to snow fall.

b. Any sediment removed from the swales or basins shall be disposed of properly in accordance with state and federal statutes and regulations.

c. [redacted] to the Department of Environmental Conservation, Water Quality Division, Building 10 North, 103 South Main Street, Waterbury, Vermont 05671-0408. This report shall include, at a minimum:

i. the dates and details of any cleaning and maintenance operations carried out in the preceding year;

ii. a narrative summarizing the results of any inspections conducted in the preceding year and highlighting any stormwater related problems encountered, and all remedial steps taken in response;

d. Should any erosional problems occur, the permittee is required to immediately correct any such problems.

e. Any basins, swales, or related stormwater devices used during construction for erosion control shall be inspected and cleaned to design specifications immediately after construction has been completed.

12. Personnel and Training Requirements: Such personnel and training as necessary to fulfill the requirements of #11 above.

13. Monitoring and Reporting Requirement: No monitoring required; reporting requirement as specified in #11 above.

14. Other Requirements:

a. Treated stormwater runoff is the only waste authorized for disposal under the terms and conditions of this permit. The discharge of any hazardous materials or hazardous waste into the stormwater management system is prohibited.

b. The issuance of this permit does not relieve the permittee from obtaining authorization to discharge stormwater runoff from the construction site pursuant to 40 CFR 122.26, if applicable.

c. **By September 15, 2003, the permittee shall submit to the Water Quality Division of DEC for approval, a plan** which ensures that any use of a chemical deicing agent or agents, including but not limited to any urea and glycol based products, shall not result in any violation of the Vermont Water Quality Standards.

15. Adverse Impact: These discharges shall not cause or contribute to conditions that would have an undue adverse effect on the composition of the aquatic biota, the physical or chemical nature of the substrate, species composition, or the propagation of fishes. If information is obtained during the term of this permit which indicates that the discharges authorized by this permit cause or contribute to violations of the Water Quality Standards, then this permit may be amended to require implementation of additional stormwater treatment and control measures.

16. Dated at Waterbury, VT this 23rd day of April, 2003

Jeffrey Wennberg, Commissioner
Department of Environmental Conservation

By Wallace McLean
Wallace McLean, Director
Water Quality Division

APPENDIX E

COLLECTION SYSTEM DRAWINGS

K:\16320011 (BTV Airport Parking Expansion)\Highway\PlotFiles\PLOT UP 1-5.dwg, UP.2, 6/20/2007 2:49:26 PM, parmata, \\us1286-f01\VT-BRL-HP5000 Trans East

STORM DRAINAGE MATCH LINE THIS SHEET

MATCH LINE UP:3

MATCH LINE UP:1

AIRPORT CIRCLE

BEDEP

GRAPHIC SCALE

20 0 10 20 40 80

(IN FEET)

1 inch = 80 ft.

GAS SYSTEM NOTES:

1. CONTRACTOR SHALL COORDINATE GAS SERVICE TO SITE AND BUILDING WITH VERMONT GAS SYSTEMS, INC.

2. CONTRACTOR SHALL EXCAVATE GAS LINE TRENCH TO A DEPTH OF 36". VERMONT GAS SYSTEMS, INC. WILL SUPPLY AND INSTALL NEW GAS PIPING. CONTRACTOR WILL BACKFILL AND COMPACT TRENCH. ALL COST FOR GAS PIPELINE SERVICE SHALL BE THE RESPONSIBILITY OF THE GENERAL CONTRACTOR.

DRAINAGE STRUCTURE TABLE

DS 2.1 — NEW 4'ID CB
RIM=331.4
S 15" CPEP IN=324.4
W 15" RCP OUT=324.4

DS 2.2 — NEW 4'ID CB
RIM=330.9
E 12" DI IN=325.8
N 15" RCP OUT=325.5

DS 2.3 — NEW 5'ID CB
RIM=331.2
S 30" RCP IN=321.5
E 30" RCP IN=320.7
W 36" RCP IN=320.4
N 36" RCP OUT=320.4

DS 2.4 — NEW 5'ID CB
RIM=329.2
W 36" RCP IN=320.5
E 36" RCP OUT=320.5

DS 2.5 — NEW 5'ID MH
RIM=329.7
W 24" IN=321.6
SW 36" IN=320.7
E 36" OUT=320.7

DS 2.6 — NEW 5'ID CB
RIM=330.8
SW 30" RCP IN=320.9
NE 36" RCP OUT=320.9

DS 2.7 — NEW 5'ID CB
RIM=330.0
E 8" DI IN=324.5
SW 15" RCP IN=323.0
SE 36" RCP IN=321.2
NE 36" RCP OUT=321.2

DS 2.8 — NEW 4'ID CB
RIM=330.0
SW 4" DI IN=325.0
SE 15" RCP IN=323.3
NE 15" RCP OUT=323.2

DS 2.9 — NEW 4'ID CB
RIM=330.1
S 15" RCP IN=323.6
SW 15" RCP IN=323.6
NW 15" RCP OUT=323.5

DS 2.10 — NEW 5'ID CB
RIM=329.6
NE 15" RCP OUT=323.8

DS 2.11 — NEW 4'ID CB
RIM=330.5
N 15" RCP OUT=324.0

DS 2.12 — NEW 5'ID CB
RIM=330.1
SE 30" RCP IN=321.4
NW 36" RCP OUT=321.4

DS 2.13 — NEW 5'ID CB
RIM=331.3
SE 4" DI IN=326.0
SW 15" RCP IN=323.4
SE 30" RCP IN=322.1
NW 30" RCP OUT=322.1

DS 2.14 — NEW 4'ID CB
RIM=331.0
SW 15" RCP IN=323.7
NE 15" RCP OUT=323.6

DS 2.15 — NEW 4'ID CB
RIM=330.8
SE 15" RCP IN=323.9
NE 15" RCP OUT=323.8

DS 2.16 — NEW 4'ID CB
RIM=331.0
NE 15" RCP OUT=324.1

DS 2.17 — NEW 5'ID MH
RIM=332.0
SW 30" EXIST. RCP IN=322.4
SE 15" EXISST. CPEP IN=322.7
NW 30" RCP OUT=322.4

DS 2.18 — NEW 4'ID CB
RIM=330.1
NE EXIST. 18" CPEP OUT=322.0±

DS E2.0 — REUSE EXISTING CB
CORE NEW:
E 15" IN=323.7

SANITARY STRUCTURE TABLE

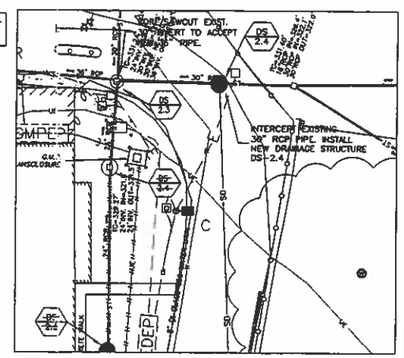
SMH 2.2 — NEW 1,000 GAL OIL/WATER SEPERATOR
RIM=AS SHOWN
E 8" PVC IN=320.6
W 8" PVC OUT=320.35

SMH 2.3 — NEW 4'ID SMH
RIM = 332.0±
E 8" IN=322.4
W 6" OUT=321.7

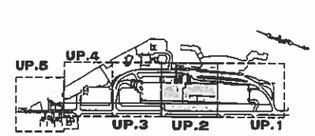
SMH E2.1 — REUSE EXISTING SMH 1
CORE NEW E 8" IN = 318.7
REFORM SHELF AND INVERTS

REFER TO LANDSCAPE DRAWINGS FOR IRRIGATION DETAILS

REFER TO ELECTRICAL DRAWINGS ES1-6 FOR SITE LIGHTING.



STORM DRAINAGE MATCH LINE THIS SHEET



Freeman French Freeman, Inc
61 Maple Street, P.O. Box 306
Burlington Vermont 05402
Ph: (802)864-6641 Fax: (802)860-1615

Dufresne-Henry
South Burlington, Vermont
Tel. (802) 864-9333
Fax (802) 864-0165
www.dufresne-henry.com

TERMINAL ROADWAY AND EXPANSION PROJECT BURLINGTON INTERNATIONAL AIRPORT

SOUTH BURLINGTON VERMONT

A0229.02

10/23/02 — 1"=20'

MAP1 — JTH

ISSUED FOR CONSTRUCTION 2/1/03

UTILITY PLAN

UP.2

K:\6320011 (BTV Airport Parking Expansion)\Highway\PlotFiles\PLOT UP 1-5.dwg, UP.3, 6/20/2007 2:50:34 PM, parmata, \\us1286-f011\VT-BRL-HP5000 Trans East

MATCH LINE UP.4

MATCH LINE UP.2

NEW STORM TO PASS BENEATH EXIST. GAS & OVER EXIST. WATERLINE. PROVIDE INSULATION OVER EXIST. WATERLINE. SEE DETAIL SHEET WL.1

ADJUST GATE VALVE

INSTALL NEW STORM OVER EXIST. WATERLINE. PROVIDE TRENCH INSULATION OVER WATERLINE. SEE DETAIL SHEET WL.1

NEW SANITARY SEWER LINE SEE SHEET SS.1 FOR PROFILES

NEW SMH 3.3 CONSTRUCT AS "DOG HOUSE" STYLE. PROVIDE CAST-IN-PLACE BASE. ESTABLISH NEW SHELF AND INVERTS WITH NEW FLOW PATH.

PIPING FROM ROOF DRAINS SHALL BE MIN. SLOPE OF 1/4"/FT

ALL COSTS FOR NEW 1" U.G. GAS PIPING FROM THE GARAGE TO THE TOLL BOOTH STRUCTURES SHALL BE THE RESPONSIBILITY OF THE GENERAL CONTRACTOR. CONTRACTOR SHALL COORDINATE INSTALLATION WITH VERMONT GAS SYSTEMS, INC.

PROPOSED PARKING GARAGE EXPANSION

NEW 8"DI 90° ELBOW INV.=326.9 CONNECT 8"DI VERTICALLY INTO TRENCH DRAIN OUTLET

HYDRANT TO BE RELOCATED

EXTEND 12" STORM SERVICE TO GARAGE. REFER TO MECH. DRAWINGS FOR CONTINUATION

CAP EXISTING SANITARY AT LIMITS OF EXCAVATION

PLUG EXIST. 12" RCP STORM

REFER TO ELECTRICAL DRAWINGS FOR POWER AND FIBER OPTIC REMOVAL/RELOCATION

INSTALL RELOCATED HYDRANT AND ASSEMBLY. PROVIDE NEW GATE VALVE

EMPLOYEE SURFACE LOT

EXISTING 66' R.O.W.

FUTURE 80' R.O.W.

AIRPORT DRIVE

MATCH LINE UP.4

MATCH LINE UP.2

GAS SYSTEM NOTES:

1. CONTRACTOR SHALL COORDINATE GAS SERVICE TO SITE AND BUILDING WITH VERMONT GAS SYSTEMS, INC.

2. CONTRACTOR SHALL EXCAVATE GAS LINE TRENCH TO A DEPTH OF 36". VERMONT GAS SYSTEMS, INC. WILL SUPPLY AND INSTALL NEW GAS PIPING. CONTRACTOR WILL BACKFILL AND COMPACT TRENCH. ALL COST FOR GAS PIPELINE SERVICE SHALL BE THE RESPONSIBILITY OF THE GENERAL CONTRACTOR.

DRAINAGE STRUCTURE TABLE

DS 3.0 — NEW 5'ID MH
RIM=328.7
S 24" RCP IN=322.7
W 15" RCP IN=322.9
N 30" RCP OUT=322.6

DS 3.1 — NEW 4'ID CB
RIM=328.3
S 15" RCP IN=323.3
E 15" RCP OUT=323.2

DS 3.2 — NEW 4'ID CB
RIM=328.3
S 15" RCP IN=323.6
N 15" RCP OUT=323.5

DS 3.3 — NEW 4'ID CB
RIM=329.0
N 15" RCP OUT=323.8

DS 3.4 — NEW 4'ID MH
RIM=330.1
S 24" RCP IN=323.7
N 24" RCP OUT=323.6

DS 3.5 — NEW 4'ID MH
RIM=331.3
S 15" RCP IN=325.0
E 12" DI IN=325.0
N 24" RCP OUT=324.9

DS 3.7 — NEW 4'ID MH
RIM=329.3
E 15" RCP IN=324.3
S 18" RCP IN=321.8
N 18" RCP OUT=321.8

DS 3.8 — NEW 4'ID CB
RIM=327.7
W 15" RCP OUT=325.0

DS 3.9 — NEW 4'ID CB
RIM=328.6
S 15" RCP IN=322.6
W 15" RCP IN=324.2
E 15" RCP IN=324.2
N 18" RCP OUT=322.5

DS 3.10 — NEW 4'ID CB
RIM=328.6
W 15" RCP OUT=325.0

DS 3.11 — NEW 4'ID CB
RIM=329.4
S 8" PVC IN=326.0
W 15" RCP IN=324.9
E 15" RCP OUT=324.8

DS 3.12 — NEW 4'ID CB
RIM=329.4
S 8" DI IN=325.9
E 15" RCP OUT=325.3

DS 3.13 — NEW 62' TRENCH DRAIN. CENTER BOTTOM DISCHARGE
RIM=329.8
N 8" PVC OUT=327.0

DS 3.14 — NEW 4'ID CB
RIM=328.8
E 15" RCP IN=323.0
N 15" RCP OUT=323.0

DS 3.15 — NEW 4'ID CB
RIM=328.8
INTERCEPT EXIST SD.
E 12"RCP IN=323.7
NEW:
W 15"RCP OUT=323.0

SANITARY STRUCTURE TABLE

SMH 3.1 — 4'ID SAN. MH
RIM=329.9
SE 8" PVC IN=319.7
NW 8" PVC OUT=319.6

SMH 3.2 — 4'ID SAN. MH
RIM=329.4
S 8" PVC IN=322.0
NW 8" PVC OUT=321.9

SMH 3.3 — 4'ID SAN. MH
RIM=330.9
E 8" IN=323.95±
N 8" PVC OUT=323.8

REFER TO ELECTRICAL DRAWINGS ES1-6 FOR SITE LIGHTING.

REFER TO LANDSCAPE DRAWINGS FOR IRRIGATION DETAILS

GRAPHIC SCALE
20 0 10 20 40 80
(IN FEET)
1 inch = 20 ft.

UP.5 UP.4 UP.3 UP.2 UP.1

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TERMINAL ROADWAY AND EXPANSION PROJECT BURLINGTON INTERNATIONAL AIRPORT

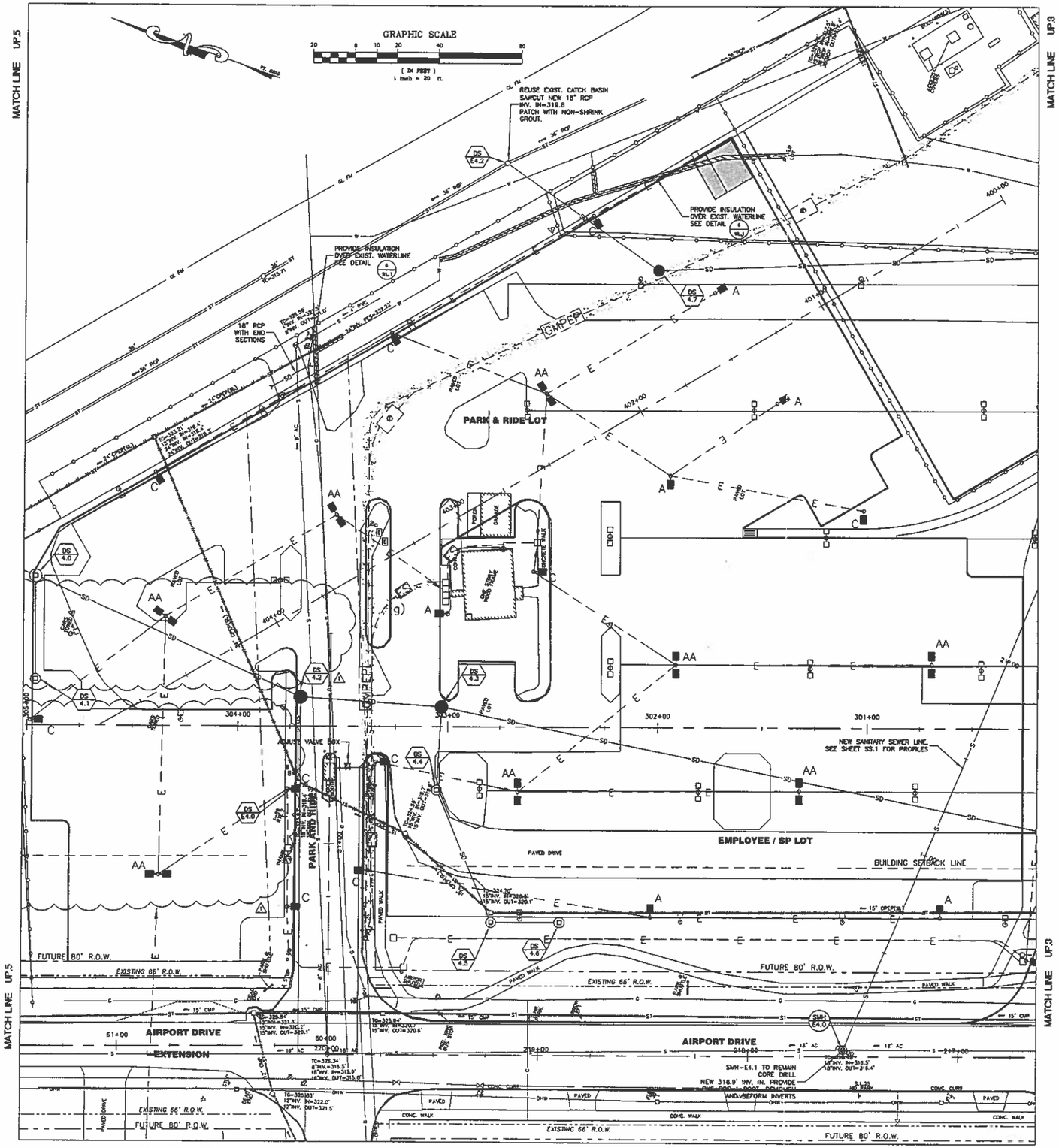
SOUTH BURLINGTON VERMONT

FF PROJECT NO. A0229.02
ORIGINATION DATE 10/23/02
SCALE 1"=20'
DRAWN BY MAM
CHECKED BY JTH
ISSUED FOR CONSTRUCTION 2/1/03

SHEET CONTENTS: UTILITY PLAN

SHEET NO. UP.3

K:\63200011 (BTV Airport Parking Expansion)\Highway\PlotFiles\PLOT UP 1-5.dwg, UP.4, 6/20/2007 2:50:49 PM, parmata, \\us1286-f01\VT-BRL-HP5000 Trans East



GAS SYSTEM NOTES:

1. CONTRACTOR SHALL COORDINATE GAS SERVICE TO SITE AND BUILDING WITH VERMONT GAS SYSTEMS, INC.

2. CONTRACTOR SHALL EXCAVATE GAS LINE TRENCH TO A DEPTH OF 36". VERMONT GAS SYSTEMS, INC. WILL SUPPLY AND INSTALL NEW GAS PIPING. CONTRACTOR WILL BACKFILL AND COMPACT TRENCH. ALL COST FOR GAS PIPELINE SERVICE SHALL BE THE RESPONSIBILITY OF THE GENERAL CONTRACTOR.

DRAINAGE STRUCTURE TABLE

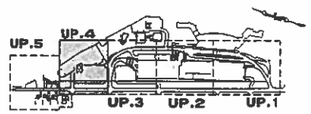
DS 4.0 — NEW 5'ID CB RIM=323.7 S 30" RCP IN=319.7 W 18" RCP IN=320.2 N 30" RCP OUT=319.7	DS E4.0 — REUSE EXIST. CB RESET FAeG RIM=323.9 CONSTRUCT: NEW 15" RCP OUT=320.5 BRICK IN: SW 15" IN NE 18" OUT
DS 4.1 — NEW 4'ID CB RIM=323.8 E 15" RCP OUT=320.8	
DS 4.2 — NEW 5'ID MH RIM=324.8 S 30" RCP IN=320.3 W 15" RCP IN=320.3 N 30" RCP OUT=320.3	DS E4.2 — REUSE EXIST. CB RESET FAeG RIM=328± SAWCUT: NEW S 18" RCP INV. IN=319.8
DS 4.3 — NEW 5'ID MH RIM=325.0 S 30" RCP IN=320.6 W W 15" RCP IN=320.6 N 30" RCP OUT=320.6	
DS 4.4 — NEW 4'ID CB RIM=324.8 W 15" RCP IN=320.7 E 15" RCP OUT=320.7	
DS 4.5 — NEW 4'ID CB RIM=324.8 S 15" RCP IN=321.1 E 15" RCP OUT=321.1	
DS 4.6 — NEW 4'ID CB RIM=324.8 N 15"RCP OUT=321.2	
DS 4.7 — NEW 4'ID MH RIM=326.1 S 18" RCP IN=320.7 N 18" RCP OUT=320.5	

SANITARY STRUCTURE TABLE

SMH E4.0 — REUSE EXIST. SAN. MH STA. 0+00 RIM=328.06 CORE NEW: E 8" PVC IN=316.9 REUSE EXIST: S 18" AC IN=316.5 N 18" AC OUT=316.4

REFER TO LANDSCAPE DRAWINGS FOR IRRIGATION DETAILS

REFER TO ELECTRICAL DRAWINGS ES1-6 FOR SITE LIGHTING.



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TERMINAL ROADWAY AND EXPANSION PROJECT
BURLINGTON INTERNATIONAL AIRPORT
SOUTH BURLINGTON VERMONT

FF PROJECT NO.	A0229.02
CONSTRUCTION DATE	SCALE 1"=20'
10/23/02	
DRAWN BY MAM	CHECKED BY JTM
ISSUE FOR ISSUED FOR CONSTRUCTION	2/1/03

SHEET CONTENT: UTILITY PLAN

SHEET NO. UP.4

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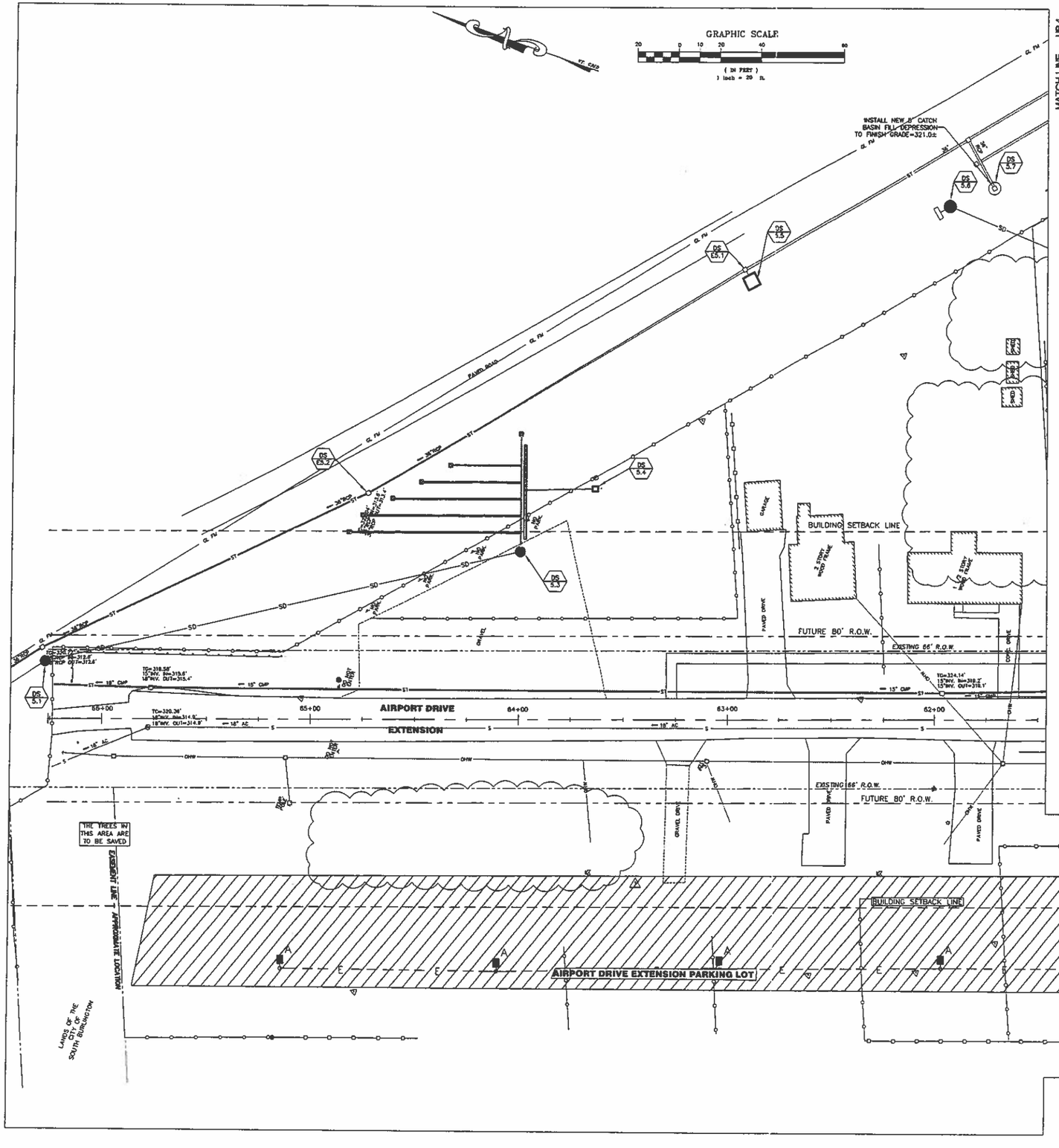


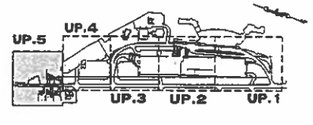
GAS SYSTEM NOTES:

1. CONTRACTOR SHALL COORDINATE GAS SERVICE TO SITE AND BUILDING WITH VERMONT GAS SYSTEMS, INC.

2. CONTRACTOR SHALL EXCAVATE GAS LINE TRENCH TO A DEPTH OF 36". VERMONT GAS SYSTEMS, INC. WILL SUPPLY AND INSTALL NEW GAS PIPING. CONTRACTOR WILL BACKFILL AND COMPACT TRENCH. ALL COST FOR GAS PIPELINE SERVICE SHALL BE THE RESPONSIBILITY OF THE GENERAL CONTRACTOR.

DRAINAGE STRUCTURE TABLE

DS 5.0	NEW 4'ID MH RIM=321.8 E 10"PVC IN=310.9 W 10" PVC OUT=310.9
DS 5.1	NEW 4'ID MH RIM=321.4 E 10" PVC IN=311.8 W 10" PVC OUT=311.8
DS 5.2	NEW 4'ID MH RIM=322.8 SE 10" DI IN=312.5 W 10" PVC OUT=312.5
DS 5.3	NEW 4'ID MH RIM=317.0 NE 8" PVC IN=313.0 NW 10" DI OUT=312.7
DS 5.4	NEW 3'x3' OUTLET STRUCTURE REFER TO DETAIL ON SWM.4
DS 5.5	NEW 7'x7' OUTLET STRUCTURE REFER TO DETAIL ON SWM.4
DS 5.6	NEW 5' ID MH RIM=324.0 30" RCP IN=319.8 30" RCP OUT=319.6
DS 5.7	NEW 5' ID CB RIM=321.0 INV. OUT=CONNECT TO EXISTING 36" RCP VERIFY IN FIELD
DS E5.0	REUSE EXIST. CB RIM=321.1 SAWCUT/CORE: NEW 10" PVC IN=310.9
DS E5.1	REUSE EXIST. CB RIM=322.5 SAWCUT/CORE: NEW S 24" RCP IN=317.0
DS E5.2	REUSE EXIST. CB RESET F&G RIM=321.0



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TERMINAL ROADWAY AND EXPANSION PROJECT
BURLINGTON INTERNATIONAL AIRPORT
SOUTH BURLINGTON VERMONT

PROJECT NO.	A0229.02
DESIGNATION DATE	SCALE
10/23/02	1"=20'
DRAWN BY	CHECKED BY
MAH	JTH
ISSUED FOR CONSTRUCTION	2/1/08

SHEET CONTENT: UTILITY PLAN

SHEET NO. UP.5

APPENDIX F

TREATMENT SYSTEM
DRAWINGS

K:\16320011 (BTV Airport Parking Expansion)\Highway\PlotFiles\SWM 1-4.dwg, SWM.1, 6/20/2007 2:53:34 PM, parmala, \\us1286-f01\VT-BRL-HP5000 Trans East

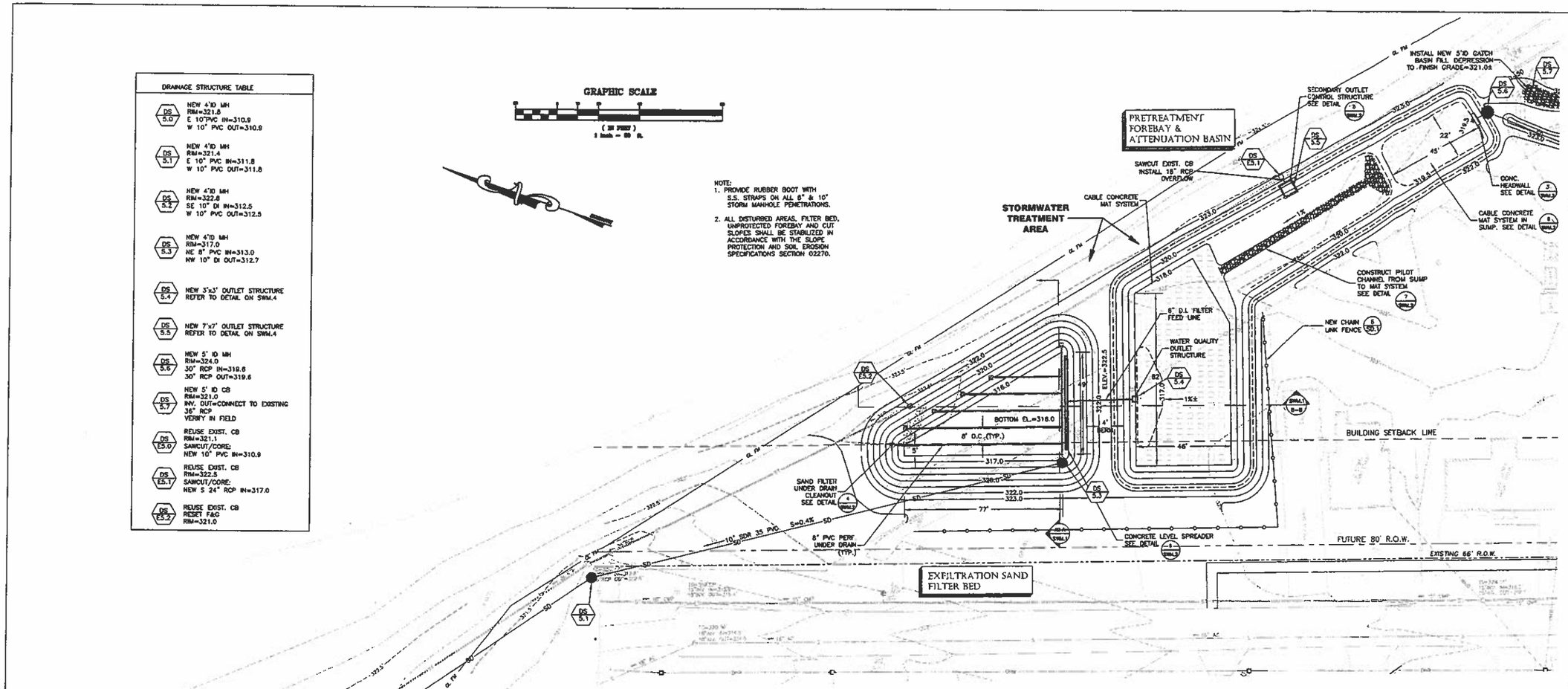
DRAINAGE STRUCTURE TABLE

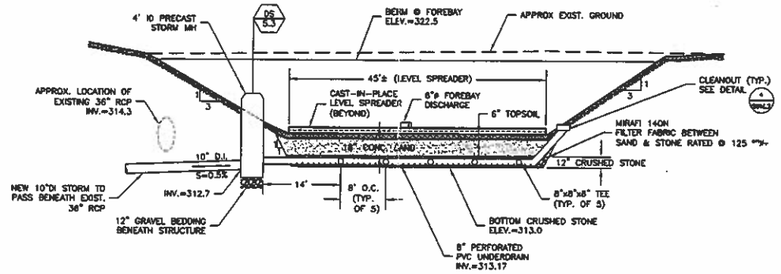
DS 5.0	NEW 4'ID MH RIM=321.5 E 10"PVC IN=310.9 W 10" PVC OUT=310.9
DS 5.1	NEW 4'ID MH RIM=321.4 E 10" PVC IN=311.8 W 10" PVC OUT=311.8
DS 5.2	NEW 4'ID MH RIM=322.8 SE 10" DI IN=312.5 W 10" PVC OUT=312.5
DS 5.3	NEW 4'ID MH RIM=317.0 NE 8" PVC IN=313.0 NW 10" DI OUT=312.7
DS 5.4	NEW 3'x3' OUTLET STRUCTURE REFER TO DETAIL ON SWM.4
DS 5.5	NEW 7'x7' OUTLET STRUCTURE REFER TO DETAIL ON SWM.4
DS 5.6	NEW 5' ID MH RIM=324.0 30" RCP IN=319.8 30" RCP OUT=319.6
DS 5.7	NEW 5' ID CB RIM=321.0 INV. OUT=CONNECT TO EXISTING 36" RCP VERIFY IN FIELD
DS E5.0	REUSE EXIST. CB RIM=321.1 SAWCUT/CORE: NEW 10" PVC IN=310.9
DS E5.1	REUSE EXIST. CB RIM=322.5 SAWCUT/CORE: NEW S 24" RCP IN=317.0
DS E5.2	REUSE EXIST. CB RESET F&G RIM=321.0

GRAPHIC SCALE

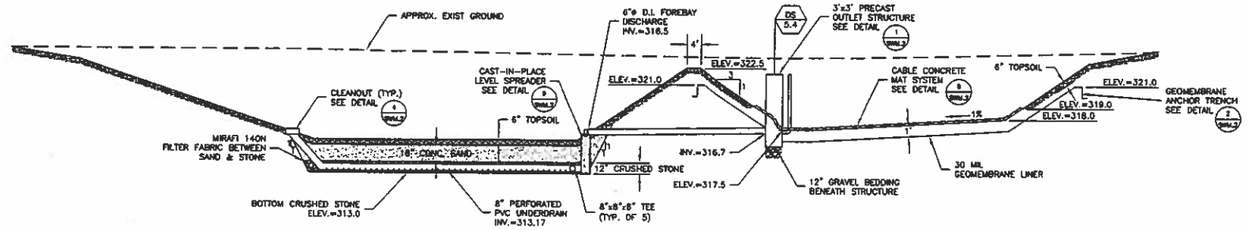
(IN FEET)
1 inch = 60 ft.

NOTE:
1. PROVIDE RUBBER BOOT WITH S.S. STRAPS ON ALL 8" & 10" STORM MANHOLE PENETRATIONS.
2. ALL DISTURBED AREAS, FILTER BED, UNPROTECTED FOREBAY AND CUT SLOPES SHALL BE STABILIZED IN ACCORDANCE WITH THE SLOPE PROTECTION AND SOIL EROSION SPECIFICATIONS SECTION 02270.





SECTION EXFILTRATION SAND FILTER A-A SWM.1
HORIZONTAL SCALE: 1"=10'
VERTICAL SCALE: 1"=5'



SECTION EXFILTRATION SAND FILTER B-B SWM.1
HORIZONTAL SCALE: 1"=10'
VERTICAL SCALE: 1"=5'

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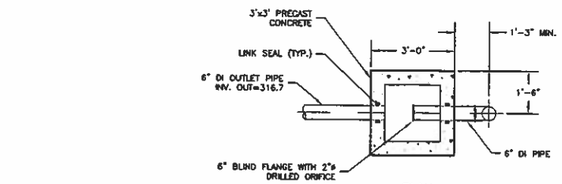
TERMINAL ROADWAY AND EXPANSION PROJECT BURLINGTON INTERNATIONAL AIRPORT

SOUTH BURLINGTON VERMONT

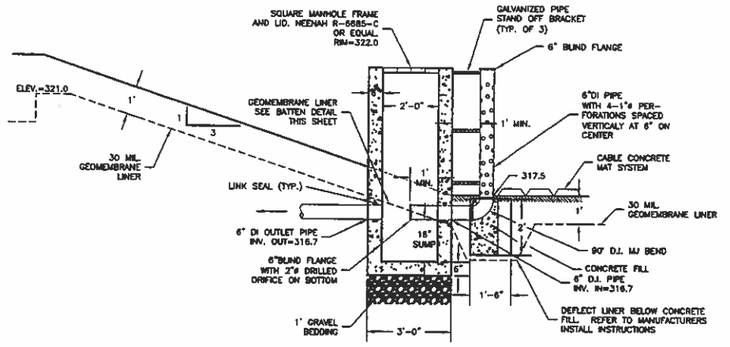
FFF PROJECT NO.	A0229.02
CONSTRUCTION DATE	SCALE: AS NOTED
1/2/08	
DRAWN BY: BJR	CHECKED BY: JTM
ISSUED FOR CONSTRUCTION	2/1/08

SHEET CONTENT: Stormwater Management

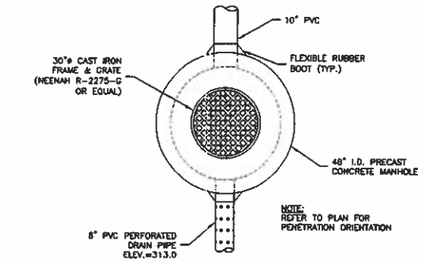
SHEET NO. SWM.1



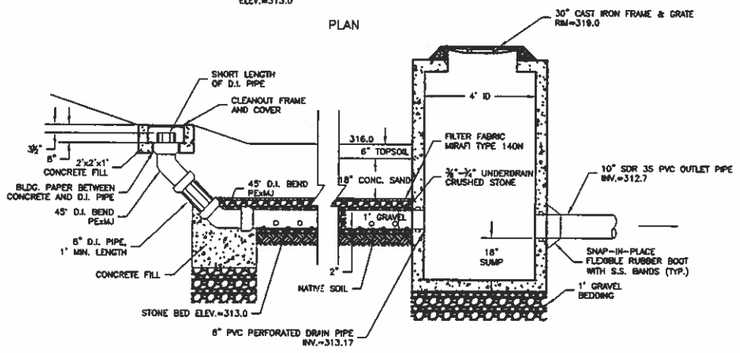
PLAN



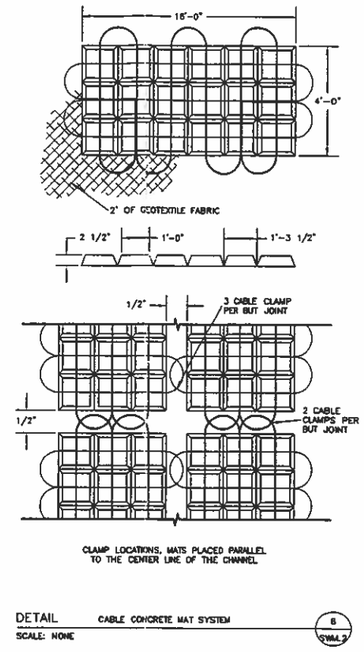
DETAIL SAND FILTER FOREBAY OUTLET STRUCTURE — SCALE: 1"=2' — 1 SWM.2



PLAN

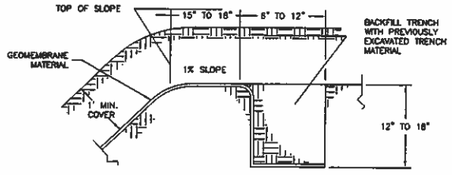


DETAIL SAND FILTER OUTLET SYSTEM — SCALE: 1"=2' — 4 SWM.2

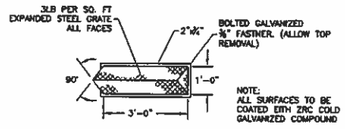


CLAMP LOCATIONS, MATS PLACED PARALLEL TO THE CENTER LINE OF THE CHANNEL

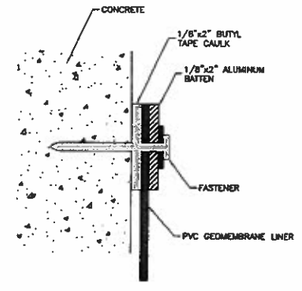
DETAIL CABLE CONCRETE MAT SYSTEM — SCALE: NONE — 8 SWM.2



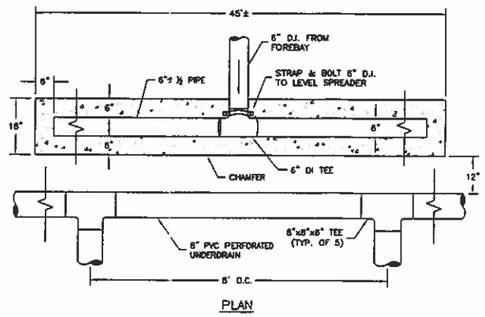
DETAIL ANCHOR TRENCH — SCALE: NONE — 2 SWM.2



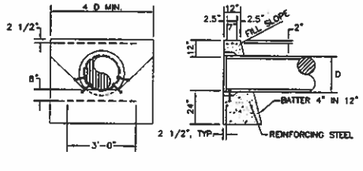
CHANNEL PROTECTION OUTLET TRASH RACK DETAIL



DETAIL GEOMEMBRANE BATTEN — SCALE: NONE — 6 SWM.2

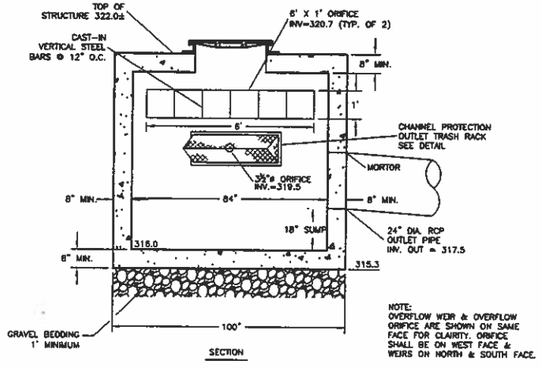


PLAN



NOTES:
1. ALL REINFORCING STEEL TO BE 5/8" DIAMETER DEFORMED BARS.
2. BELL AND SPIGOT PIPE TO BE LAID WITH THE BELL UPSTREAM.
3. CLASS B CONCRETE OR EQUAL.

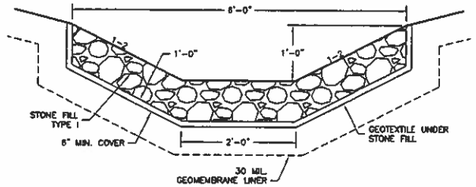
DETAIL REINFORCED CONCRETE HEADWALL — SCALE: NONE — 3 SWM.2



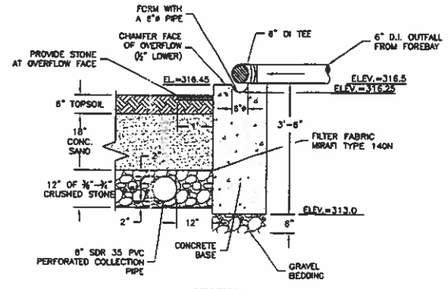
SECTION

NOTE: OVERFLOW WEIR & OVERFLOW ORIFICE ARE SHOWN ON SAME FACE FOR CLARITY. ORIFICE SHALL BE ON WEST FACE & WEIRS ON NORTH & SOUTH FACE.

DETAIL PRETREATMENT BYPASS STRUCTURE — SCALE: 1"=2'-0" — 5 SWM.2



DETAIL STONE LINED PILOT CHANNEL — SCALE: NONE — 7 SWM.2



SECTION

DETAIL SAND FILTER – LEVEL SPREADER — SCALE: N.T.S. — 9 SWM.2

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TERMINAL ROADWAY AND EXPANSION PROJECT
BURLINGTON INTERNATIONAL AIRPORT
SOUTH BURLINGTON VERMONT

AIP PROJECT NO.	A0229.02
ORIGINATION DATE	SCALE
1/2/03	AS NOTED
DRAWN BY	CHECKED BY
BFR	JTH
REVISION	
ISSUED FOR CONSTRUCTION	2/7/03

SHEET CONTENTS: Stormwater Managment

SHEET NO. SWM.2

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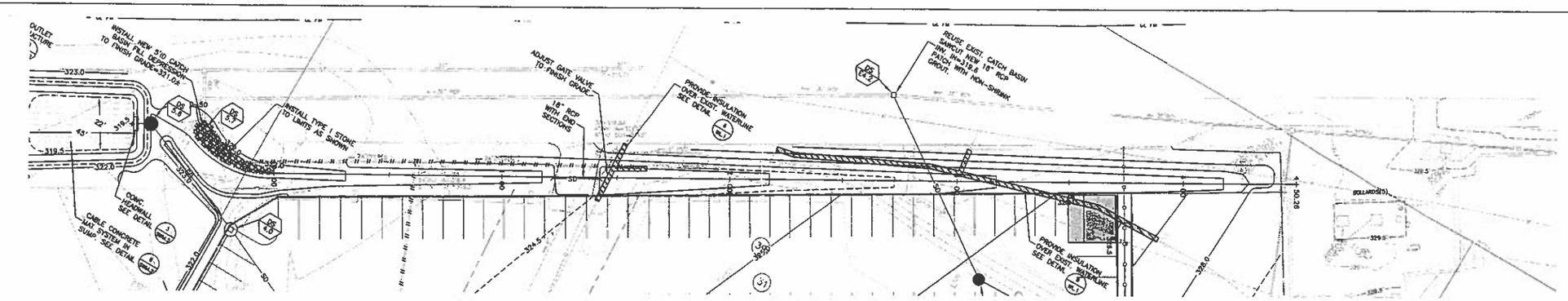
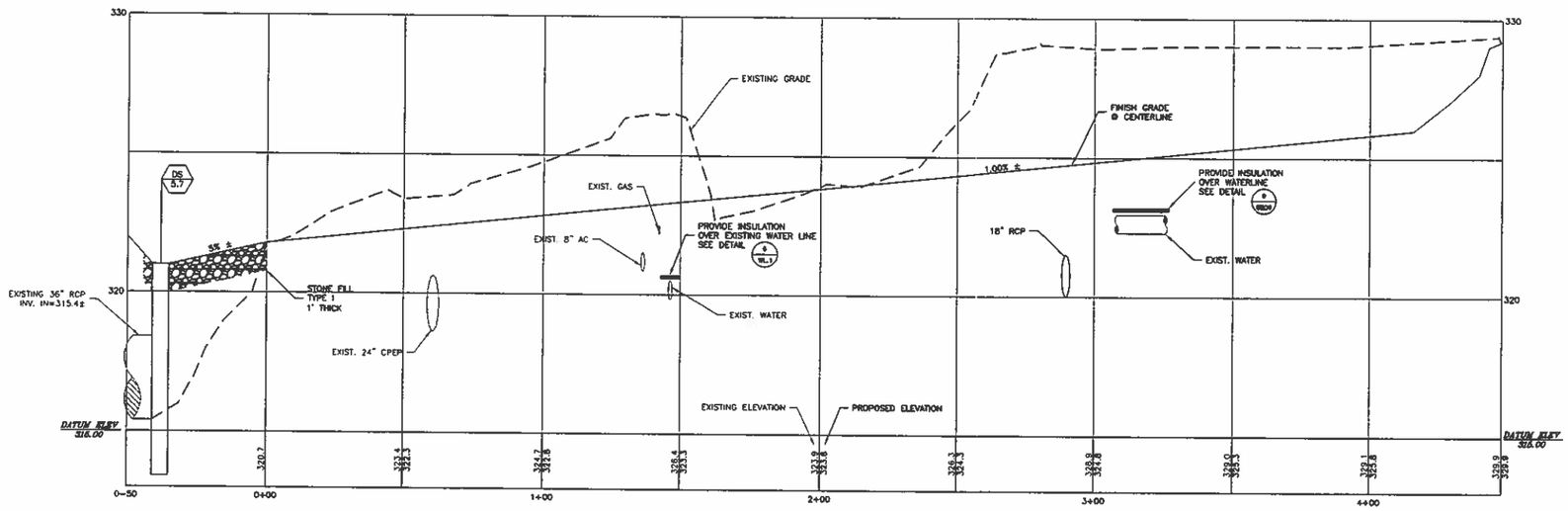


PLAN GRASS CHANNEL (1 / SWM.3)
SCALE: 1"=20'

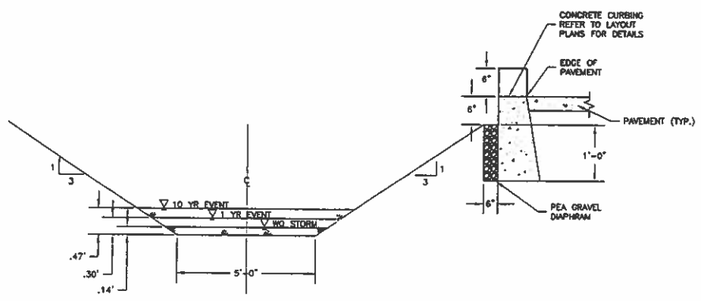


PROFILE GRASS CHANNEL (2 / SWM.3)
HORIZONTAL SCALE: 1"=20'
VERTICAL SCALE: 1"=2'

GRAPHIC SCALE
(IN FEET)
1 inch = 20 ft.

DRAINAGE STRUCTURE TABLE

DS 5.7	NEW 5' ID CB RIM=321.0 INV. OUT=CONNECT TO EXISTING 36" RCP VERIFY IN FIELD



SECTION GRASS CHANNEL (TYP.) (3 / SWM.3)
HORIZONTAL SCALE: 1"=2'-0"
VERTICAL SCALE: 1"=1'-0"

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TERMINAL ROADWAY AND EXPANSION PROJECT
BURLINGTON INTERNATIONAL AIRPORT
SOUTH BURLINGTON VERMONT

FR PROJECT NO: A0229.02
DRAWING/ISSUE DATE: 1/2/08
SCALE: AS NOTED
DRAWN: BFR
CHECKED: JTM
ISSUED FOR CONSTRUCTION 2/7/08

SHEET CONTENT: Stormwater Management

SHEET NO: SWM.3

K:\63200011 (BTV Airport Parking Expansion)\Highway\PlotFiles\SWM 1-4.dwg, SWM.3, 6/20/2007 2:55:05 PM, parmala, \\us1286-f01\VT-BRL-HP5000 Trans East

APPENDIX G

STORMWATER
COLLECTION AREA MAP

K:\6320011 (BT Parking Expansion)\Documents\Reports-Permits\storm_watch Sheds.dwg, Layout1, 6/24/2003 10:03:41 AM, Jason Eastman

CATCHMENT #1

AREA = 2.3 Ac

PERVIOUS AREA = 0 Ac
IMPERVIOUS AREA = 2.3 Ac

PERCENT IMPERVIOUS = 100%

CATCHMENT #2

AREA = 3.57 Ac

PERVIOUS AREA = 0.63 Ac
IMPERVIOUS AREA = 2.94 Ac

PERCENT IMPERVIOUS = 82.4%

CATCHMENT #3

AREA = 1.66 Ac

PERVIOUS AREA = 0.25 Ac
IMPERVIOUS AREA = 1.41 Ac

PERCENT IMPERVIOUS = 84.8%

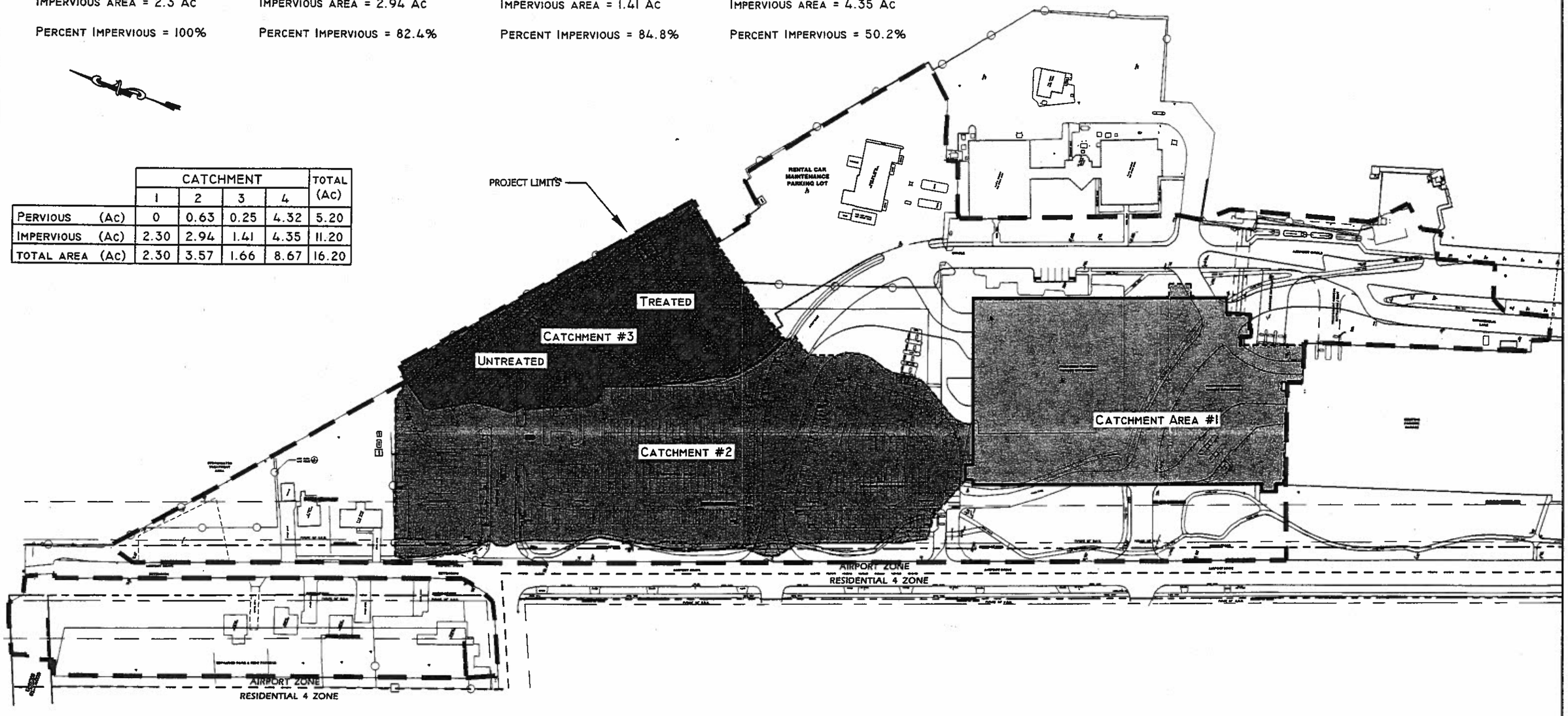
CATCHMENT #4

AREA = 8.67 Ac

PERVIOUS AREA = 4.32 Ac
IMPERVIOUS AREA = 4.35 Ac

PERCENT IMPERVIOUS = 50.2%

	CATCHMENT				TOTAL (Ac)
	1	2	3	4	
PERVIOUS (Ac)	0	0.63	0.25	4.32	5.20
IMPERVIOUS (Ac)	2.30	2.94	1.41	4.35	11.20
TOTAL AREA (Ac)	2.30	3.57	1.66	8.67	16.20



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Burlington International Airport
Terminal Road and Parking Project

Sub-Watersheds

South Burlington Vermont

Project No.	6320011
Proj. Mgr.	JBL
Scale:	NONE
Date	1/7/03
	B