INSPECTION & MAINTENANCE PLAN:

Stormwater, Sanitary Sewer, Water, and Irrigation Systems

University at Albany (Uptown Campus)

SUCF Project No. 01834

Prepared for:

The State University Construction Fund and the University at Albany

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COMMITMENT & INTEGRITY DRIVE RESULTS

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PURPOSE

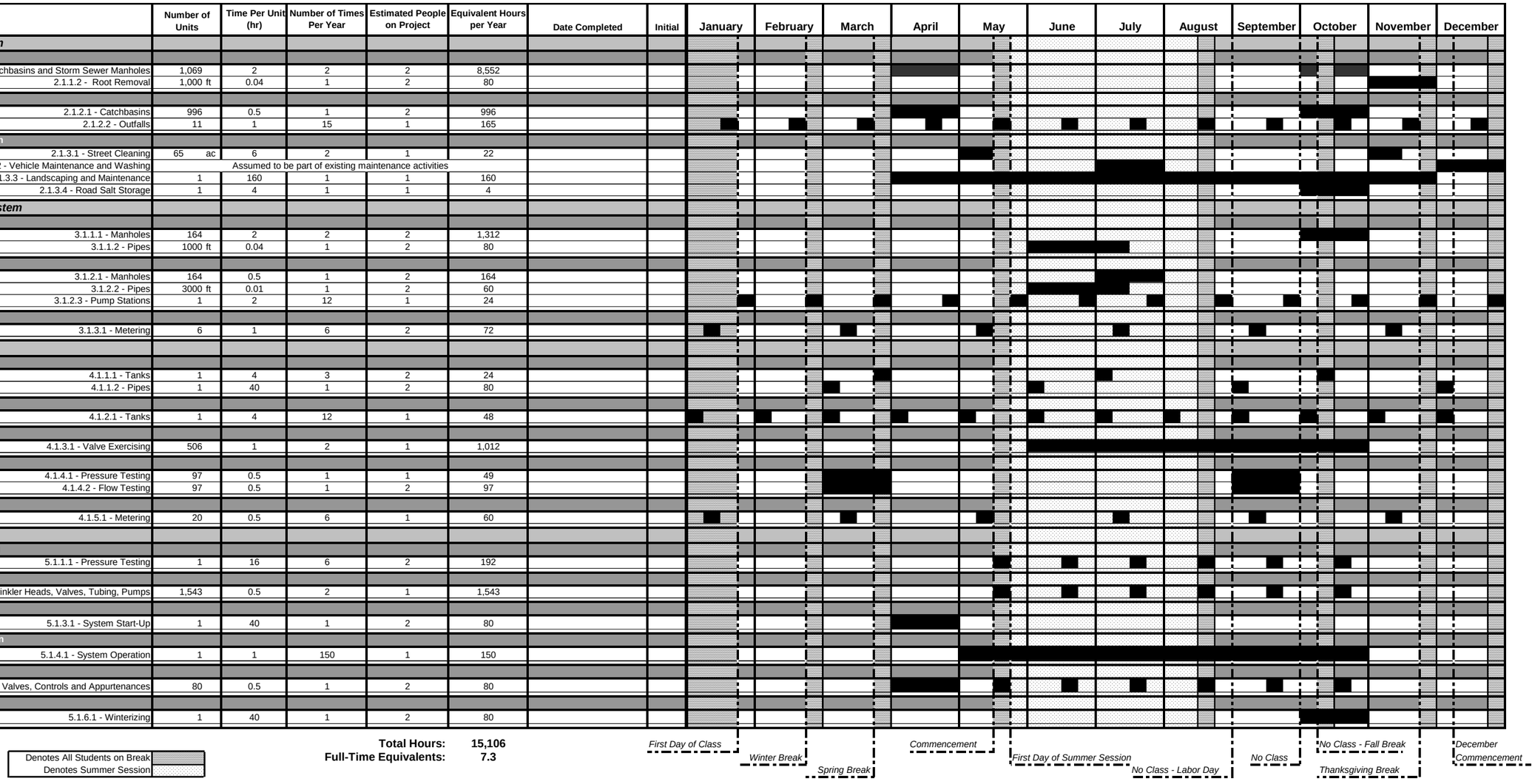
This document details the inspection and maintenance tasks which should be completed in order to efficiently maintain and repair storm sewer, sanitary sewer, water, and irrigation infrastructure. Tasks have been separated into periodic and long-term tasks. Periodic tasks are tasks which should occur annually (such as catch basin cleaning and hydrant flushing). Long-term tasks are tasks which will take more than a year to develop and implement (such as developing and implementing a training program and developing and updating the sustainability program).

Calendars have been included which detail when each task should be completed. The periodic calendar includes an estimate of the time required to complete each of the periodic tasks, as well as a space to indicate when a task has been completed. The long-term calendar has spaces to keep track of the status of each task for the first five years.

1. MASTER CALENDARS

1.1 PERIODIC INSPECTION AND MAINTENANCE TASKS

Tasks	Number of Units	Time Per Unit (hr)	Number of Times Per Year	Estimated People on Project	Equivalent Hours per Year	Date Completed	Initial
Stormwater System							
2.1.1 - Cleaning							
2.1.1.1 - Catchbasins and Storm Sewer Manholes	1,069	2	2	2	8,552		
2.1.1.2 - Root Removal	1,000 ft	0.04	1	2	80		
2.1.2 - Inspection							
2.1.2.1 - Catchbasins	996	0.5	1	2	996		
2.1.2.2 - Outfalls	11	1	15	1	165		
2.1.3 - Source Mitigation							
2.1.3.1 - Street Cleaning	65 ac	6	2	1	22		
2.1.3.2 - Vehicle Maintenance and Washing	Assumed to be part of existing maintenance activities						
2.1.3.3 - Landscaping and Maintenance	1	160	1	1	160		
2.1.3.4 - Road Salt Storage	1	4	1	1	4		
Sanitary Sewer System							
3.1.1 - Cleaning							
3.1.1.1 - Manholes	164	2	2	2	1,312		
3.1.1.2 - Pipes	1000 ft	0.04	1	2	80		
3.1.2 - Inspection							
3.1.2.1 - Manholes	164	0.5	1	2	164		
3.1.2.2 - Pipes	3000 ft	0.01	1	2	60		
3.1.2.3 - Pump Stations	1	2	12	1	24		
3.1.3 - Metering							
3.1.3.1 - Metering	6	1	6	2	72		
Water System							
4.1.1 - Cleaning							
4.1.1.1 - Tanks	1	4	3	2	24		
4.1.1.2 - Pipes	1	40	1	2	80		
4.1.2 - Inspection							
4.1.2.1 - Tanks	1	4	12	1	48		
4.1.3 - Maintenance							
4.1.3.1 - Valve Exercising	506	1	2	1	1,012		
4.1.4 - Hydrant Testing							
4.1.4.1 - Pressure Testing	97	0.5	1	1	49		
4.1.4.2 - Flow Testing	97	0.5	1	2	97		
4.1.5 - Metering							
4.1.5.1 - Metering	20	0.5	6	1	60		
Irrigation System							
5.1.1 - Pressure Testing							
5.1.1.1 - Pressure Testing	1	16	6	2	192		
5.1.2 - Inspection							
5.1.2.1 - Sprinkler Heads, Valves, Tubing, Pumps	1,543	0.5	2	1	1,543		
5.1.3 - System Start-Up							
5.1.3.1 - System Start-Up	1	40	1	2	80		
5.1.4 - System Operation							
5.1.4.1 - System Operation	1	1	150	1	150		
5.1.5 - System Repair							
5.1.5.1 - Valves, Controls and Appurtenances	80	0.5	1	2	80		
5.1.6 - Winterizing							
5.1.6.1 - Winterizing	1	40	1	2	80		



Denotes All Students on Break
Denotes Summer Session

Total Hours: **15,106**
Full-Time Equivalents: **7.3**

1.2 LONG-TERM MAINTENANCE TASKS

1.2.1 Stormwater System

Stormwater System Long Term Inspection and Maintenance Tasks

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Tasks	Year 1		Year 2		Year 3		Year 4		Year 5	
Stormwater System	2008		2009		2010		2011		2012	
Source Mitigation	**Action Item**	**Status**	**Action Item**	**Status**	**Action Item**	**Status**	**Action Item**	**Status**	**Action Item**	**Status**
Assessment of Current Conditions	Continue to assess conditions.									
Hazardous and Waste Materials Management Plan	Continue development and implementation of plan.		Finish implementation of plan.		Maintain program.		Maintain program.		Maintain program.	
Illegal Inflow Elimination Public Education Plan	Continue development and implementation of plan.		Finish implementation of plan.		Maintain program.		Maintain program.		Maintain program.	
Integrated Pest Management Plan	Develop plan.		Finish implementation of plan.		Maintain program.		Maintain program.		Maintain program.	
Landscaping and Maintenance Staff Outreach Plan	Continue development and implementation of plan.		Finish implementation of plan.		Maintain program.		Maintain program.		Maintain program.	
Catch Basin Rehabilitation/Accessibility	**Action Item**	**Status**	**Action Item**	**Status**	**Action Item**	**Status**	**Action Item**	**Status**	**Action Item**	**Status**
Prioritizing Issues	Develop a list of prioritized issues.		Maintain the list.		Maintain the list.		Maintain the list.		Maintain the list.	
Creating a Budget	Develop a budget.		Maintain the budget.		Maintain the budget.		Maintain the budget.		Maintain the budget.	
Scheduling	Develop a schedule.		Update schedule.		Update schedule.		Update schedule.		Update schedule.	
Compliance With MS4	**Action Item**	**Status**	**Action Item**	**Status**	**Action Item**	**Status**	**Action Item**	**Status**	**Action Item**	**Status**
Compliance	Continue implementing compliance tasks.		Continue implementing compliance tasks.		Continue implementing compliance tasks.		Continue implementing compliance tasks.		Continue implementing compliance tasks.	
Pipe Inspections	**Action Item**	**Status**	**Action Item**	**Status**	**Action Item**	**Status**	**Action Item**	**Status**	**Action Item**	**Status**
Pipe Inspections	25% pipes inspected.		25% pipes inspected.		25% pipes inspected.		25% pipes inspected.		25% pipes inspected.	

1.2.2 Sanitary Sewer System

Sanitary Sewer System Long Term Inspection and Maintenance Tasks

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Tasks	Year 1		Year 2		Year 3		Year 4		Year 5	
Sanitary Sewer System	2008		2009		2010		2011		2012	
Infrastructure Testing and Rehabilitation	**Action Item**	**Status**	**Action Item**	**Status**	**Action Item**	**Status**	**Action Item**	**Status**	**Action Item**	**Status**
Testing	Develop program.		Begin testing.		Continue testing program.		Continue testing program.		Continue testing program.	
Rehabilitation	Develop program.		Begin program.		Continue program.		Continue program.		Continue program.	
Inflow Reduction Program	Develop program.		Begin program.		Continue program.		Continue program.		Continue program.	
SSO Notification Program	**Action Item**	**Status**	**Action Item**	**Status**	**Action Item**	**Status**	**Action Item**	**Status**	**Action Item**	**Status**
Written Procedure	-		Develop the written procedure.		Update the procedure.		Update the procedure.		Update the procedure.	
Documentation	-		Develop a method of documentation.		Circulate the documentation method to all involved stakeholders.		Update documentation.		Update documentation.	
Process Testing	-		-		Test the process; run scenarios.		Test the process; run scenarios.		Test the process; run scenarios.	
Hydrogen Sulfide Monitoring Program	**Action Item**	**Status**	**Action Item**	**Status**	**Action Item**	**Status**	**Action Item**	**Status**	**Action Item**	**Status**
Inspection	Inspect 25% of infrastructure		Inspect 25% of infrastructure		Inspect 25% of infrastructure		Inspect 25% of infrastructure		Inspect 25% of infrastructure	
Documentation	Develop a method of documentation.		Develop a method of documentation.		Develop a method of documentation.		Develop a method of documentation.		Develop a method of documentation.	
Mitigation	Develop a mitigation plan.		Begin implementing plan.		Continue to implement plan.		Continue to implement plan.		Continue to implement plan.	
Metering Program	**Action Item**	**Status**	**Action Item**	**Status**	**Action Item**	**Status**	**Action Item**	**Status**	**Action Item**	**Status**
Budgeting	Develop budget.		Update budget.		Update budget.		Update budget.		Update budget.	
Installation of New Meters	-		Begin installing new meters.		Finish installing new meters.		-		-	
Maintenance and Rehabilitation	-		-		Begin maintaining and rehabilitating meters.		Continue maintaining and rehabilitating meters.		Continue maintaining and rehabilitating meters.	

1.2.3 Water System

Water System Long Term Inspection and Maintenance Tasks

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Tasks	Year 1		Year 2		Year 3		Year 4		Year 5	
Water System	2008		2009		2010		2011		2012	
Infrastructure Assessment/Rehabilitation	**Action Item**	**Status**	**Action Item**	**Status**	**Action Item**	**Status**	**Action Item**	**Status**	**Action Item**	**Status**
Leak Detection Program	Develop a list of prioritized issues.		Maintain the list.		Maintain the list.		Maintain the list.		Maintain the list.	
Rehabiliation	Develop a budget.		Maintain the budget.		Maintain the budget.		Maintain the budget.		Maintain the budget.	
Inspections	**Action Item**	**Status**	**Action Item**	**Status**	**Action Item**	**Status**	**Action Item**	**Status**	**Action Item**	**Status**
Tank Inspections	-		-		-		Inspect tanks.		-	
Pipe Inspections	Inspect 25% of pipes.		Inspect 25% of pipes.		Inspect 25% of pipes.		Inspect 25% of pipes.		Inspect 25% of pipes.	
Metering Program	**Action Item**	**Status**	**Action Item**	**Status**	**Action Item**	**Status**	**Action Item**	**Status**	**Action Item**	**Status**
Budgeting	Develop budget.		Update budget.		Update budget.		Update budget.		Update budget.	
Installation of New Meters	-		Begin installing new meters.		Finish installing new meters.		-		-	
Maintenance and Rehabilitation	-		-		Begin maintaining and rehabilitating meters.		Continue maintaining and rehabilitating meters.		Continue maintaining and rehabilitating meters.	
Cross Connection and Backflow Program	**Action Item**	**Status**	**Action Item**	**Status**	**Action Item**	**Status**	**Action Item**	**Status**	**Action Item**	**Status**
Implement Program	Develop program.		Implement program.		Maintain program.		Maintain program.		Maintain program.	
Disinfectant Residual Monitoring	**Action Item**	**Status**	**Action Item**	**Status**	**Action Item**	**Status**	**Action Item**	**Status**	**Action Item**	**Status**
Implement Program	Develop program.		Implement program.		Maintain program.		Maintain program.		Maintain program.	

1.2.4 Irrigation System

Irrigation System Long Term Inspection and Maintenance Tasks

SUCF SUNY - Albany

Tasks	Year 1		Year 2		Year 3		Year 4		Year 5	
Irrigation System	2008		2009		2010		2011		2012	
Leak Detection	**Action Item**	**Status**	**Action Item**	**Status**	**Action Item**	**Status**	**Action Item**	**Status**	**Action Item**	**Status**
Leak Detection Inspection	Inspect lines.		-		-		Inspect lines.		-	
Repair/Replacement	**Action Item**	**Status**	**Action Item**	**Status**	**Action Item**	**Status**	**Action Item**	**Status**	**Action Item**	**Status**
Pipes	-		Repair/replace damaged pipes found in regular inspection and Leak Detection Inspection.		-		-		Repair/replace damaged pipes found in regular inspection and Leak Detection Inspection.	
Pumps	Rebuild/replace 50% of pumps.		Rebuild/replace other 50% of pumps.		-		-		-	
Campus Irrigation Central Control System	**Action Item**	**Status**	**Action Item**	**Status**	**Action Item**	**Status**	**Action Item**	**Status**	**Action Item**	**Status**
Central Control System	Acquire funding.		Design new control system.		Construct new control system.		-		-	
New Irrigation Systems	**Action Item**	**Status**	**Action Item**	**Status**	**Action Item**	**Status**	**Action Item**	**Status**	**Action Item**	**Status**
Lower Football Practice/Baseball Fields	Acquire funding.		Design new irrigation system.		Construct new system.		-		-	
Practice/Softball Fields	Acquire funding.		Design new irrigation system.		Construct new system.		-		-	
University Fields	Acquire funding.		Design new irrigation system.		Construct new system.		-		-	

1.2.5 Overall System Management

Overall System Management Long Term Inspection and Maintenance Tasks

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Tasks	Year 1		Year 2		Year 3		Year 4		Year 5	
Overall System Management	2008		2009		2010		2011		2012	
Training Program	**Action Item**	**Status**	**Action Item**	**Status**	**Action Item**	**Status**	**Action Item**	**Status**	**Action Item**	**Status**
Develop/Implement Program	Continue to define goals, policies and mission. Continue to develop and implement program.		Finish developing program, continue implementing it.		Update program, continue to implement.		Update program, continue to implement.		Update program, continue to implement.	
Public Education and Outreach	**Action Item**	**Status**	**Action Item**	**Status**	**Action Item**	**Status**	**Action Item**	**Status**	**Action Item**	**Status**
Classroom Education/School Programs	Continue to develop and implement programs and printed materials.		Continue to develop and implement programs and printed materials.		Continue to develop and implement programs and printed materials.		Continue to develop and implement programs and printed materials.		Continue to develop and implement programs and printed materials.	
Public Communication Program	Continue to develop and implement program.		Continue to develop and implement program.		Continue to develop and implement program.		Continue to develop and implement program.		Continue to develop and implement program.	
Public Outreach/Volunteering	Continue to develop and implement program.		Continue to develop and implement program.		Continue to develop and implement program.		Continue to develop and implement program.		Continue to develop and implement program.	
Legal Authority and Enforcement	Continue to develop and implement a program to educate the public on laws and regulations.		Continue to implement program, develop a system of enforcing laws.		Continue education program, begin to enforce regulations.		Continue education program, continue to enforce regulations.		Continue education program, continue to enforce regulations.	
Mapping	**Action Item**	**Status**	**Action Item**	**Status**	**Action Item**	**Status**	**Min. Control Measure**	**Status**	**Action Item**	**Status**
Mapping	Develop process for keeping maps up to date.		Implement process, update maps.		Update maps.		Update maps.		Update maps.	
Sustainability Program Development	**Action Item**	**Status**	**Action Item**	**Status**	**Action Item**	**Status**	**Action Item**	**Status**	**Action Item**	**Status**
Program Development/Implementation	Continue to network with people organizing outreach / volunteer events and get access to metering info. Continue to research and implement new water conservation methods and develop a water conservation plan.		Continue to develop and implement program.		Continue to develop and implement program.		Continue to develop and implement program.		Continue to develop and implement program.	
Development of Organizational Structure	**Action Item**	**Status**	**Action Item**	**Status**	**Action Item**	**Status**	**Action Item**	**Status**	**Action Item**	**Status**
Develop Structure	Develop structure.		Implement structure.		Update structure.		Update structure.		Update structure.	
Internal Communication Program	**Action Item**	**Status**	**Action Item**	**Status**	**Action Item**	**Status**	**Action Item**	**Status**	**Action Item**	**Status**
Develop/Implement Program	-		Develop internal communication network.		Implement internal communication network.		-		Update network.	
Management Information Systems	**Action Item**	**Status**	**Action Item**	**Status**	**Action Item**	**Status**	**Action Item**	**Status**	**Action Item**	**Status**
Develop/Maintain MIS	Begin developing a user-friendly MIS.		Finish developing MIS system.		Implement system.		Continue implementing system.		Update system.	
Budgeting	**Action Item**	**Status**	**Action Item**	**Status**	**Action Item**	**Status**	**Action Item**	**Status**	**Action Item**	**Status**
Budgeting	Develop budget.		Update budget.		Update budget.		Update budget.		Update budget.	
Emergency Preparedness and Response	**Action Item**	**Status**	**Action Item**	**Status**	**Action Item**	**Status**	**Action Item**	**Status**	**Action Item**	**Status**
Emergency Preparedness and Response	Continue to develop plan.		Implement plan.		Update plan.		Update plan.		Update plan.	
New Construction Program	**Action Item**	**Status**	**Action Item**	**Status**	**Action Item**	**Status**	**Action Item**	**Status**	**Action Item**	**Status**
Develop/Implement Program	Continue to develop and implement program.		Continue to develop and implement program.		Continue to develop and implement program.		Continue to develop and implement program.		Continue to develop and implement program.	
Updating Operating Procedures	**Action Item**	**Status**	**Action Item**	**Status**	**Action Item**	**Status**	**Action Item**	**Status**	**Action Item**	**Status**
Develop/Implement Process	-		Develop process.		Implement process.		Continue to implement process.		Update process.	

2. STORMWATER SYSTEM

2.1 PERIODIC INSPECTION AND MAINTENANCE TASKS

2.1.1 Cleaning

Regular cleaning will help maintain the flow capacity and sediment removal ability of the system. The catch basins and piping will require regular cleaning.

2.1.1.1 Catch Basins and Storm Sewer Manholes

Catch basins and manholes must be cleaned to prevent build-up of material in the sumps. Also, floatables and oils should be skimmed off to reduce discharges of these materials to the stormwater outfall.

Catch basin and manhole cleaning shall consist of shoveling out the sump, skimming of floatables and oils off the standing water in the sump, and flushing the walls of the catch basin. Catch basins and manholes should be cleaned once in the fall and once in the spring because these are the two peak seasons for organic matter build-up.

2.1.1.2 Root Removal

Roots can enter into small cracks in pipes and catch basins and grow, causing cracks to grow larger. Roots can impede flow and cause infiltration and exfiltration.

Roots shall be removed as determined by routine pipe inspection. Root removal shall occur during low flow periods during the non-winter months. Historically, March, April, September and November have lower average rainfalls than the other non-winter months. November has been selected for root removal activities.

2.1.2 Inspection

Regular inspection will allow for early detection of issues before flooding issues occur.

2.1.2.1 Catch Basins

Inspection of catch basins is necessary to determine if there is any infiltration to the catch basin. It is also necessary to determine if there is any damage which may require repair, or a high usage catch basin which may require cleaning more frequently.

Catch basins can be inspected visually, using the GIS-based inspection forms. Catch basin inspection shall occur during the catch basin cleaning operations in the spring and fall.

2.1.2.2 Outfalls

Inspection of outfalls is necessary to determine if there is any blockage of the outfall or damage.

Outfalls can be inspected visually, using the GIS-based inspection forms. Outfall inspections shall occur monthly, and after rainfalls greater than 2.2 inches over a 24-hour period (the one year, 24-hour design storm).

2.1.3 Source Mitigation

Contamination of stormwater may be prevented by mitigating sources of pollution. Possible sources of pollution are road run-off, vehicle washing, hazardous waste spills, organic materials, pests, and road salt storage leaks. For many of these items, coordination with other university departments is necessary. Minimally, coordination with other university departments should involve communication of concerns related to stormwater management and understanding of policies and procedures as they relate to source mitigation.

2.1.3.1 Street Cleaning

Oil and other pollutants on the street mix with rainwater and enter into storm drains. It is necessary to prevent as much of this polluted run-off from entering stormwater drains as possible to reduce discharge to the receiving water bodies.

Street cleaning is a source mitigation measure because it removes sediment and floatables before they enter the stormwater system. Street cleaning should occur at least twice per year: once in the spring and once in the fall.

2.1.3.2 Vehicle Maintenance and Washing

Vehicle washing is one of the largest sources of stormwater run-off pollution. Vehicles leaking oil will leave oil on streets which will eventually mix with stormwater and enter stormwater drains.

University vehicles should be inspected and maintained twice a year, once in the summer and once in the winter. Vehicle washing should take place as needed in an area which does not drain to a stormwater catch basin or at an off-campus car washing establishment.

2.1.3.3 Landscaping and Maintenance

Landscaping and maintenance affect how much material enters catch basins and the stormwater system. Regular care of grounds and equipment will prevent blockages of catch basin grates. Also, less cleaning of catch basins, pipes, and grates will be required.

Landscaping around stormwater infrastructure including and not limited to grass mowing, hedge clipping, and shrub trimming, shall occur from April through November.

Landscaping also involves the use of pesticides. Proper training on the handling and use of pesticides should be continued in order to prevent illicit discharging into storm sewers.

2.1.3.4 Road Salt Storage

Road salt storage facilities shall be inspected annually during the month of October to ensure that no salt is infiltrating into the stormwater system. Cracks, deterioration, and damage to facilities shall be repaired.

2.2 LONG-TERM INSPECTION AND MAINTENANCE TASKS

2.2.1 Source Mitigation Program

A Source Mitigation Program should continue to be refined to aid in eliminating illegal inflow sources to the stormwater system. The program shall include the following:

Assessment of Current Conditions

Existing conditions must be assessed to identify appropriate management practices to reduce pollutant discharge to the maximum extent practicable. Conditions and events which are detrimental to the quality of the stormwater shall be assessed and quantified (i.e.,run-off from a busy road, salt storage leaking, etc.). The Source Mitigation Program/Plan shall address each of the issues determined by this assessment.

Hazardous and Waste Materials Management Plan

Hazardous and waste materials which enter the stormwater system may end up in the receiving water bodies. A plan shall continue to be developed which includes public education and coordination with university environmental health and safety personnel to reduce hazardous waste releases. Emphasis should be placed on coordination of emergency spill response activities. Training for emergency spill response and the handling of hazardous waste materials should continue.

Illegal Inflow Elimination Public Education Plan

A comprehensive program shall continue to be refined and implemented to inform and educate the public about illegal discharging into stormwater sewers. The program shall target local businesses, students, grounds workers, and university staff. Items that shall be covered in the program should include: illegal materials to dump into catch basins such as oils, greases, chemicals, and car-washing suds; the implications of illegal dumping (pollution of local waters); and where to deposit materials appropriately. Catch basin labels reminding the public where the stormwater system drains to or not to dump waste into it, should be considered.

Integrated Pest Management Plan

An integrated pest management plan benefits a stormwater system by reducing the entry of both pests and pest control chemicals into the stormwater system. A plan including public education and coordination with university grounds keeping and building maintenance personnel should be developed to help manage pests and pesticide entry to the stormwater system.

Landscaping and Maintenance Staff Outreach Plan

A comprehensive plan shall continue to be refined and implemented, including public education and coordination with university grounds keeping personnel, to help maintain the stormwater infrastructure. This plan shall include a process of evaluating current practices and updating them.

2.2.2 Catch Basin Rehabilitation/Accessibility

A program shall be developed to rehabilitate the current stormwater infrastructure and ensure that all infrastructure is accessible. This program will address issues determined by the Condition Assessment, Capital Improvement Plan, and by ongoing inspections. This program shall be developed in one year, and then be implemented over the following years. The program shall include:

Prioritizing Issues

A method of prioritizing issues shall be established. The budget can then be applied to the most pressing issues. More pressing issues might include: clogged catch basins, infiltration to manholes, and structures that are not safe for vehicle or pedestrian traffic. The Capital Improvement Plan developed by Woodard & Curran provides a basis and starting point for this ongoing task.

Setting Up a Budget

An annual budget must be created to regularly fund rehabilitation projects. This will ensure that all issues on the priority list are funded eventually.

Scheduling

High priority issues shall be scheduled first, then lower priority issues. When possible, consideration should be given to work periods that will have the least impact to the infrastructure function and public safety, such as low flow periods or school breaks.

2.2.3 Compliance with MS4 Permit

The University's stormwater discharge was previously covered under a 2003-2008 MS4 permit. The University is currently covered under the new MS4 permit effective May 1, 2008 through April 30, 2010. Under the new general permit, the University must implement the following Minimum Control Measures:

a. Program implementation reporting including education and outreach activities, construction site stormwater control training, and employee pollution prevention and good housekeeping training

b. Development and implementation of public involvement and participation programs and SWMP development and implementation, including annual SWMP reporting

c. Development and implementation of illicit discharge detection and elimination programs, including SWMP reporting

d. Development and implementation of a construction site stormwater runoff control program, including SWMP reporting

e. Development and implementation of a post-construction stormwater management program, including SWMP reporting

f. Development and implementation of a pollution prevention and good housekeeping program, including SWMP reporting

These measures are generally the same as the measures from the University's previous permit. The University shall continue to work on the following required tasks from their previous MS4 permit:

1. Public Education and Outreach on Storm Water Impacts
    a. Continuation of an ongoing public education and outreach program
    b. Development of classroom education/school programs
    c. Development and distribution of printed materials
    d. Organization of events and programs
    e. Development of a pollution prevention program for businesses
    f. Development of a program to facilitate proper disposal of household hazardous wastes
    g. Development of a trash management program
2. Public Involvement/Participation
    a. Organization of public notice and access to documents and information
    b. Creation of a method of public presentation of comments received on the SWMP and on annual reports
    c. Creation of community hot lines
    d. Organization of adopt-a-stream
    e. Organization of stream, beach, and/or roadway clean-ups
3. Illicit Discharge Detection and Elimination
    a. Prohibition of illicit discharges
    b. Development of a program to inform the public, employees, businesses of hazards from illicit discharges
    c. Identification of illicit discharges
    d. Dye testing
    e. System inspections
    f. Targeting of industrial/business discharging
    g. Targeting of wastewater connections to the storm drain system

4. Construction Site Storm Water Runoff Control

    a. Requirement of erosion and sedimentation controls through an ordinance or other regulatory mechanism

    b. Creation of opportunities for public comment on construction plans

    c. Requirement of construction site plan reviews

    d. Requirement of overall construction site waste management

    e. Site inspections and enforcement of these inspections

    f. Education and training of construction site operators

    g. Meeting criteria of New York State Standards and Specifications for Erosion and Sediment Control

    h. Meeting criteria of New York State Stormwater Management Design Manual

5. Post-Construction Stormwater Management

    a. Assessment of existing conditions throughout the MS4 and identification of appropriate management practices to reduce pollutant discharge to the maximum extent practicable

    b. Regulation of post-construction runoff from development through an ordinance or other regulatory mechanism

    c. Development of management practice inspections and a maintenance program

    d. Meeting criteria of New York State Stormwater Management Design Manual

6. Pollution Prevention/Good Housekeeping for Municipal Operations

    a. Prevention of discharge of pollutants from municipal operations

    b. Following of DEC NPS Management Practices Catalog, or equivalent

    c. Conducting of employee pollution prevention training

    d. Street cleaning

    e. Catch basin and storm drain system cleaning

    f. Vehicle maintenance and washing

    g. Hazardous and waste materials management

    h. Landscaping and lawn care

i. Integrated Pest Management

j. Prevention of discharge of pollutants from road salt storage

k. Development of a spill response and prevention plan

7. Measurable Goals

a. Provision of annual stormwater awareness presentation to new students

b. Inclusion of stormwater awareness and pollution prevention in student handbook, to be updated annually

c. Organization of annual spring clean-up of entire campus

d. Implementation of stormwater remediation design project

e. Implementation of SOPS for stormwater management and prevention of illicit discharges, to be updated annually

f. Implementation of SOP for review of site plans and SWP3s

g. Implementation of program of site inspections and enforcement

h. Implementation of SOP for review of plans for structural controls to limit post-construction runoff

i. Maintenance of existing structural controls, ongoing

j. Conduction of employee pollution prevention training, to be completed annually

k. Continuation of existing street sweeping program, ongoing

l. Implementation of program of regular catch basin cleaning, to be completed annually

2.2.4 Pipe Inspection

Inspections of all piping should occur to determine if any pipes are blocked, if they require repair or replacement due to cracks, root intrusion or other damage, and/or if they require cleaning due to material build-up. Areas where significant material is accumulating in the catch basin sumps shall be targeted. Camera inspection is recommended.

3. SANITARY SEWER SYSTEM

3.1 PERIODIC INSPECTION AND MAINTENANCE

3.1.1 Cleaning

3.1.1.1 Manholes

Manholes must be cleaned to prevent build-up of material in the manhole. While manholes should be designed for self-cleaning flow velocities, organic material can build up on the manhole benchwalls and walls if surcharging occurs in the collection system. Manhole cleaning shall consist of shoveling out accumulated material and flushing the walls of the manhole.

Cleaning should be done during the fall at manholes determined based on manhole inspections.

3.1.1.2 Pipes

Although sewer collection pipes are generally designed for self-cleaning flow velocities, material buildup can occur especially if there are issues with pipe deterioration, root intrusion, or fats, oils, and grease. Cleaning should be done as required based upon pipe inspection, evidence of surcharging in manholes and/or restrictions in flow. Cleaning should be done during low-flow periods, such as during the summer break.

Considerations include:

- Age - older systems have a greater risk of deterioration than newly constructed sewers.
- Construction material - pipes constructed of materials that are susceptible to corrosion have a greater potential of deterioration and potential collapse. Non-reinforced concrete pipes, brick pipes, and asbestos cement pipes are examples of pipes susceptible to corrosion.
- Pipe diameter/volume conveyed - pipes that carry larger volumes take precedence over pipes that carry a smaller volume.
- Location - pipes located on shallow slopes or in flood prone areas have a higher priority.
- Force main vs. gravity - force mains have a higher priority than gravity, size for size, due to the complexity of the cleaning and repairs.
- Subsurface conditions - depth to groundwater, depth to bedrock, soil properties (classification, strength, porosity, compressibility, frost susceptibility, erodibility, and pH).
- Corrosion potential - Hydrogen Sulfide (H2S) is responsible for corroding sewers, structures, and equipment used in wastewater collection systems. The interior conditions of the pipes need to be monitored and treatment needs to be implemented to prevent the growth of slime bacteria and the production of H2S gases.

Light pipe cleaning typically uses a high pressure jetter truck (jetter) or a combination jetter-vacuum truck (jetter-vac). Sewer segments that contain excessive amounts of grease, sand or debris may have to be jetted multiple times to thoroughly clean the line. Where root intrusion is a problem, a root cutting tool is attached to the jetter nozzle. Heavy pipe cleaning of sewer segments generally needs to be implemented when the cleaning involves larger diameter sewer pipes (24" or greater in diameter) that have accumulated sand or debris which fills 30% – 40% of the diameter of the sewer pipe. High

pressure jetting alone will normally not clean this sewer segment satisfactorily. Typically, a bucket machine would be used to clean heavy accumulations of sand or debris from these sewer segments.

3.1.2 Inspection

Regular inspection will allow for early detection of issues before surcharging and possible overflow issues occur.

3.1.2.1 Manholes

Inspection of manholes is necessary to determine if there is any evidence of surcharging or inflow to the manhole. It is also necessary to determine if there is any damage which may require repair or cleaning.

Manholes can be inspected visually, using the GIS-based inspection forms. They should be inspected once per year, during a low flow period, such as during the summer break.

3.1.2.2 Pipes

Inspections of the piping should occur to determine if any pipes are blocked, if they require repair or replacement due to cracks, root intrusion or other damage, and/or if they require cleaning due to material build-up. Special attention shall also be given to pipe crossing areas where there is potential for contamination of water or stormwater.

Camera inspection is recommended. Twenty-five percent of sewer piping shall be inspected every year so that the total piping system is inspected once every four years. Inspections shall occur during low-flow periods, such as during the summer break.

3.1.2.3 Pump Station

The pump station should be inspected to ensure that the structure is in satisfactory condition and that equipment is in adequate condition. Inspections shall occur monthly.

3.1.3 Metering

Regular metering is necessary to know how the system is functioning at a given point in time. Metering will help to identify potential issues such as clogging and surcharging before they occur. It will also help determine where the largest sources of sanitary sewer water are originating from. Metering data shall be evaluated bi-monthly for potential problem areas. Metering equipment shall be inspected twice a year to ensure that it is functioning properly.

3.2 LONG-TERM INSPECTION AND MAINTENANCE

3.2.1 Infrastructure Testing and Rehabilitation

A program to regularly test and rehabilitate infrastructure shall be developed and created to ensure that the stormwater system is maintained in adequate condition. This program shall be developed over one year, and implemented during the following years. The program shall include the following:

Testing

Testing can include dye testing and smoke testing. Areas which are generally smoke tested are: drainage paths, ponding areas, roof leaders, cellars, yard and area drains, fountain drains, abandoned building sewers, and faulty service connections. Areas which did not smoke are then dye tested. Smoke and dye testing should occur in critical areas identified during inspection activities.

Rehabilitation

The rehabilitation program is meant to ensure structural integrity, limit inefficiencies in the system due to infrastructure issues, and limit exfiltration that causes contamination. Infrastructure which does not perform adequately during testing shall be reported. These reports shall be prioritized, beginning with infrastructure which performed the worst during testing.

Inflow Reduction Program

An inflow reduction program shall be developed and implemented to reduce inflow into the system. All sources of inflow should be documented. All illegal inflow sources should be repaired. Other sources can be mitigated by water/flow conservation measures such as low flow toilets.

3.2.2 Sanitary Sewer Overflow (SSO) Notification Program

An SSO Notification program shall be developed and implemented to increase the efficiency of response to SSO events. The program shall include:

Written Procedure

A written procedure shall be developed that includes the chain of command which needs to be notified during an SSO event. This procedure shall include appropriate chains of command given different intensities of SSO events. The document shall include contact information for every person on the procedure list. The document shall include how each person on the chain of command is to be notified.

Documentation

The appropriate personnel shall draft a reporting form to be used for documenting all SSO events. A central location for organizing all reports shall be determined.

Process Testing

The process shall be tested by choosing likely scenarios and running them. Any problems with communication shall be noted, fixed, and incorporated into the written procedure.

3.2.3 Hydrogen Sulfide Monitoring Program

Hydrogen sulfide is typically present in sanitary sewer systems, and often causes damage to infrastructure. A program should be set up to inspect infrastructure regularly for deterioration due to hydrogen sulfide, and mitigate areas with high levels of hydrogen sulfide. The inspections can correspond with sanitary sewer manhole and pipe inspections. This program should take one year to develop and should continue annually. The program shall include:

Inspection

Sanitary sewer infrastructure must be inspected regularly to detect areas of deterioration due to hydrogen sulfide. The inspection shall include taking hydrogen sulfide readings. Areas with high levels of hydrogen sulfide shall be noted and checked more frequently. A pH of the crown of the infrastructure in those areas shall be taken to check for early signs of corrosion (indicated by a pH of four or less.)

Documentation

All inspections shall be documented. Part of the documentation process shall include notification of the appropriate parties when deterioration is detected.

Mitigation

There are ways of mitigating hydrogen sulfide levels if high levels are detected. The following methods of mitigation should be considered if high levels are found during inspection:

1. Redesign – a problematic area of the sewer system can be replaced with a newer design which helps eliminate build-up of hydrogen sulfide.

2. Chemical/Physical – the levels of hydrogen sulfide can be mitigated by the addition of aeration, chlorine, hydrogen peroxide, potassium permanganate, iron salts, or sodium hydroxide.

3. Frequent Cleaning – reduction of solids in the sewer system will decrease the amount of hydrogen sulfide which is released into the sewer system.

3.2.4 Metering Program

Regular metering is necessary to know how the system is functioning at a given point in time. Metering will help to identify potential issues such as clogging and surcharging before they occur. During the infrastructure assessment section of this program, meters were installed in various locations on campus. Additional meters could be installed at strategic locations to add more detail to the flow data. A metering program shall be set up to accomplish the following tasks:

The metering program shall take one year to develop and one year to implement. The metering program shall accomplish the following tasks:

Budgeting

A budget shall be set aside to fund the new metering equipment and long-term operations and maintenance of the equipment.

Installation of New Meters

New metering equipment shall be installed at strategic locations in the collection system including at the northeastern corner of the State Quad, near the intersection of Justice Drive and University Drive East, and one just south of the Dutch Quad. Current meters should be replaced, including the meter next to the Power Plant, the meter northeast of Indian Quad, and the meter northwest of the Colonial Quad.

Maintenance and Rehabilitation Plan

All equipment must be maintained annually based on data acquired during regular inspections. A budget must be set aside to maintain this equipment over the long-term. The plan shall include plans and funding for necessary training, equipment rehabilitation, and regular equipment maintenance expenditures.

4. WATER SYSTEM

4.1 PERIODIC INSPECTION AND MAINTENANCE

4.1.1 Cleaning

4.1.1.1 Tanks

Tank sediment shall be drained three times per year by opening the gate valve located at the base of the storage tank. The water shall be discharged for at least two full minutes or until the water is clear and free of visible particles which ever is longer. If the flushing takes more than fifteen minutes, then the storage tank shall be drained and cleaned in accordance with AWWA Standard C652-92. The storage tank will be flushed three times per year. To minimize impacts on water system users, tank cleaning should be conducted during low water demand periods, such as fall break, spring break, and summer.

4.1.1.2 Pipes

The water distribution system shall be flushed regularly to reduce stagnant water and sediment build-up. In addition to protecting water quality, regular flushing can help reduce corrosive conditions associated with biofilm growth that can often lead to pipeline leaks and breaks. Dead end lines will be flushed every three (3) months to remove sediment and reduce stagnant water.

4.1.2 Inspection

Regular inspection will allow for early detection of issues before flooding issues occur.

4.1.2.1 Tanks

Water storage tanks should be inspected on a regular basis to ensure that the structure is in satisfactory condition and properly secured. Records should be maintained of these inspections and can be incorporated into the GIS-based inspection forms. Access hatches should be locked and all openings to the tank should be properly screened. Roofs should not allow entry of contaminants. All cracks, deterioration, and damage to facilities detected during inspection shall be repaired.

The storage tank should be visually inspected monthly.

4.1.3 Maintenance

4.1.3.1 Valve Exercising

There should be adequate valves to help isolate portions of the distribution system that are under repair. Valves must be maintained in working order. This necessitates that valves be “exercised” on a routine basis. The valves are exercised by opening fully and then closing them fully through a complete cycle to check that they operate properly and that there is not any leaking.

A portion of the valves should be exercised each month such that every valve is exercised at least once each year.

4.1.4 Hydrant Testing/Cleaning

4.1.4.1 Pressure Testing

Distribution systems must be maintained under pressure at all times to ensure that contamination does not enter the system and that demand can be met at all times in all locations. The storage tank which provides gravity flow must be maintained above 25 psi throughout the distribution system during peak demands. System pressure at the storage tank shall be checked daily. Hydrant pressure testing shall be conducted annually, preferably during peak flow periods, to determine whether or not all hydrants have adequate pressure. Half of the hydrants, from all areas of the campus, should be tested during the fall, and the remainder tested in the spring.

4.1.4.2 Flow Testing

Flow testing of hydrants is necessary to determine whether or not hydrants have adequate flow for fire flow needs. Testing procedures from Chapter 6 of the AWWA M17 manual for *Installation, Field Testing, and Maintenance of Fire Hydrants* should be followed. It is not necessary to test all hydrants in a given year, but the hydrants that are tested should represent the different areas of campus. Testing should be conducted in September and March, with every hydrant being tested at least once every four years.

4.1.5 Metering

Regular metering is necessary to know how the system is functioning at a given point in time. Metering will help determine where highest demands in the system are, water age, and any potential leaks. Metering data shall be evaluated bi-monthly for potential problem areas. Metering equipment shall be inspected twice a year to ensure that it is functioning properly.

4.2 LONG-TERM INSPECTION AND MAINTENANCE

4.2.1 Infrastructure Assessment and Rehabilitation

A program to regularly inspect the integrity of infrastructure and rehabilitate deteriorated infrastructure shall be developed and created to ensure that the water system is maintained in adequate condition. This program shall be developed over one year, and implemented during the following years. The program shall include the following:

Leak Detection Program

A bi-annual comprehensive water leakage audit shall be conducted. Signs of leakage include: areas around a water main where ground is wet and soft, pooling water, water visibly leaking from the ground, and where water is visibly leaking into a residence or business. A method of documenting and responding to reports of leakage shall be developed.

Rehabilitation

The rehabilitation program is meant to ensure structural integrity, limit inefficiencies in the system due to infrastructure issues, and limit infiltration which could cause contamination. Reports from the Leak Detection Program and issues found during regular inspection shall be prioritized, beginning with infrastructure with highest priority issues.

4.2.2 Inspection

It is necessary to complete inspections of infrastructure to keep track of what infrastructure must be rehabilitated every year.

Tank Inspection

A condition inspection of the tank should be conducted every 5 years according to the inspection and testing procedures in the AWWA standard D100-06 for Welded Carbon Steel Tanks for Water Storage. This testing should be done more frequently if the weekly visual inspections find any potential structural or water quality issues.

Pipe Inspection

Inspections of piping should occur to determine if any pipes are blocked, if they require repair or replacement due to cracks, root intrusion or other damage, and/or if they require cleaning due to material build-up. Areas where significant material is accumulating in the catch basin sumps shall be targeted. Camera inspection is recommended. Complete inspections of infrastructure shall take place once every four years.

4.2.3 Metering Program

Regular metering is necessary to know how the system is functioning at a given point in time. Metering will help determine long-term water demands and peak demand times and locations. Metering will also indicate areas with the highest demands and consequently, areas of campus which could use more water conservation measures (as part of the campus Sustainability Initiative). During the infrastructure assessment section of this program, meters were installed in various locations on campus. Data collected by these meters indicated which areas new meters shall be installed.

The metering program shall take one year to develop and one year to implement. The metering program shall accomplish the following tasks:

Budgeting

A budget shall be set aside to fund the new metering equipment and long-term operations and maintenance of the equipment.

Installation of New Meters

New metering equipment shall be installed at locations indicated by initial assessment metering data.

Maintenance and Rehabilitation Plan

Equipment must be maintained annually based on data acquired during regular inspections. A budget must be set aside to maintain this equipment over the long-term. The plan shall include plans and funding for necessary training, equipment rehabilitation, and regular equipment maintenance expenditures.

4.2.4 Cross Connection and Backflow Program

Cross connections are locations in the system where potable water comes into contact with non-potable water. These connections can occur anywhere between the water main and end-user. Backflow is when the non-potable water flows into the drinking water system due to low pressure in the water system or back pressure from the source of the non-potable water. These backflow events can result in waterborne diseases. A program should be developed to locate all cross-connections, and prevent backflow events.

4.2.5 Monitoring Program of Disinfectant Residuals

Long detention time and warm temperatures of water can result in the loss of disinfectant residual, allowing possible contamination of water. Areas that are especially susceptible to these conditions are the water tower and interior piping. A program shall be developed to monitor disinfectant residuals in the water tower and also in the system at some end-user locations. If the residuals are low, mixing of water in the water tower should be considered.

5. IRRIGATION SYSTEM

5.1 PERIODIC INSPECTION AND MAINTENANCE

5.1.1 Pressure Testing

Pressure testing is necessary to determine if there are leaks in the irrigation system. Leaks will result in inefficient of water use and higher operational costs for pumps. When leaks are present, the system will not hold pressure and the pumps will cycle on frequently, even when there is no active irrigation. Due to the size and complexity of the system, pressure testing of the system shall occur monthly.

5.1.2 Inspection

At the beginning and end of each irrigation season, irrigation valves, controls, and appurtenances shall be inspected and repaired to maintain a functional system.

Sprinkler heads shall be visually inspected for misting, bubbling, clogging, and to determine whether or not they require maintenance. Sprinkler heads which are tilted, blocked by vegetation or out of alignment with grade should be adjusted. Sprinkler heads which are not being used shall be capped to prevent leakage. Tubing shall be inspected for cracks or pinching. Irrigated areas shall be inspected for under-watering and over-watering as well as spillage into roadways, walls, or out of intended area of coverage, and the system shall be adjusted accordingly. Valves shall be inspected for clogging and valve boxes shall be maintained to remove debris and repair damage. The system shall be given a complete inspection monthly. A general inspection shall be conducted weekly.

Some indicators that a remote control valve is not functioning properly are:

1. Water leaking from the valve itself.
2. Sprinkler heads weeping water constantly.
3. Valve won't open.
4. Valve won't close.

Some indicators that a remote control valve is not functioning properly are:

1. Water leaking from the top of the valve.
2. Valve won't open.
3. Valve won't close.

Some signs of a controller malfunction are:

1. Remote control valves not activating.
2. Remote control valves not turning off.

3. Remote control valves that stay on longer than what is programmed.

4. Remote control valves coming on at times other than what is programmed.

5. Simultaneous activation of more that one remote control valve.

6. "Garbage" on displayed screen. Check that ground wire is connected.

Backflow preventers should be tested annually by a certified tester recognized by the State of New York.

5.1.3 System Start-Up

At system start-up, the system shall be inspected for any damage which may have occurred over the winter months. Dirt shall be cleaned out of the valve boxes and rain sensor. All filters shall be inspected and cleaned. The system shall be flushed by removing the last sprinkler head in each line, and allowing the water to run for a few minutes. The system controls shall be checked for proper operation. All sprinkler heads and valves shall be visually inspected for clogging, blockage, and damaged parts. Tubing shall be inspected for pinching and cracks. All damaged parts shall be repaired or replaced.

Make sure rain sensor is operating properly. Set the rain sensor shut-off levels as per manufacturer's written instructions.

Clean out the irrigation controller cabinet. Replace the controller battery, check all wiring connections, and check the time/day settings.

Set up irrigation schedules.

System start-up for drip irrigation systems requires special care. The following need to be completed for to start-up drip irrigation systems:

1. Flush the drip system before running it by removing the emitters and letting water run through the tubing for a few minutes to flush out any dirt and debris. Replace emitters and run the system, one valve at a time, to check for problems.

2. Clogged emitters should be replaced.

3. Clean filter.

4. Check the placement of the emitters. Emitters need to be at the edge of the root-ball on new plantings and moved to the drip line (edge of foliage) of established plants.

5. Check for emitters that have popped off tubing because of high pressure, and install a pressure regulator if needed.

6. Check to see that all emitters are in place. Missing and broken emitters need to be replaced to keep your system running efficiently.

7. Look for pinched or broken tubing and straighten or replace it. Also make sure that all connections are secure.

5.1.4 System Operation

5.1.4.1 Controller Programming

The Controller shall be programmed to water between midnight and 7:00 a.m. If extreme environmental conditions cause a greater demand for water than can be supplied within this "watering window" the maintenance personnel shall program controller with an earlier start-time. Irrigation times shall be adjusted weekly at the controller. Each controller valve station shall be set for the peak season time (longest irrigation time required at hottest time of year). Time adjustments shall be made each week based on local conditions. The controller shall be programmed for run times that do not exceed the infiltration capacity of the soil, in order to prevent ponding and run-off. To increase the volume of water applied, additional starts or repeats can be programmed after some time has elapsed allowing water to penetrate the soil.

Watering times, days and duration shall conform to all local rules and regulations. Damage to any public or private property or to persons resulting from excessive irrigation water or irrigation water runoff shall be avoided at all costs.

5.1.4.2 Operation During System Breakdown or In Hot Weather Conditions

The personnel and materials required to adequately water all landscaped areas during extremely hot weather, over-extended holiday periods and during or following breakdown of systems should be provided. When breakdowns or malfunctions exist, the maintenance personnel shall water manually by whatever means necessary to maintain all plant material in a healthy condition. Dry conditions shall not be permitted to develop.

5.1.4.3 Operation During Periods of Rainfall

The Maintenance personnel shall turn off irrigation system during periods of rainfall and times when suspension of irrigation is desirable to conserve water while remaining within guidelines of good horticulturally acceptable maintenance practices.

5.1.5 System Repair

The maintenance personnel shall keep controller and valve boxes clear of soils and debris and maintain the irrigation system including the replacement, repair, adjustment and any other operation required for the continued performance of the system. All bleed ports shall be cleaned prior to re-assembly of valve.

If the controller needs repairs they should be performed by qualified irrigation contractor.

Normal wear and tear of system, vandalism, accidental breakage by others shall be repaired as soon as possible after discovering the damage. Any replacement of irrigation system components shall be original equipment types. All repairs to the system shall be done according to standard irrigation details.

5.1.6 Winterizing

Winterizing a system is necessary in a freezing climate where the irrigation system could be damaged during the winter months when it is not in use. Winterizing shall consist of turning off the water at the main valve, setting the irrigation controller to the "off" setting, turning on all of the valves to reduce the pipe pressure, and finally letting all of the water drain out of the system. All water must be removed from pipes, valves, and sprinkler heads before freezing temperatures occur. Special care shall be taken to remove all standing water from valves either by blowing it out with compressed air, or by disassembling each valve to manually remove the water.

Leave the controller's power on and leave the rain or station start switch in the off position to prevent condensation in the enclosure.

Winterizing drip irrigation systems requires special care. The following need to be completed for to winterize drip irrigation systems:

1. Shut off the water source.
2. Drain and blow out system via compressed air. (This should be done by qualified personnel since it can cause damage to the system).
    a. Connect the compressor (100 CFM for pipe 2" or less in diameter, 250 CFM over 4").
    b. Activate the zone of sprinklers at the highest elevation and furthest from the compressor before opening the valve on the compressor.
    c. Turn on the compressor.
    d. Introduce air into the system gradually to avoid surges.
    e. Slowly increase air pressure to 50 psi to reduce chance of water ram.
    f. If heads do not pop up and seal, adjust pressure upward until they do (never let pressure exceed 80 psi).
    g. Do not go longer than 2 minutes on a zone. Run through 2 to 3 times.
    h. Be sure to lower the pressure when blowing out any micro or drip zones.
    i. Do not stand over component parts while the system is under pressure.
    j. Do not leave the compressor unattended.
    k. Close manual drain valves before you leave.
3. Drain pump completely, leaving all drain plugs open.
4. Blow out all pilot lines on the control valve leaving tubes disconnected.
5. Tighten all connections, electrical and mechanical.

Backflow preventers shall be protected by freezing by either draining or removal.

Winterization shall occur every fall before the first frost. A final inspection of the system shall be completed before the system is shut down to ensure that the system is properly winterized.

5.2 LONG-TERM INSPECTION AND MAINTENANCE

5.2.1 Water Conservation

It is the Maintenance Personnel's responsibility to conserve water.

5.2.2 Leak Detection

A detailed evaluation of main pipe lines shall be completed to detect leaks. Leaks decrease the efficiency of the system and increase demands on the pumps.

5.2.3 Repair/Replacement of Pipes

All leaks determined by the Leak Detection inspection shall be repaired, or the pipes shall be replaced. This will decrease the possibility of further damage and increase the efficiency of the system.

5.2.4 Repair/Replacement of Pumps

The current irrigation pumps shall be rebuilt or replaced. This will increase the efficiency of the system.

5.2.5 Campus-wide Irrigation Central Control System

A central irrigation control system will increase the efficiency of the overall system by moving all controls to the same location. It will also allow for simpler maintenance of control systems.

5.2.6 New Irrigation Systems

Certain areas on campus are in need of new irrigation systems.

5.2.6.1 Lower Football Practice/Baseball Fields

The Lower Football Practice/Baseball Fields require a new irrigation system including sprinkler heads, lateral pipe, valves and control systems, with a link to the central control.

5.2.6.2 Practice/Softball Fields

The Practice/Softball Fields require a new irrigation system including sprinkler heads, lateral pipe, valves and control systems, with a link to the central control.

5.2.6.3 University Fields

The University Fields require a new irrigation system including sprinkler heads, lateral pipe, valves and control systems, with a link to the central control.

6. OVERALL SYSTEM MANAGEMENT

6.1 MANAGEMENT PROGRAM AND PLANS

In order to effectively operate and manage water system infrastructures, several programs and plans must be developed and implemented. The following programs are critical elements of the overall plan.

6.1.1 Safety

Establishing a worker safety program is a major responsibility of management. The operation and maintenance of water systems presents numerous hazards in the form of electrical energy, hydraulic pressures, chemical exposure, potential body contact with moving parts, high decibel noise, falls, exposure to traffic, and various ergonomic concerns.

A properly designed program will include a written policy, define safety principles, and organize staff training on specific safety procedures. The program shall also organize and maintain appropriate safety equipment and safety vehicles. Industry standards indicate that the training budget is typically three to five percent of the total budget and that it should include the following aspects:

- Clearly defined goals, policies, and a mission,
- Mandatory training requirements,
- Measurements of progress and performance,
- Testing of the effectiveness of training, and
- A means of ensuring that new employees receive training.

A staff program shall include, at a minimum, training in the following areas:

- General safety, first aid, and CPR instruction,
- Traffic control,
- Confined space entry,
- Electrical energy management (Lockout / Tagout),
- Trench shoring protection,
- Slips, trips, and fall protection,
- Hearing protection,
- Pathogen exposure protection,
- Chemical management and personal protective equipment (PPE)
- Proper hand tool and equipment use.

6.1.2 Operations and Maintenance Training

Successful water utility organizations have demonstrated that investment in the proper training of field staff and supervisors maintains regulatory compliance with consistency, stretches the working life of equipment, reduces operational costs, and maintains a higher value of all system assets.

Quality field staff must demonstrate some level of skill in equipment mechanics, water microbiology and chemistry, hydraulics, mathematics, public relations, data management, and computer use. At a minimum, a successful training program will provide instruction that addresses:

- Equipment and system inspection guidelines,

- Preventive maintenance procedures (pumps, motors, control panels),
- Water sample collection, analyses, and laboratory chain-of-custody protocols, with emphasis placed on constituents that affect public health such as disinfectants, disinfection byproducts (DBPs), metals, total coliform and finally, how the operation of the distribution system affects these;
- Broken pipe, valve, and meter repair/replace procedures including proper decontamination practices when replacing water main pipe;
- Wastewater spill disinfection and cleanup;
- Catch basin, pump station, and collection system cleaning procedures;
- Emergency response procedures (training based on emergency response plan);
- Applicable regulatory requirements;
- Customer relations;
- Data management;
- GIS applications and use; and
- Sustainability goals and objectives.

6.1.3 Maintenance Management Information Systems

A maintenance management information system (MMIS) is a method of keeping up to date records on all facility infrastructure information. All stakeholders are responsible for keeping it as up to date and accurate as possible. An MMIS creates the following advantages:

- The ability to maintain preventative maintenance and inspection schedules,
- The ability to keep track of budgetary justification information,
- The ability to track repairs and work orders,
- The ability to organize capital replacement plans,
- The ability to keep an up to date parts and equipment inventories,
- The ability to create purchase orders,
- The ability to organize customer service inquiries, complaints, and requests, and
- The ability to provide measurement of effectiveness of programs.

Numerous computer software programs are available to manage this information. The MMIS must be user friendly and accessible to all persons who will be updating it. A computer data base with GIS compatibility is recommended. Necessary training on the system will need to be organized, and accounted for in the MMIS budget.

A website and logical approach to selecting the most relevant and meaningful software package to assist a user can be found at http://cmms.plantservices.com.

In realistic terms, purchase, implementation, and full staff use of such a system will take from 18 to 24 months.

6.1.4 Public Education and Outreach

Educating and outreaching to the public about the Storm Sewer, Sanitary Sewer, Water, and Irrigation Systems is important for the following reasons:

- Funding – Public understanding of the importance of these systems is necessary to gain support when funding is required to maintain and rehabilitate these systems.
- Source Mitigation – Illegal dumping into storm sewer drains can be mitigated by educating the public on the consequences of dumping. Enforcement of illegal dumping laws and regulations will be easier after the public has been educated on proper disposal of certain materials.

- Conservation Initiatives – When the public understands how water systems work and each user's impact on the system and the environment, the introduction of conservation initiatives will make sense and gain support from the public.

A public education and outreach program at the University shall reach all staff, workers, students and surrounding communities. The program shall include the following:

Classroom Education/School Programs

Since the water systems are present on a college campus, a large portion of the outreach and education can take place in a classroom. The classroom portion of these presentations shall cover each water system, how it works, how each user impacts the system, how to conserve water, and rules and regulations for interacting with each system. Campus-wide events shall continue to be organized to engage the public in activities to educate them on the water systems. These events can include tours of the stormwater system – from catch basin to receiving waters, a tour of the water treatment plant, a tour of the wastewater treatment plant, and/or a sustainability event addressing water conservation. Printed materials should continue to be developed to distribute to the public for presentations and events.

Public Communication Program

A standard means of communication between the public and water systems management personal shall be organized and regularly updated. This shall include:

- An identified SUCF – SUNY Albany systems management contact person- a customer service/public relations person/department,
- Public notice and access to documents and information,
- Public notice, presentation on, and access to annual reports,
- Public opportunity to comment on annual reports,
- Public opportunity to comment on construction plans, and/or
- A public involvement/participation program to notify the public of the above events and initiatives.

Public Outreach/Volunteering

Public outreach/volunteering in the community is a means of actively involving the public in a learning experience- in their own "back-yards". It is a means of gaining trust, support, and interest in water systems. Some public outreach events which must take place per the University's MS4 permit are Adopt-a-Stream and a stream/beach/roadway clean-up event such as the Annual Spring Clean-Up Day. Other possible outreach/volunteer events which might take place are nature walks near water bodies, a tour of the retention pond with a nature guide who can describe the impacts of pollution on the pond, an organized volunteer day to assist maintenance workers in cleaning infrastructure (such as manholes), and bringing in a speaker to give a public talk about the importance of protecting water sources in the area.

Legal Authority and Enforcement

In order to enforce laws, water laws and regulations, a program must be set up to educate the public about the laws, educate the public about consequences upon violation of the laws, and finally, to enforce these laws.

6.1.5 Mapping

Accurate mapping allows for efficient maintenance and repair of infrastructure. Maps must be as accurate and detailed as possible. Geographic Information System (GIS) is a method of efficiently keeping maps updated. Complete maps for the storm sewer, sanitary sewer, water, and irrigation systems must be updated annually and more often if any infrastructure changes take place (i.e.,construction of new manholes, replacing pipes with larger diameter pipes.) Standard procedures shall be developed for updating maps and fixing errors. Updated GIS maps have been provided as part of this report. A process for follow-up updating must be established. This process shall take one year to develop and shall be implemented in the following years.

6.1.6 Sustainability Program Development

The University has an active sustainability program that includes the President's Task Force on Environmental Sustainability, the University Green Chemicals Program, and affiliated student organizations. As part of the sustainability program, low flow showerheads, hands-free devices, and other water saving devices for all new bathroom upgrades have been installed.

Water conservation initiatives can continue to be developed and evaluated in conjunction with new metering equipment and data. One example of an initiative is retro-fitting bathrooms with water conservation devices in areas with the highest water demands.

The sustainability program shall continue to overlap with new volunteer programs in the community such as the adopt-a-stream and beach/river/roadways clean-up events.

This program may require funding and staffing, and should continue to be developed and implemented.

6.1.7 Development of Organizational Structure

An organizational structure shall be designed and implemented in order to implement the programs, plans, and initiatives in this report. The organizational structure will assign every task to a person, who shall be responsible for carrying out the task. The document containing the outline of this structure will include contact information for every person who has been designated a task. This structure will ensure accountability for each of the tasks.

6.1.8 Internal Communication Program

Communication is a necessary aspect of running a system. A communication network shall be developed and documented. This network shall include all stakeholders: upper management, middle management, University staff, and students. As part of the program, appropriate contact information should be distributed to stakeholders. This program shall take a year to develop and a year to implement.

6.1.9 Budgeting

It is important to maintain an annual baseline budget so that adequate funds are allocated to rehabilitation and maintenance of infrastructure. The budgeting shall include moneys for staff, maintenance, rehabilitation, and emergency repairs. The budget shall be updated annually based on the previous year's cost records and the projected rehabilitation backlog which must be completed in the upcoming year.

6.1.10 Emergency Preparedness and Response

A comprehensive emergency plan shall be in place for both routine and catastrophic emergencies. The plan shall be reviewed and adjusted annually and after every catastrophic event. It shall be updated every time infrastructure undergoes rehabilitation or construction to accommodate system changes. The plan shall outline a chain of command given the type of emergency, and it shall have outlined the responsibilities of each person in this chain of command. Each person on the chain of command shall have access to a copy of the plan, and contact information for each person on the chain of command. The plan shall also include a means of documenting emergencies.

6.1.11 New Construction Program

The New Construction Program shall continue to be developed and implemented to mitigate new construction impacts on the storm sewer system. This program shall include:

- Requirements on overall construction site waste management;
- Site inspections and enforcement; and
- Education and training of construction site operators on appropriate methods of erosion control, and other source mitigation measures.

6.1.12 Updating Operating Procedures

A process should be put in place to annually evaluate and update all standard operating procedures which affect the storm sewer, sanitary sewer, water, and irrigation systems on campus. The process shall include a method for stakeholder input, research on new procedures which could be implemented, and a review of problematic areas of the system which could use new standard operating procedures. There shall be a party assigned the task of implementing new standard operating procedures and notifying staff and stakeholders impacted by the new procedures of changes.