OPERATIONS AND MAINTENANCE MANUAL- WET POND

Project: _GlenPark Subdivision_(15-SB-011)_

STORMWATER CONTROL STRUCTURE-Wet Detention Pond

Cary, NC

Owners: GlenPark Owners Association INC

Prepared By:__Ashton Raleigh Residential LLC._____

Date:___2/06/2017___

Project: _15-SB-011 GlenPark__

Date Constructed: __Summer-Fall 2016__

Location: 1305 Walnut Street, Wake County

Receiving Water Course:___Neuse__

Contractor: (List below)

Impoundment & Dam	Kenneth West INC
Spillway	Kenneth West INC

Material Supplies: (List below)

Riser Structure	3x3 Pre Cast RCP Box
DIP, Bottom Drain	6” DIP Drawdown/Attachment for Temp Skimmer
Clow Gate Valve	6” Gate Valve
Outlet Pipe	15” RCP Class III with Concrete Cradle
Trash Rack	Welded Rebar

OPERATIONS & MAINTENANCE MANUAL

(Project Name): GlenPark Wet Detention Pond

This manual established procedures for maintenance and operation of the (Project) __15-SB-011__ wet detention pond # 1 in accordance with the Town of Cary guidelines as set forth in the LDO, Chapter 4.4.6.

I. Maintenance of Embankments

A. Vegetation

The embankment has a ground cover of fescue, which if properly maintained will prevent erosion of the embankment and provide an easy surface for inspection. The grass will be most difficult to obtain in the area subject to water level fluctuation below the top of the riser. Grass should be fertilized every October and April.

- Re-Seeding – periodically re-seeding may be required to establish grass on areas where seek did not take or has been destroyed. Before seeding, fertilizer (12-12-12) should be applied at a minimum rate of 12 to 15 pounds per 1,000 SF. The seed should be evenly sewn at a rate of three pounds per 1,000 SF. The seed should be covered with soil to the depth of approximately ¼". Immediately following the planting, the area should be mulched with straw.

- Trees & Shrubs – trees, shrubs, and other landscape vegetation should be permitted only as shown on the approved planting plan.

- Mowing – grass mowing, brush cutting and removal of weed vegetation will be necessary for the proper maintenance of the embankment. All embankment slopes and vegetation of spillways should be mowed when the grass exceeds 8" in height. Acceptable methods include the use of weed whips or power brush cutters and mowers.

B. Erosion

Erosion occurs when the water concentrates causing failure of the vegetation or when vegetation dies and sets up the environment for rill erosion and eventually gullies from the stormwater runoff. The dam should be inspected for these areas. Proper care of vegetative areas that develop erosion is required to prevent more serious damage to the embankment. Rills and gullies should be filled with suitable soil compacted and then seeded. Methods described in Section I-A, on vegetation, should be used to properly establish the grass surface. Where eroded areas are detected, the cause of the erosion should be addressed to prevent a continued maintenance problem. Frequently problems result from the concentration of runoff to one point of the embankment crest instead of a uniform distribution of runoff. This

can be corrected by reshaping the crest to more evenly distribute the runoff to areas, which are not experiencing erosion problems. The top of the dam should not be allowed to be used for pedestrian or bicycle traffic.

- Abutment Areas -- the abutment is the line formed where the embankment fill comes into contact with the existing slope. Runoff from rainfall concentrates in these gutter areas and can reach erosive velocities because of the steep slopes. If a normal stand of grass cannot be maintained on the abutments, additional measures may be needed such as jute matting to provide for the establishment of a good ground cover.

- Upstream Embankment Slope – Erosion problems can develop on the upstream face of the dam due to the fluctuation of water level in the pond. This is a result of a combination of wave actions and ground saturation, which occurs from the elevated water levels. The erosion generally occurs as the water level falls and the saturated ground becomes subjected to the wave action. If erosion becomes a problem, it may necessitate the installation of a stone armoring along the zone subject to fluctuating water level. This would consist of 18” of NCDOT Class B stone for erosion control underlain with Mirifi 140 geotextile fabric. It should be centered at the point of the erosion problem and covering an area 2’ above and below the approximate center of the eroded area.

C. Seepage

- Detection – due to the fact that the “permanent” impoundment level is only 6’ deep, and the road embankment is immediately downstream and continuous with the dam embankment, seepage should not be expected on the downstream slope of the embankment. However, a cursory inspection of the road embankment should be made for completeness of the inspection. Seepage may vary in appearance from a soft wet area to a flowing spring. It may show up first as only an area where the vegetation is more lush and darker green. Cattails, reeds, mosses and other marsh vegetation often become established in a seepage area. The downstream abutment areas where the embankment fill and natural ground interface are very common locations for seepage. Also the contact between the embankment and the spillway conduit is a very common location which is generally attributed to poor compaction around the conduit. Due to the way in which conduits are put in, this is generally most evident on the underside of the conduit. Slides may result from excessively saturated embankment slopes. The natural foundation area immediately downstream of the dam abutment should also be inspected to ensure that “piping” is not occurring underneath the embankment. “Piping” may appear as a “boil” evident as spring carries soil. The soil usually deposits around the boil area and is evident by the sedimentary deposits accompanying it. Seepage can also occur into the spillway conduit through cracks in the pipe or improperly sealed joints. These can be seen by observing the conduit when the water level is high. The movement of the water itself is not dangerous, but if soil particles are being carried with

it, then it can create a shortcut for the piping of soil. This might show up on the upstream face of the embankment roughly along the line of the conduit itself.

D. Cracks, Slides, Sloughing, and Settlement

- Cracks – the entire embankment should be inspected for cracks. Short, isolated cracks are usually not significant, but larger cracks (wider than ¼"), well defined cracks indicate a serious problem. There are two types of cracks: transverse and longitudinal.

  Traverse cracks appear crossing the embankment and indicated difference of settlement within the embankment. these cracks provide avenues for seepage and piping could develop.

  Longitudinal cracks run parallel to the embankment and may signal the early stages of a slide. In recently built structures, these cracks may be indicative of poor compaction or poor foundation preparation resulting in consolidation after construction.

- Slides – Slides and slumps are serious threats to the safety of an embankment. Slides can be detected easily unless obscured by vegetation. Arch shaped cracks are indications that slides are slipping or beginning to slip. These cracks soon develop into large scarps in the slope at the top of the slide.

- Settlement – settlement occurs both during construction and after the embankment has been completed and places in service. To a certain degree this is normal and should be experienced. It is usually the most pronounced at the location of maximum foundation depth or embankment height. Excessive settlement will reduce the free board (difference in elevation between the water surface and the top of the dam). Any area of excessive settlement should be restored to original elevation and condition to reduce the risk of overtopping. A relatively large amount of settlement (more than 6") within a small area could indicate serious problems in the foundation or perhaps the lower part of the embankment. Settlement accompanied by cracking often precedes failure.

- What to do if seepage, cracks, slides or settlement are detected: If any of the above items are detected there may be signs of significant problems, which could lead, to the failure of the structure. A geotechnical or civil engineer should be consulted regarding the origin of these problems and for the assessment of the appropriate solutions for correcting them. If the professional is not immediately able to inspect the dam, then the bottom drain should be opened and the water level lowered to remove the risk of failure until a professional can observe these problems.

E. Rodent Control

Generally in this urban environment, rodents are not a problem. Rodents such as ground hogs, muskrats, and beavers are attracted to dams and

reservoirs and can be quite dangerous to structural integrity and proper performance of the embankment and spillway. Groundhog and muskrats thrive on burrowing in the manmade earth embankments, which become pathways for seepage. In the event that burrows are detected within the dam, then the rodents should be dealt with by removal.

II. MAINTENANCE OF SPILLWAYS& CONTROL STRUCTURES

A. Inspection of Spillway Conduits

Conduits should be inspected thoroughly once a year. Conduits should be visually inspected by actually entering the conduit a sufficient distance between the riser structure and the outlet to check all the joints. Because the outlet works tie into the street storm sewer system, catch basins and pipes. Conduit should be inspected for proper alignment (sagging), elongation and displacement at joints, cracks, leaks, surface water, surface wear, loss of protective coating, corrosion and blocking. Problems with conduits most often occurs at joints and special attention should be given to them during inspection. Joints should be checked for gaps caused by elongation or settlement and loss of joint filler material. Open joints can permit erosion of the embankment material and possibly the piping of soil material through the joints. Catch basin should be checked for signs that water is seeping along the exterior surface of the pipe where it enters the catch basin. A depression in the soil surface over the pipe may be signs that soil is being removed from around the pipe.

- ♦ What to do if problems are detected with the spillway: Retain the assistance of a civil engineer or geotechnical engineer qualified in the design of embankments to perform an inspection of the dam. If in doubt, lower the water surface elevation of the pond until such time as an inspection can be performed by a qualified professional.

B. Trashracks on Pipe Spillways

The spillway riser for this dam is the only spillway structure. The intake structure has been fitted with a trashrack to prevent debris from entering the spillway structure. Most of the runoff entering the pond comes in through grated inlets, which have essentially provided filtration of the runoff and should limit the size of the debris that enters the basin to floating debris which will most likely pass through the trashrack. The opening between the trashrack and riser is smaller than the opening of the outlet pipe. the intent is that any debris, which passes through the trashrack, will be easily passed by the pipe outlet.

Maintenance should include periodically checking the rack for rusted or broken sections and repairing as needed. The trashrack should be checked frequently during and after storm events to ensure that it is properly functioning and to remove accumulated debris.

III. OPERATION

A. Lake Drains

Lake drains should always be operable so that the pool level can be drawn down in case of an emergency or for repairs or maintenance. Lake drain valves or gates that have not been operated for a long time present a special problem. Generally, when draining the pond, it should be drained slowly. Open the drain until a good flow of water is present but not a torrent, so that the water level can be drained over a period of 48 hours or more. Rapidly lowering the water level in the pond can cause permanent damage to the embankment and must be avoided. The gate valve controlling the lake drain should be operated from fully closed to fully opened position at least twice a year.

B. Record Keeping

Operation of a dam should include recording of the following:

- Annual Inspection Reports – a collection of written inspection report should be kept on record in Section IV of this manual. Inspection should be conducted annually. Copies should be provided to the Town of Cary Stormwater Management Section of the Engineering Division.
- Observations – all observations should be recorded. Where periodic inspections are performed following significant rainfall events, these inspections should be logged into the Periodic Inspection, Operation & Maintenance Form in Section IV of this manual.
- Maintenance – written records of maintenance and/or repairs should be recorded on the Periodic Inspection, Operation & Maintenance Form in Section IV of this manual.
- Other Operation Procedures – the owner should maintain a complete and up-to-date set of plans (as-built drawings) and all changes made to the dam over time should be recorded on the as-builts.

C. Sedimentation & Dredging

Sedimentation from establishing areas tributary to the pond will eventually result in the reduction of the retention pool and eventually will have to be removed. the frequency of this sediment removal can be reduced by ensuring that the site areas around the building be stabilized with a vegetative ground cover such that it restrains erosion. This would include a periodic application of fertilizer and other treatments necessary to promote a stable groundcover and minimize sedimentation to the pond. The maintenance on this pond requires that when the sediment level (as measured from the top of the riser to the sediment pool) is within 72” of the top of the riser that the sediment must be removed and the original pond restored. For aesthetic purposes it may be desirable to maintain it prior to this point. Generally, the dredging process begins with the removal of as much water as possible from the deposited silt and so the material can be excavated with conventional

equipment for trucking offsite. The removed material should be hauled offsite to a suitable landfill site or mounded somewhere on site and stabilized with a groundcover sufficient to restrain erosion.

IV. INSPECTION, OPERATION & MAINTENANCE CHECKLISTS

V. SPECIAL CONSIDERATIONS

POND INSPECTION CHECKLIST

Date: _____
Time: _____

(Project Name): GlenPark Wet Detention Pond # ____, Cary, NC

SPILLWAYS – DRAINS – OUTLETS

Check/Circle Condition Noted	Observations	Action – Repair	Action – Monitor	Action -- Investigative
Principal Spillway	**Type:**			
Trashracks/Debris				
Cracks/Deterioration				
Joint Deterioration				
Improper Alignment				
Cracks/Deterioration				
Joint Deterioration				
Seepage/Piping				
Undercutting				
Erosion				
Debris				
Lake Drain/Other Outlets	**Type:**			
Gates/Valves				
Operability				

General Comments, Sketches & Field Measurements

POND INSPECTION CHECKLIST

Date: _____
Time: _____

(Project Name): GlenPark Wet Detention Pond # ____, Cary, NC

EMBANKMENT -- POOL

Check/Circle Condition Noted	Observations	Action – Repair	Action – Monitor	Action -- Investigative
U/S Slope	**Type:**			
Vegetation/Riprap				
Beaching/slides/cracks				
Undermining/erosion				
Rodent burrows				
Crest	**Type:**			
Ruts/erosion				
Cracks/settlement				
Poor alignment				
D/S Slope	**Type:**			
Vegetation/erosion				
Rodent burrows				
Sloughs/slides/cracks				
Seepage/wetness				
Pool	**Type:**			
Erosion/ground cover				
Sedimentation				
Water quality				
Abutment	**Type:**			
Vegetation/erosion				
Slough/slides/cracks				
Seepage/wetness				

General Comments, Sketches & Field Measurements

PERODIC INSPECTION, OPERATION & MAINTENANCE RECORDS

(Project Name): GlenPark Wet Detention Pond # ____, Cary, NC

Date	Time	Rain "	Pool Level	Weather Conditions	General Observations or Comments	Recorded By

Date	Maintenance Performed	Comments	Recorded By

Date	Equipment Operated	Comments	Recorded By