Attachment 6

City of Boynton Beach
Construction Site Inspection Plan and Inspection Form

Third Term, Year 1 Report
March 2012

Construction site inspections are conducted for land-disturbing projects which have the potential to discharge stormwater runoff into our MS4.

Timing

Construction site inspections are conducted:

- Before the start of construction, after the placement of temporary BMPs
- During construction (one or more inspections, based on the project's potential for discharge to our MS4)
- At the end of the construction

Site Priority

All construction sites are considered priority if they have the potential to discharge into water bodies or our MS4. Sites will be inspected with a frequency deemed appropriate during the site plan review process and with consideration to rainfall events. In addition, any sites where compliance is a concern, will be inspected more frequently.

Inspection Procedure

Inspections are the responsibility of the Utilities Department and are conducted using the attached construction site inspection form. The intent of the inspection is to verify that BMPs are performing and to document the inspections. All completed inspection forms are kept in the project file.

Enforcement

Instances of non-compliance will be handled with successively more rigorous enforcement measures.

1. Notice of Violation
2. Stop work order

The construction site inspector will issue notices of violation or stop work orders as deemed necessary.

City of Boynton Beach
Utilities Department
Construction Site
Stormwater Inspection Report

Project Name: _____
Permit or CIP # _____
Location: _____
Property Owner: _____

Project Start Date_____
Contractor: _____
Site Representative: _____
Telephone: _____

		Yes	No	NA
1	Erosion and turbidity controls properly installed and maintained?			
2	Disturbed areas properly stabilized?			
3	Offsite areas adjacent to disturbed areas protected?			
4	Receiving waters protected with turbidity barrier and other means as needed?			
5	Offsite soil tracking prevented and roadway cleaned?			
6	Stormwater inlets adequately protected from sediment?			
7	Soil stockpiles adequately contained / stabilized?			
8	Erosion problems addressed as they arise?			
9	Trash / Hazardous / Toxic materials contained and protected from stormwater?			
10	Site subject to NPDES permit ≥ acre disturbed?			
11	Stormwater Pollution Prevention Plan (SWPPP) on site?			
12	Erosion and Sediment Control Plans on site? (if not part of the SWPPP).			
13	Notice of Intent (NOI) and required permits on site?			
14	Violation found? If yes, Check action taken below: ☐ NOV ☐ Notified Contractor ☐ Stop Work ☐ Referred to PBCDPEP ☐ Other			

List Receiving Water Bodies: _____
_____

Overall Status: _____
_____
_____

Comments: _____
_____
_____

CHAPTER 5 – EROSION AND SEDIMENT CONTROL

Erosion is the process by which the land surface is worn away by the action of water and wind. Flowing water can create small channels and eventually larger channels, and washouts around pipe end walls and structures. Wind erosion can cause health and safety problems and is a source of fugitive dust.

Sedimentation occurs when the eroded soil particles from the land surface are deposited at a new location. When erodible material enters a stormwater conveyance system, capacity is reduced. When it enters a body of water, it is considered a pollutant. Turbidity occurs when eroded soil is suspended in the water. Turbid water can stress or kill fish by clogging their gills and making it hard for them to see food sources.

A critical time when erosion can occur is when land is cleared of vegetation and graded. The removal of natural vegetation and topsoil renders the exposed area particularly susceptible to erosion, causing transformation of existing drainage areas and disturbance of sensitive areas. Erosion control is the process of minimizing the amount of soil that runs off during the construction process, and sediment control is the process of retaining eroded soil on site, and preventing damage to water bodies and infrastructure.

Effective and practical measures should be used to minimize erosion potential and prevent sediments from leaving the site and reaching the stormwater system and water bodies. Erosion and sediment control practices that can typically be used are; 1) Temporary gravel construction entrance, 2) Construction road stabilization, 3) Silt fence, 4) Storm drain inlet protection, 5) Temporary diversion dike, 6) Temporary sediment trap, 7) Outlet protection, 8) Rip rap, 9) Check dams, 10) Temporary seeding, 11) Permanent seeding, 12) Sodding, and 13) Dust control.

5.01 Temporary Gravel Construction Entrance

Construction entrances provide an area where mud can be removed from construction vehicle tires before they enter a public road. A stone stabilized pad should be located at points of vehicular ingress and egress.

The pad is to be constructed of 1.5 inch to 3.5 inch stone to a thickness of at least 6 inches. It must extend the full width of the vehicular ingress and egress area. The length of the entrance should be at least 50 feet.

If conditions on the site are such that the majority of the mud is not removed from the vehicles traveling over the gravel, then the tires of the vehicles must be

washed. Wash water should be carried away from the entrance to a settling area to remove the sediment.

The entrance shall be maintained in a condition that will prevent tracking or flow of mud onto public roads. This may require periodic top dressing with stone, as conditions demand.

5.02 Construction Road Stabilization

Areas which are graded for construction traffic are especially susceptible to erosion. The exposed soil surface is continually disturbed. Such areas also tend to collect and transport runoff water along their surfaces. Temporary stabilization will reduce erosion.

Roads shall follow the natural terrain as much as possible. Slopes should not exceed 10 percent. All cuts and fills shall have side slopes no greater than 3 horizontal to 1 vertical. Place a 6 inch course of FDOT No. 1 aggregate to a width of at least 14 feet for one-way traffic and 20 feet for two-way traffic. Top dress periodically with new gravel.

5.03 Silt Fence

A silt fence is a temporary sediment barrier constructed of posts and filter fabric. It is placed across or at the toe of a slope or in a minor drainage way to intercept and detain sediment and decrease flow velocities from drainage areas of limited size. Under no circumstances shall silt fences be constructed in live streams or in swales or ditches where flows exceed 1 cubic foot per second.

Filter fabric shall be a pervious sheet of propylene, nylon, polyester or ethylene yarn containing ultraviolet ray inhibitors. The height of the silt fence shall be between 15 and 18 inches. Posts shall be hard wood, spaced a maximum of 6 feet apart, and driven securely into the ground (minimum of 12 inches). Trench fabric into the ground a minimum of 8 inches. Cant silt fence towards the flow. Splice filter fabric together only at a post. Silt fences can be removed after they have served their purpose, but not before the upslope area has been permanently stabilized.

Inspect silt fences immediately after each rainfall and at least daily during prolonged rainfall. Any required repairs shall be made immediately. Remove sediment when deposits reach one-half the height of the barrier.

5.04 Storm Drain Inlet Protection

Inlet protection prevents sediment from entering storm drainage systems prior to permanent stabilization of the disturbed area. It prevents excessive distribution of sediment and it decreases the probability of reducing their capacity.

For protection of curb inlets, place drainfield pipe in front of the opening and anchor using sand bags. Drainfield pipe consists of perforated drain pipe with a filter fabric sock. For protection of other inlets, install a silt fence around the inlet or place sod to form a turf mat covering the soil for a distance of 4 feet from each side of the inlet structure.

These inlet protection devices are for areas of less than one acre. Areas larger than one acre should be routed through a temporary sediment trap.

Inlet protection should be inspected after each rain and repairs made as needed. Remove sediment when it has accumulated to ½ the design depth of the protection device. The inlet protection can be removed when the drainage area has been properly stabilized.

5.05 Temporary Diversion Dike

A diversion dike is a ridge of compacted soil located at the top or base of a sloping disturbed area. It diverts storm runoff from unprotected slopes to sediment trapping facilities.

The dike should be at least 18 inches in height with a top width of at least 24 inches and a minimum base width of 4.5 feet. Side slopes are to be 3 horizontal to 1 vertical or flatter. The channel behind the dike shall have a positive grade to a stabilized outlet. If the channel slope is less than or equal to 2 percent, stabilization is usually not required. If the slope is greater than 2 percent, the channel should be stabilized. If the dike is going to remain in place for more than 30 days, temporary or permanent vegetation should be established. The maximum allowable drainage area should be 5 acres.

The diversion dike should be inspected and repaired after each rainfall. It should also be inspected and repaired once every week, whether a storm has occurred or not. Damage caused by construction traffic must be repaired before the end of each working day.

5.06 Temporary Sediment Trap

A sediment trap is a ponding area formed by excavation and/or an embankment across a drainageway to detain sediment laden runoff. The detainment is long enough to allow the majority of the sediment to settle out. It is usually installed in a drainageway, at a storm drain inlet or at other points of discharge from a disturbed area. The contributing drainage area should be no more than 5 acres. The sediment trap should have an initial storage volume of 67 cubic yards per acre of drainage area. The outlet should be constructed and maintained so that sediment does not leave the trap and that erosion of the outlet does not occur.

Sediment shall be removed and the trap restored to it's original dimensions when the sediment has accumulated to ½ the design volume of the trap. The structure should be checked regularly to insure that it is structurally sound. The structure should be removed and the area stabilized when the upslope drainage area has been stabilized.

5.07 Outlet Protection

Outlet protection consists of rock rip rap placed below storm drain outlets to reduce erosion at the outlet and to reduce flow velocities before storm water enters the receiving channel below the outlet. Protection is constructed at zero grade for a distance related to the outlet flow rate and the tailwater level. Line apron area with filter fabric before placement of rip rap. The criteria for designing outlet protection is as follows:

1. Thickness to be 1.5 times the maximum rock diameter but not less than 6 inches.

2. The width should extend across the channel bottom and up the channel banks to an elevation 1 foot above the maximum tailwater elevation.

   If the pipe discharges onto a flat area with no defined channel, the upstream width shall be at least 3 times the diameter of the outlet pipe. The downstream end for a minimum tailwater condition (tailwater depth is less than half the diameter of the outlet pipe) shall have a width equal to the pipe diameter plus the length of the apron. For a maximum tailwater condition (tailwater depth greater than half the diameter of the pipe) the downstream end shall have a width equal to the pipe diameter plus 0.4 times the length of the apron.

3. Side slopes shall not be steeper than 2 horizontal to 1 vertical in a well defined channel.

4. There are to be no bends in the horizontal alignment.

5. The apron length shall be at least 4.5 times the diameter of the outfall pipe.

6. Thirty percent of the rock rip rap shall be larger than 6 inches in diameter.

5.08 Rip Rap

Rip rap is a permanent, erosion resistant ground cover of large, loose, angular rock underlain with filter fabric installed whenever soil conditions, water turbulence and velocity are such that soil may erode under design flow conditions. Rip rap may be used at storm drain outlets, to line channels, at roadside ditches, and at drop structures.

Rip rap that contains a mixture of stones that vary in size from small to large is preferred. The size of the stone is determined according to the tailwater condition mentioned in paragraph 5.07.

The thickness of the rip rap layer shall be 1.5 times the maximum stone diameter but not less than 6 inches. The stone should be angular, have a specific gravity of at least 2.5, and not disintegrate on exposure to water and weathering.

When lining a channel bend, rip rap shall extend across the bottom and up both sides, and extend upstream from the point of curvature and downstream from the point of tangency a distance of at least 5 times the channel bottom width.

Where rip rap is used only for bank protection and does not extend across the bottom of the channel, the rip rap shall be keyed into the bottom of the channel to a minimum depth equal to the thickness of the blanket.

Filter fabric is to be placed between the rip rap and the underlying soil surface to prevent movement of soil into or through the rip rap.

Once rip rap installation has been completed, it should require very little maintenance. It should, however, be inspected periodically to determine if high flows have caused scour beneath the rip rap or dislodged any of the stone. If repairs are needed they should be accomplished immediately.

5.09 Check Dams

Check dams are constructed of stone across a swale or drainage ditch to reduce the velocity of concentrated stormwater flows, thereby reducing erosion. It also

helps trap small amounts of sediment. This practice is limited to use in small open channels which drain less than 10 acres.

The maximum height of a check dam should be 2 feet. The center should be at least 6 inches lower than the outer edges. The maximum spacing between the dams should be such that the toe of the upstream dam is at the same elevation as the top of the downstream dam. Check dams should be constructed of FDOT No. 1 aggregate (2-3 inch stone).

Check dams should be checked for sediment accumulation after each significant rainfall. Sediment should be removed from behind the check dams when it has accumulated to one half of the original height of the dam. Regular inspections should be made to insure that the center of the dam is lower than the edges. Erosion caused by high flows around the edges of the dam should be corrected immediately.

Check dams must be removed when their useful life has been completed. The area beneath the check dams should be seeded and mulched or sodded (depending on velocity) immediately after they are removed.

5.10 Temporary Seeding

Establishing temporary vegetative cover by seeding will reduce erosion and sedimentation by stabilizing disturbed areas that will not be brought to final grade for a year or less. It will reduce problems associated with mud and dust production from bare soil surfaces during construction.

Use mulch to reduce damage from water runoff or wind erosion, and to improve moisture conditions for seedlings.

5.11 Permanent Seeding

Establish permanent seeding to reduce erosion and sedimentation in areas that can be final graded.

5.12 Sodding

Sodding establishes permanent turf immediately, prevents erosion and damage from sediment and runoff, reduces the production of dust and mud, and stabilizes drainageways where concentrated overland flow will occur.

On slopes greater than 3 horizontal and 1 vertical, sod shall be laid with staggered joints and secured by pegging. Install sod with the length perpendicular to the slope.

5.13 Dust Control

Dust control reduces surface and air movement of dust from exposed soil surfaces and reduces the presence of airborne substances which may be harmful or injurious to human health, welfare, or safety, or to animal or plant life.

The less soil exposed at any one time, the less potential there will be for dust generation. Phasing the work and utilizing temporary stabilization practices upon the completion of grading can significantly reduce dust emissions.

Sprinkling the exposed areas with water until the surface is wet and repeating as needed is the most economical and efficient way to control dust.