

STORMWATER MANAGEMENT SYSTEM OPERATION & MAINTENANCE PLAN

SITE: Lot 17, A.P. 1E, Gardiner Road, Richmond, RI
OWNERS: Wawaloam Reservation, Inc.
ADDRESS: c/o James J. Smith, president
 510 Gardiner Road
 West Kingstown, RI 02892
PHONE: (401) 539-7412 camp office

STATEMENT OF RESPONSIBILITY

James J. Smith, president of Wawaloam Reservation, Inc. the owner of subject site, is assigned the responsibility for the operation and maintenance of the stormwater management system. The above named person shall notify the RI DEM Office of Water Resources Wetland Section of any transfer of this responsibility and for the conveyance of the operation and maintenance requirements if the title of the land is transferred.

The proposed stormwater management system does not require any easements for access to the best management practices, installation of the systems and operation and maintenance of the proposed systems. Because this project is for the expansion of an existing bridge within the campground and the asphalt of an access lane within the campground, funding for the stormwater management plan is the responsibility of the owner, heirs and assigns. The owner also asserts that no illicit discharges exist or are proposed to the stormwater system in accordance with state regulations.

PROJECT DESCRIPTION

The proposed project is located on the easterly side of the property near Gardiner Road. The project consists of two items. The first item is the expansion and widening of an existing wooden bridge that crosses a stream flowing from the existing freshwater pond to the existing crossing culvert on Gardiner Road. The existing wooden bridge is presently used for pedestrian traffic to and from the existing recreation hall and campground store. The reason for the proposed widening of the wood bridge is to allow for both pedestrian and golf cart access to the store and recreation hall. Presently the golf carts from the campground have to travel out onto Gardiner Road to gain access to the store/hall. The bridge expansion will alleviate the safety hazard between automobiles and golf carts travelling on Gardiner Road.

The second item is the construction of an asphalt access lane from the proposed expanded existing wooden bridge to the existing asphalt parking lot in front of the store. Also incorporated into this access lane is a wider section of asphalt paving to allow the recreational vehicles a more convenient and safer access to the existing propane fueling station located along the proposed asphalt lane. Presently, the recreational vehicles back onto the existing lawn from the asphalt parking lot and get as close as they can to the fueling station. It presently takes two to three personnel to drag hoses to the vehicle to refuel with propane. The proposed asphalt lane has been designed to allow the recreational vehicles to back up right along side of the refueling station. This allows for a more efficient operation and certainly much more safer stable situation for vehicles.

STORM WATER MANAGEMENT

The stormwater management plan for this project will be handled and incorporated into the stormwater management plan for Wawaloam Campground as approved by RI DEM on December 1, 2011. See RI DEM File No. 10-0125. The proposed bridge widening has no effect on storm water run-off due to the minimal size increase of the existing wooden bridge and the allowance of run-off thru the decking of the bridge. There is however a small increase in storm water run-off for the proposed golf cart and propane filling station located on the bridge. The Rhode Island Stormwater Design and Installation Standards Manual were either accommodated for or did not apply as shown on the accompanying Checklist A. Standards 2 thru 5 will be mitigated by the use of a proposed dry swale area on this permit and the previously approved stormwater management system from Permit 10-0125. This system consists of a slotted drain, sediment trap, and retention basin that was designed to meet water quality standards, 25 YR retention, and safe passage and attenuation of the 100 YR event. The following computation sheets with comments show that the minimal increase in storm water runoff from the proposed project can be efficiently handled in both the proposed dry swale and previously approved system.

OPERATION & MAINTENANCE

The operation and maintenance of the entire stormwater management plan can be found on the approved stormwater management plan per RI DEM Wetland Permit No. 10-0125. The O&M for the proposed dry swale with rip-rap inlet and outlet protection for the proposed project as shown on this plan follows.

Each of the following best management practices (BMP) are required to be inspected and maintained to insure the proper operation of the stormwater management system. Each BMP's utilized in the design has been listed below with a description of the recommended inspections and maintenance tasks that should be performed regularly.

BMP - DRY SWALE

DESCRIPTION
 A dry swale was incorporated into the Stormwater Management Plan to handle the required groundwater recharge, water quality protection, and overbank flood protection standards adopted in the RISDISM. The swale is a shallow depression with a bottom consisting of a bio-retention soil designed to slow run-off and promote infiltration of the first flush volume.

ACCESS & SAFETY
 The dry swale is located on the southerly side of the proposed access lane between the lane and the existing parking area in the vicinity of the mailbox kiosk. All maintenance of the BMP shall be done from either the parking area or the proposed access lane. Protection shall be taken to protect the stream to the north during maintenance activities. No known safety issues are associated with this type of best management practice as proposed.

INSPECTIONS

The following inspections shall be performed annually and after storms of greater than 2.8 inches of rainfall. If any of the items below appear to be below standard they should be corrected immediately. Corrective maintenance recommendations can be found under the maintenance portion of this report.

- Adequate vegetation and ground cover
- Erosion and/or gully of banks and berms
- Animal burrows
- Debris and trash buildup
- Water retention longer than 48 hours
- Sediment buildup

MAINTENANCE - Scheduled

- EVERY YEAR**
 - Keep swale mowed to a 4 - 6 inch height. Grass heights shall not exceed 10 inches.
 - Remove any woody vegetation.
 - Remove sediment buildup within the bottom of the swale that exceed 3 inches deep.
 - Remove all trash and debris.
 - De-thatch the swale bottom and remove thatching.
- EVERY FIVE YEARS**
 - All sediment buildup should be removed prior to scraping and/or rotor-tilling the swale bottom.
 - Scarpe, Rotor-till or cultivate the swale bottom.
 - Restore the dry swale to the original cross section shape and size.
 - Replace the vegetation with grasses chosen from the RI DISM in Table B-2.

MAINTENANCE - Corrective

After each inspection, if the BMP is found to have structural issues or is not functioning properly, the following corrective maintenance can be performed.

Inadequate Vegetation - Any bare spots or thin vegetation should be cultivated and re-seeded.

Erosion & Gully - Any gullies in the banks or bottom of the swale shall be scraped, loamed and seeded. If gullies persist then the areas should be supplemented with an erosion control blanket or rip-rap.

Water retention longer than 48 hours - If the swale holds water longer than 48 hours after a storm event then the bottom of the swale should be rotor-tilled to break up any hard packed soils to a depth of 6 to 12 inches. The area shall then be re-seeded with proper grasses.

BMP - RIP-RAP INLET/OUTLET PROTECTION

DESCRIPTION
 Rip-rap has been proposed at the inlet and outlet of the proposed best management practice, Dry Swale Area. The rip-rap will allow for the safe passage of storm water run-off and will protect the Dry Swale Area from becoming eroded. The outlet rip-rap will also protect the discharge of larger storm events into the previously approved slotted drain system.

ACCESS & SAFETY
 The proposed rip-rap outlet protection devices are located on the southeast corner of the proposed addition away from the pond. Access to these BMP's shall be from the existing asphalt parking area to the east. No known safety issues are associated with this type of best management practice as proposed.

INSPECTIONS

The following inspections shall be performed annually and after storms of greater than 2.8 inches of rainfall. If any of the items below appear to be below standard they should be corrected immediately. Corrective maintenance recommendations can be found under the maintenance portion of this report.

- Adequate vegetation and ground cover
- Erosion and/or gully of banks and berms
- Animal burrows
- Debris and trash buildup
- Sediment buildup

MAINTENANCE - Scheduled

- EVERY YEAR**
 - Keep lawn mowed to a 4 - 6 inch height.
 - Remove any woody vegetation starting to grow in the rip-rap.
 - Remove sediment buildups between the rip-rap stones that exceed the height of the stones.
 - Remove all trash and debris.

MAINTENANCE - Corrective

After each inspection, if the BMP is found to have structural issues or is not functioning properly, the following corrective maintenance can be performed.

Inadequate Vegetation - Any bare spots or thin vegetation should be cultivated and re-seeded.

Erosion & Gully - Any gullies in the banks or bottom of the rip-rap shall be scraped, loamed and seeded. If gullies persist then the areas should be supplemented with an erosion control blanket.

EROSION & SEDIMENT CONTROL PLAN

EXISTING & PROPOSED SITE CONDITIONS

This parcel is currently developed as a recreational campground with existing roads, existing infrastructure and many support facilities and buildings. The campground is located on Lot 17 of AP 1E in Richmond, RI situated between Hillside Road on the west and Gardiner Road on the east. An extensive erosion and sediment control plan and stormwater management plan has been approved by RI DEM for the entire campground. See Wetland Permit No. 10-0125 for further detail.

The proposed project is located on the easterly side of the property near Gardiner Road. The project consists of two items. The first item is the expansion and widening of an existing wooden bridge that crosses a stream flowing from the existing freshwater pond to the existing crossing culvert on Gardiner Road. The existing wooden bridge is presently used for pedestrian traffic to and from the existing recreation hall and campground store. The reason for the proposed widening of the wood bridge is to allow for both pedestrian and golf cart access to the store and recreation hall. Presently the golf carts from the campground have to travel out onto Gardiner Road to gain access to the store/hall. The bridge expansion will alleviate the safety hazard between automobiles and golf carts travelling on Gardiner Road.

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Both items of this project are within the 100 foot riverbank wetland. However, the area is already developed with mature lawns, a propane re-fueling station and the existing pedestrian wooden bridge.

SOILS

The soil classification in the vicinity of the proposed construction site is RaB - Rainbow silt loam, 3 to 8 percent slopes and is classified in a Class C Hydrological group. This soil classification is suited for community development. It has moderate surface permeability and slow substratum permeability. The hazard of erosion is slight to moderate.

CRITICAL EROSION AREA

There are two areas to address during the construction of the bridge expansion and the asphalt access lane. Concerning the bridge expansion; the installation of the new bridge footing in the stream banks could cause sediments to enter the existing stream and wash down stream. The second area of concern is the construction of the access lane. The time of concern is while the excavation of the sub base box is being done and while the gravel base is being placed. Erosion of sediments could wash downhill along the access lane onto the asphalt parking lot and subsequently wash out onto Gardiner Road until such time as the asphalt surface is applied.

EROSION AND SEDIMENT CONTROL MEASURES

All management, vegetative, and structural erosion and sediment control practices will be constructed and maintained according to the Rhode Island Soil Erosion and Sediment Control Handbook standards and specifications.

Several control measures are proposed for this project. Silt fence is to be installed as a construction barrier and to protect the existing stream. Straw wattles will be used to protect the existing asphalt parking lot and Gardiner Road. Sandbags will be placed downstream of the proposed bridge construction. Stone rip-rap is to be installed to protect the dry swale. Loaming and seeding of all disturbed areas.

PERMANENT AND TEMPORARY STABILIZATION

TEMPORARY
 A silt fence will be installed before the start of any construction to mark the down gradient limit of disturbance and to protect against sediment travel by erosion during construction. This silt fence will also protect the existing stream.

Sandbags are to be placed downstream of the bridge to collect sediments and checked periodically. After the footings are installed for the bridge in the stream embankments, the area disturbed around the footing stone, once back filled, shall be covered with straw mulch and spaded in to protect for erosion until a permanent seed is applied.

A straw wattle is to be installed along the edge of the existing asphalt area before the start of construction. All excess material from the excavation of the sub base area for the proposed access lane shall be loaded into trucks while the excavation is being done and hauled to an appropriate disposal area. The straw wattle shall be re-placed after every construction cycle or day. Access to the construction shall be over the access lane area only.

All temporary stabilization methods shall remain in place until permanent methods have been installed and stabilized.

PERMANENT
 The inlet and outlet to the proposed dry swale area is to be lined with rip-rap (3 to 6 inch angular stone) to prevent scouring of the soil. All disturbed areas adjacent to the bridge and asphalt access lane shall be either loamed and hydro seeded that includes a tackifier or loamed and seeded followed by a spaded in hay mulch.

SEQUENCE OF CONSTRUCTION

The following is a list of sequential steps for construction and implementation of the erosion and sediment control and stormwater design plans:

1. Install silt fence before start of any earth disturbance per plan.
2. Install sand bags in stream.
3. Excavate and backfill stump
4. Excavate bridge footings, place stone footings, mulch with straw and spade in.
5. Construct bridge.
6. Install straw wattle
7. Excavate the access lane sub base.
8. Backfill sub-base box with gravel and compact
9. Construct Dry Swale and rip-rap protection
10. Install asphalt
11. Remove silt fence and sandbag footings, mulch with straw and spade in.
12. Loam and seed or hydro seed all disturbed areas.

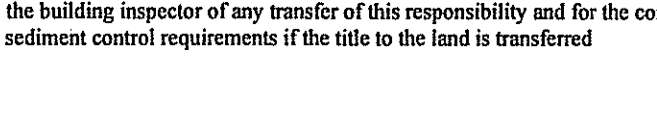
MAINTENANCE

In general, all erosion and sediment control measures will be checked weekly and after each significant rainfall. The silt fence barriers for limits of disturbance shall be checked regularly and maintained throughout all construction phases. The sandbags shall be checked for sediments and stability. All excessive sediments are to be cleaned out after removal. All seeded areas will be checked regularly to see that a good stand is maintained. Areas shall be re-seeded and mulches as needed.

STATEMENT OF RESPONSIBILITY

James J. Smith, president of Wawaloam Reservation, Inc., is assigned the responsibility for the erosion and sediment control measures and informing all parties working on the construction site of the erosion and sediment control plan requirements and objectives. The above named person shall notify the Department of Environmental Management Office of Water Resources Wetland Section and the offices of the building inspector of any transfer of this responsibility and for the conveyance of the erosion and sediment control requirements if the title to the land is transferred.

ENTRANCE DETAIL



STAKING PATTERN DETAIL



STRAW WATTLE TYPICAL

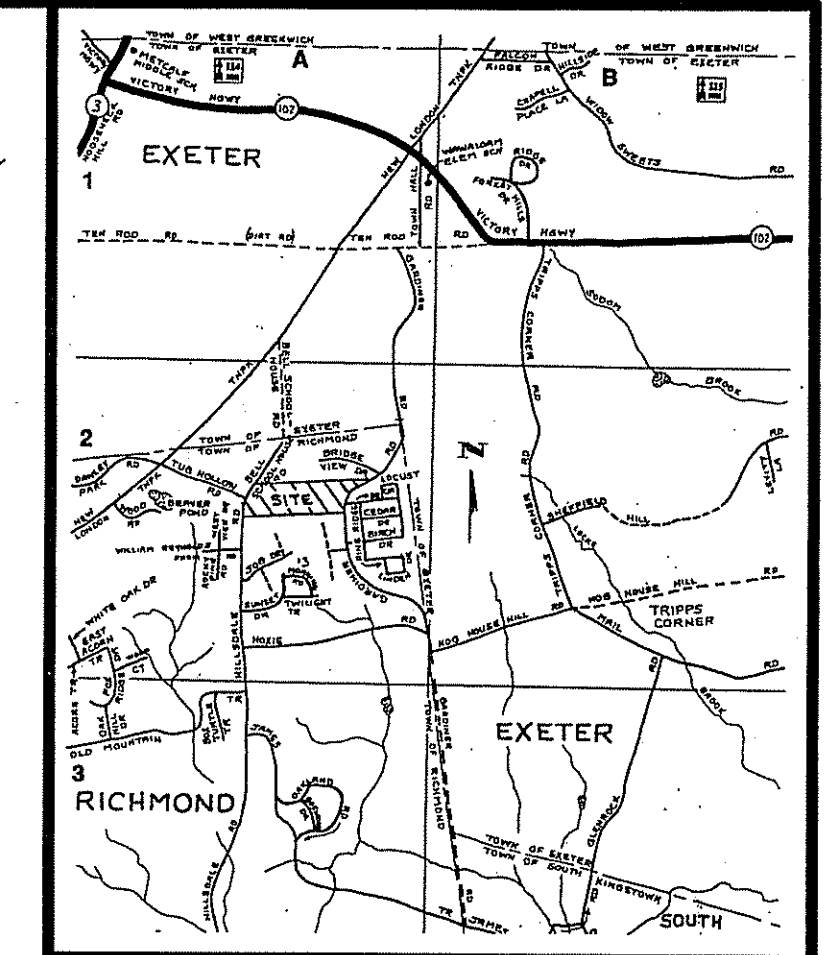
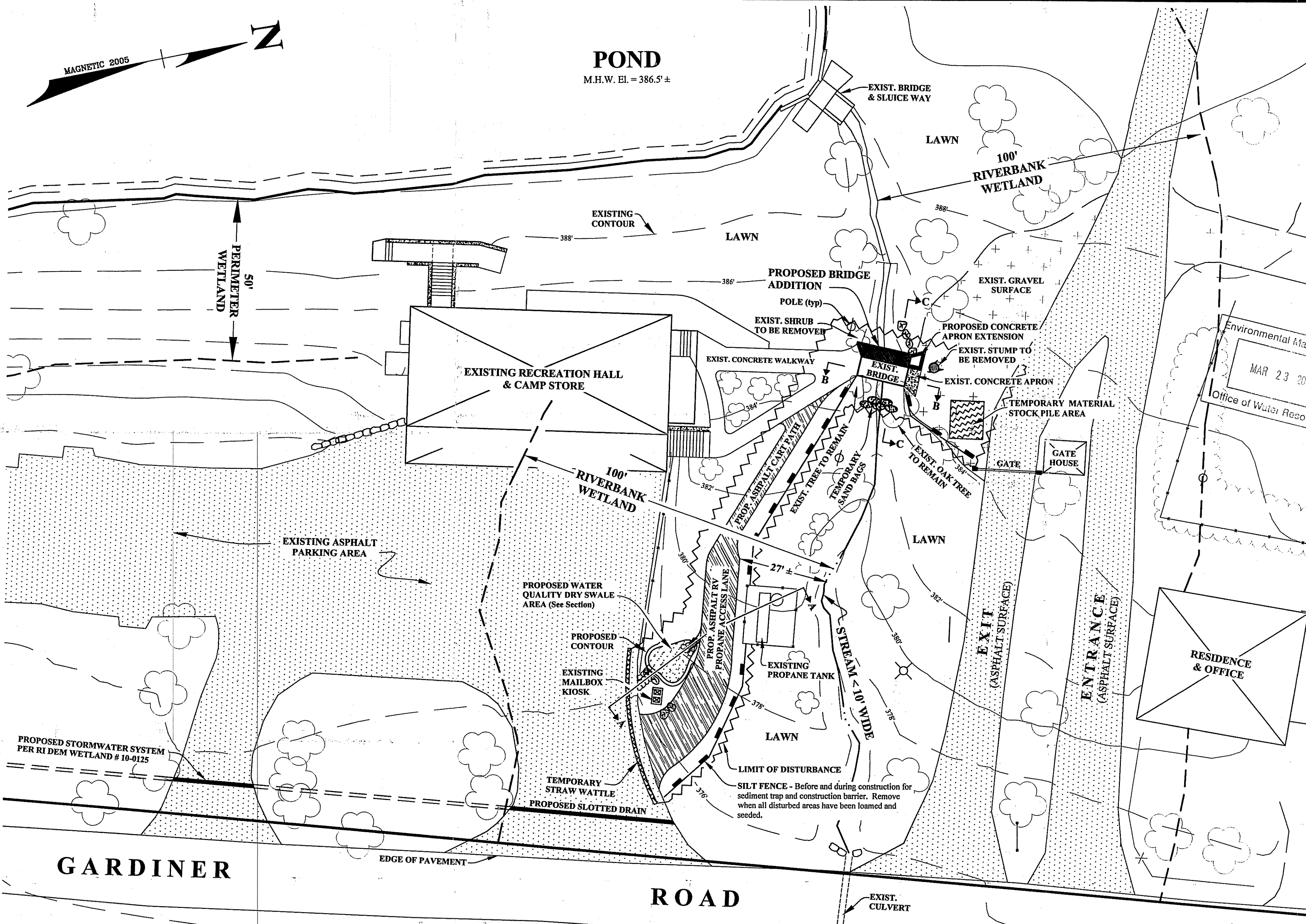


SILT FENCE TYPICAL



PERMANENT SEEDING SCHEDULE

| Plant Species | Quantity | Planting Date | Planting Method |
|---------------|----------|---------------|-----------------|
| Grass | 1000 | Spring | Hydroseed |
| Wildflower | 500 | Spring | Hydroseed |
| Shrub | 50 | Spring | Plant |
| Tree | 10 | Spring | Plant |

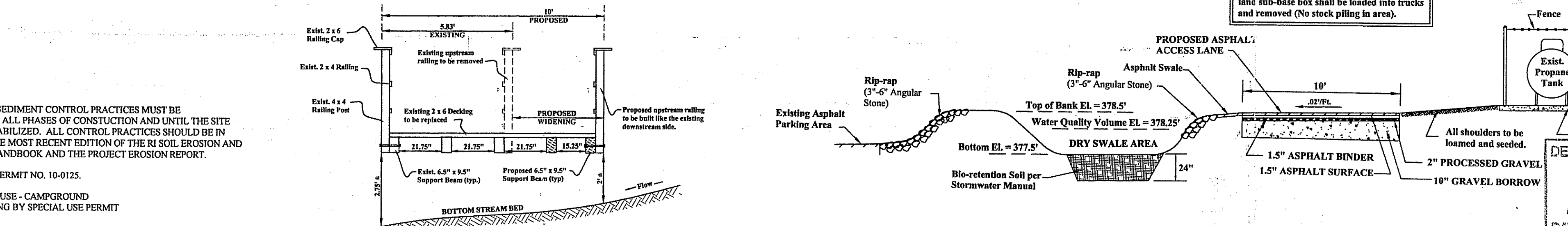


LOCATION MAP

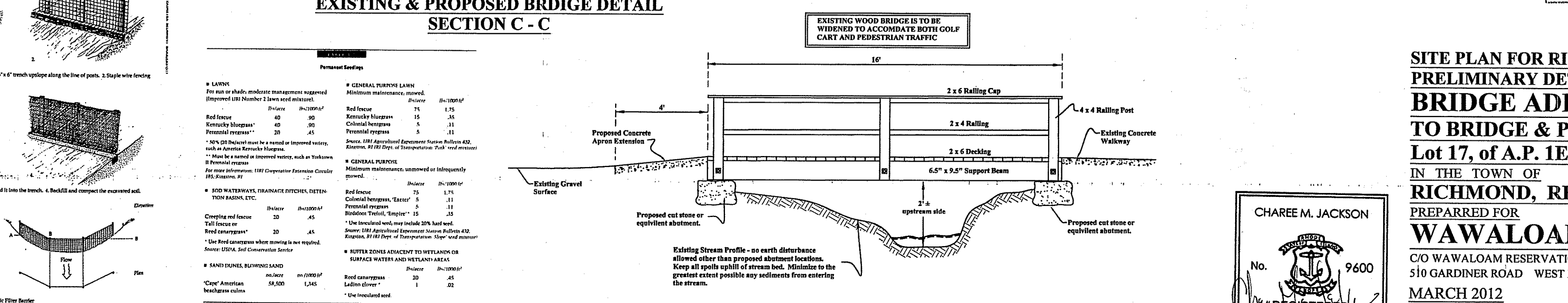
LEGEND

- UTILITY POLE
- EXIST. BUILDING
- EXIST. FENCE
- EXIST. TREE
- EXIST. BRUSHLINE
- EXIST. CONTOUR
- PROPOSED CONTOUR
- SILT FENCE
- STRAW WATTLE
- STOCK PILE AREA
- RIP-RAP
- LIMIT OF DISTURBANCE

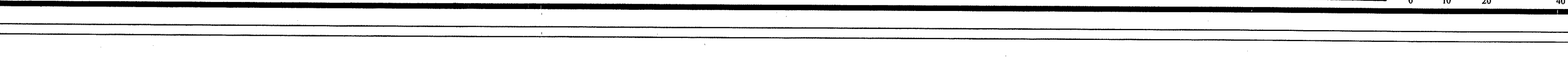
EXISTING & PROPOSED BRIDGE DETAIL SECTION C - C



PROPOSED BRIDGE & PROPANE FUELING ACCESS LANE SECTION A - A



EXISTING & PROPOSED BRIDGE DETAIL SECTION B - B



All access material excavated from the access lane sub-base box shall be loaded into trucks and removed (No stock piling in area).

DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
 OFFICE OF WATER RESOURCES
 FRESHWATER WETLANDS PROGRAM
 APPROVED WITH CONDITIONS
 AS SPECIFIED IN THE LETTER OF APPROVAL
 DATED APR 18 2012 FILE # 12-0055
 NO CHANGES ALLOWED WITHOUT PRIOR APPROVAL
 APPROVED PLANS MUST BE AT ALL CONSTRUCTION SITES

JACKSON SURVEYING, Inc.
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CHAREE M. JACKSON
 No. 9600
 REGISTERED PROFESSIONAL ENGINEER CIVIL

SITE PLAN FOR RI DEM WETLAND PRELIMINARY DETERMINATION FOR BRIDGE ADDITION & ACCESS LANE TO BRIDGE & PROPANE FUELING STATION
 Lot 17, of A.P. 1E
 IN THE TOWN OF RICHMOND, RHODE ISLAND
 PREPARED FOR WAWALOAM CAMPGROUND
 C/O WAWALOAM RESERVATION INC., JAMES SMITH
 510 GARDINER ROAD WEST KINGSTOWN, RI 02892
 MARCH 2012
 SCALE: 1" = 20'