



CONSERVATION DESIGN FORUM

Landscape Architecture • Community Planning • Ecological Restoration • Water Resource and Ecological Engineering

375 West First Street
Elmhurst, Illinois 60126
630.559.2000 phone
630.559.2030 fax
www.cdfinc.com

MEMORANDUM

DATE: MAY 15, 2007
TO: JOHN KREMER, MCHENRY COUNTY CONSERVATION DISTRICT
FROM: TOM PRICE
RE: EXNER MARSH PARKING LOT STORMWATER IMPROVEMENTS
CC: DEANNA GLOSSER, ENVIRONMENTAL PLANNING SOLUTIONS, INC.
REF. #: 04055.01 - 2007-05-15 – EXNER MARSH PARKING IMPROVEMENTS

MEMO:

Background

The Exner Marsh parking lot is located west of Lakewood Road with its entrance located at the east end of Reed Road. As shown in the attached aerial (Figure 1), the parking lot is located at the end of an approximately 500 foot gravel road.

The parking lot surface is gravel and includes a center island protected by standard concrete curb. The perimeter of the parking lot has no curb. Although the site was visited in January, it appears that native vegetation has been established within the center island as well as up to the exterior edge. The aerial suggests that a narrow mow strip may be maintained around the perimeter of the parking lot during the growing season.

CDF was requested to visit the site to identify improvements that could be made to better manage stormwater and reduce surface runoff to the adjacent natural areas and Exner Marsh. It was discussed that the parking lot may be paved at some time in the future.

Drainage

No topographic or any other base mapping was available and the options and recommendations are based solely on visual inspection. The parking lot is quite flat but appears to be sloped to the exterior. It also appears that runoff leaves the parking lot as sheet drainage with little or no concentration of flow. During conversations with Amy Peter from MCCD, significant runoff problems associated with the current parking lot were not reported. Due to the current grading, the gravel surface, the lush native prairie vegetation adjacent to the parking, and the long slope from the parking lot to the wetlands, it is credible that the parking lot is not having a discernable influence on the marsh at this time.

However, if the parking lot is paved with asphalt or other hard material to reduce maintenance or for other reasons, the impacts could become more significant due to the greater runoff frequency and rate.

Recommended improvements Alternatives

If the parking lot is to remain as gravel, the current configuration may be acceptable and no further improvements may be necessary. However, if there is a need to improve and pave that parking lot or if there is concern that the existing lot is causing problems, there are several options that could be implemented to address runoff from the lot.

1. **Install infiltration edge along parking lot perimeter:** The least expensive option would be to retain the current drainage directions and to install infiltration trenches along the edges of the parking lot to intercept the runoff. However, trees that have been planted very near the south edge of the parking lot may prevent this option (at least for the south edge) or the trees would have to be relocated. The infiltration edge should be constructed as follows (See Figure 2 showing bioretention swale):
 - Excavate five foot wide by three foot deep trench and fill it with open graded gravel (IDOT CA-7 gradation) to within approximately six inches of the surface to create a shallow gravel lined swale (Figure 2 without the amended soil layer). The exterior of the trench should be lined with a non-woven, needle punch filter fabric to prevent migration of soil into the gravel trench. The voids within the gravel would provide sufficient storage to completely retain up to a 1 inch rainfall event. Depending on the infiltration capacity of the subgrade soils, larger events could be retained as well. Also, depending on the infiltration capacity of the subgrade soils, a perforated drain may be necessary to allow the portion of the trench below the perforated pipe to drain within 48 to 72 hours. Over time, vegetation may migrate into the stone. However, this should not significantly affect the performance of the trench.
 - Provide overflow route. During most rainfall events, the runoff from the parking lot would drain into the gravel trench and infiltrate into the subgrade soils. During heavy rainfall events the trench and swale would overflow and excess runoff would continue down the slope, similar to what occurs today.
 - **Planted surface swale enhancement:** As an enhancement, widen surface swale to ten feet and install optional 12 inch layer of amended topsoil to allow planting of the surface of the swale with herbaceous vegetation and improve water quality treatment (Figure 2). A layer of filter fabric should be placed between the 5 foot wide gravel trench and the amended topsoil. The topsoil should be amended with organic matter and coarse sand (IDOT gradation FA2) to meet the following specifications to provide sufficient permeability and water quality treatment. The trench would need to be excavated an additional twelve inches deep to provide the same volume of water retention.
 - 70% to 80% sand
 - 8% to 10% organic content
 - <10% clayIt should be noted that compost often has an organic matter content of only 35% to 50%.
 - **Decorative stone enhancement:** As an alternative enhancement, install optional finish layer of decorative stone instead of amended soil. This could be a veneer of decorative stone, hand placed cobbles or similar to provide a more finished appearance. This would not affect performance provided the six inch deep swale surface is retained.
2. **Convert center island to bioretention swale:** As an alternative to the exterior infiltration edges, the center island could be converted to a bioretention swale. This would require the following (See standard detail in Figure 2):

- Regrade parking lot to drain toward the center prior to paving. This would require regrading of the existing gravel surface and may require importing additional gravel to obtain necessary grades prior to paving.
 - Sawcut curb cuts to allow runoff into the center island.
 - Excavate 10 foot wide by four foot deep trench and backfill with open graded stone similar to described under the perimeter infiltration edge.
 - Place 12 inch layer of amended topsoil as described previously over the area of the island.
 - Depending on subgrade soils, it may be necessary to install a perforated pipe within the trench. Because the bioswale is located in the center of the parking lot and up gradient of the parking lot (subsurface water moving laterally must travel beneath the parking lot), the perforated pipe may be necessary to prevent potential softening of the subgrade and premature pavement failure. The need for the drain will depend on the subgrade soils.
 - Provide overflow route. Because the island is surrounded by parking surface, a defined overflow route should be established for events that exceed the retention capacity of the system. A surface inlet (See standard detail in Figure 3) could be provided or topography may allow for surface overflow to the east without significant parking surface flooding. The rim of the inlet should be located approximately 6 inches above the finish grade of the bioswale.
3. **Install permeable paving surface:** Permeable paving surfaces are becoming increasingly popular but remain more expensive than asphalt paving. Pervious asphalt was installed at Ryerson Woods in Lake County. Interlocking concrete permeable pavers have been installed at Waubensee Community College in Sugar Grove, Otto Engineering in Carpentersville, and numerous other locations. Permeable asphalt suffers from many of the same limitations as conventional asphalt, including longevity and need for periodic resurfacing. Interlocking permeable pavers are much more durable than asphalt and should last well over 50 years with proper design and installation. Also, permeable pavers are, visually, more obviously permeable and therefore help to tell the story of proper stormwater management. However, the installation cost is approximately twice that of conventional asphalt paving. A permeable paving installation would include the following (see standard detail in Figure 4).
- Remove existing gravel parking surface and replacement with a 12-inch base of open graded stone (IDOT CA-7 graded crushed gravel). (Thickness is subject to adequate subgrade soil strength).
 - Install perimeter barrier or ribbon curb to provide edge restraint for permeable surface.
 - Install permeable pavers on a one to two inch bed of CA16 gravel. Or alternatively, install permeable asphalt.
 - Depending on the infiltration capacity of the subgrade soils, install perforated pipe(s) to ensure drainage of the permeable base within sufficient time to prevent softening of the subgrade (within 72 hours for 10- to 100-year event).
 - Grade to drain to the perimeter of the parking lot to allow for surface overflow for extreme rainfall events that exceed the surface infiltration capacity of the permeable surface.
4. **Install Level Spreader:** If perforated drain pipes are necessary for either of the two options above, a level spreader should be provided at the end of the perforated pipe to deconcentrate the runoff (See standard detail in Figure 5). As the name implies, the level spreader must be installed on the level and should be approximately 30 feet long for a four inch drain pipe. The perforated pipe within the level spreader should be 8 inches to allow adequate distribution of the runoff over the length of the level spreader. The discharge rate to a level spreader must be limited to prevent downstream erosion. Thus, a surface inlet from the parking lot should not be

connected directly to a level spreader except when the inlet is installed in conjunction with a bioretention swale that can reduce flow rates and/or the discharge is controlled by a 4-inch or similar drain pipe.

Figure 1: Parking Lot Location



Figure 2: Infiltration Trench/Bioswale Standard Detail

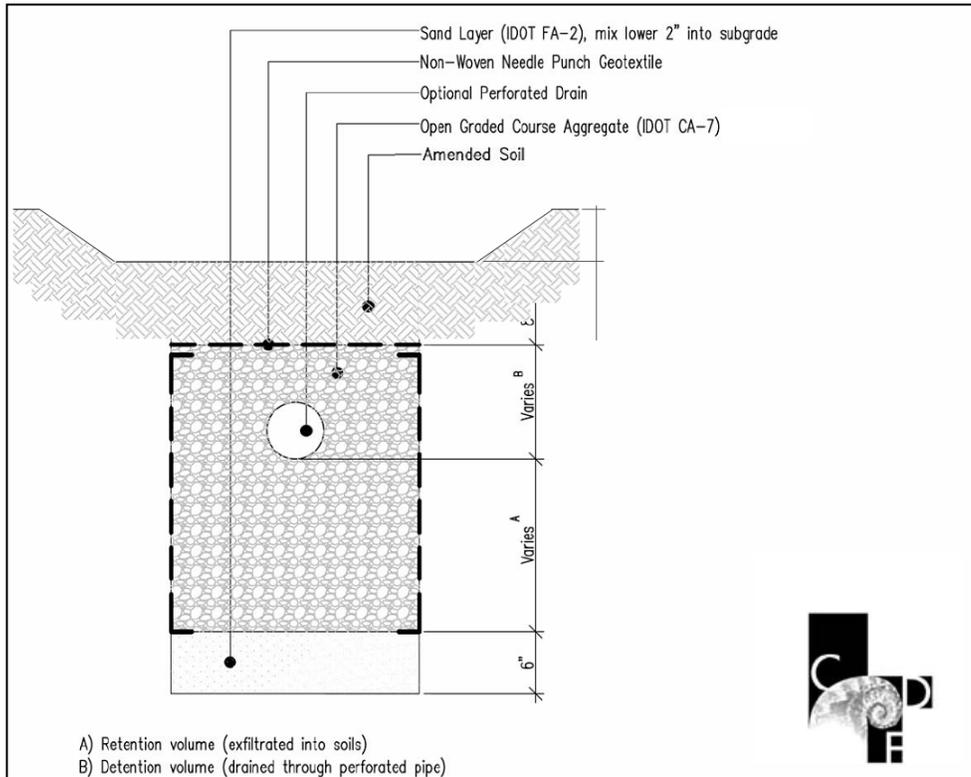


Figure 3: Bioswale Surface Inlet Standard Detail

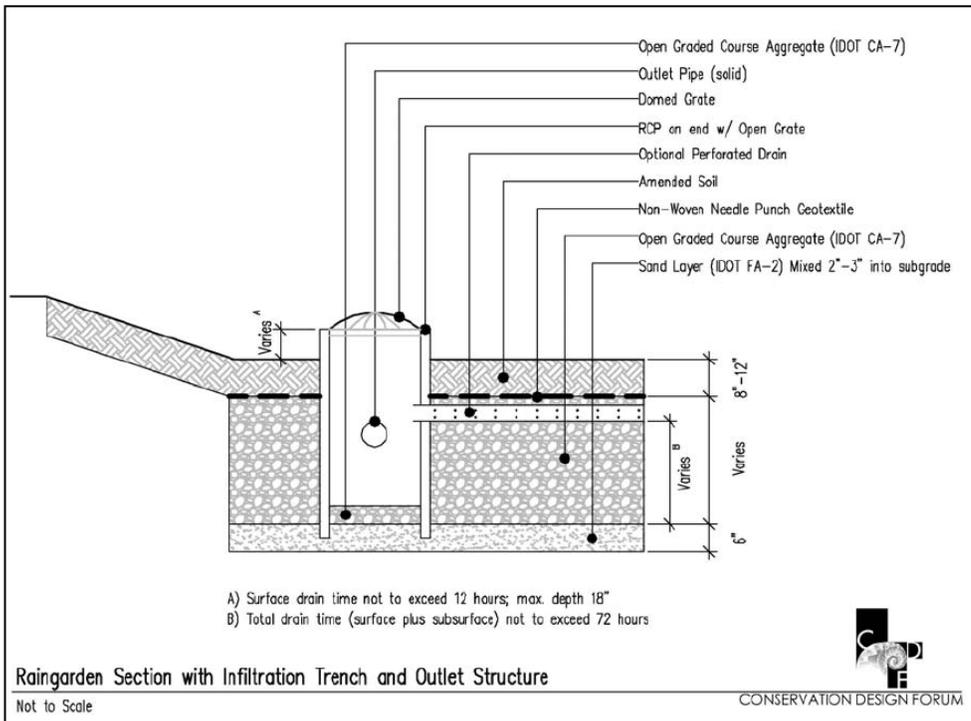


Figure 4: Permeable Paver Standard Detail

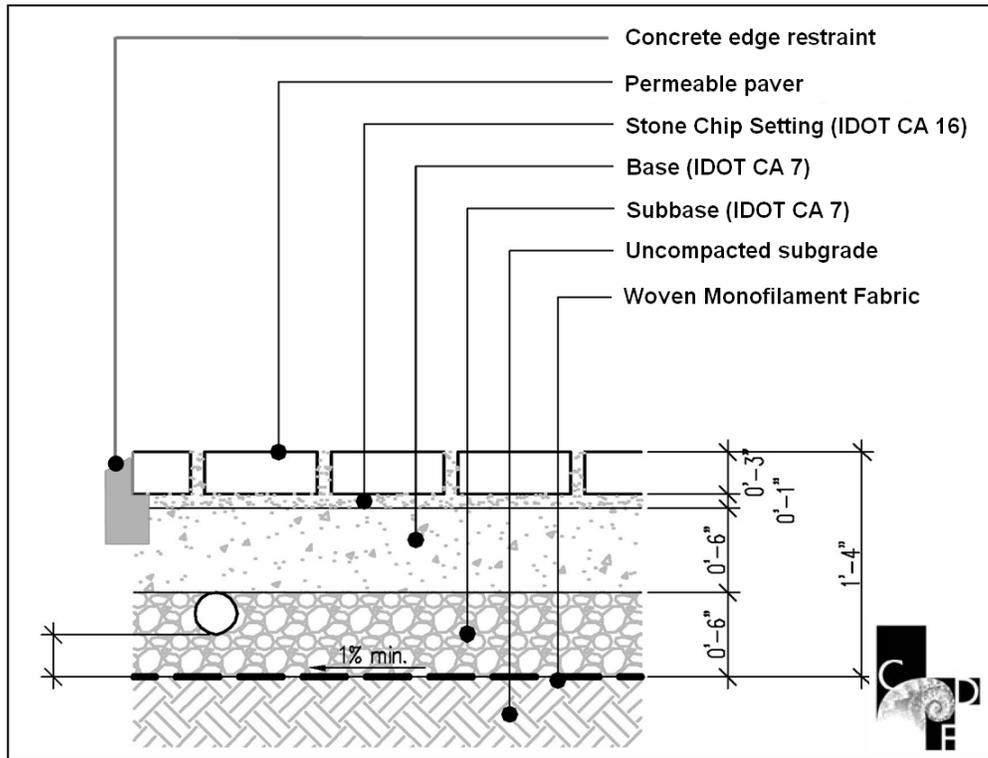


Figure 5: Level Spreader Standard Detail

