

Pond and Dam Maintenance Agreement

NORTH CAROLINA

WAKE COUNTY

Property of:

KNOWN ALL MEN BY THESE PRESENTS that,
being the owners of all properties surrounding that pond as well as the pond itself, located in Wake County, North Carolina designated as Stonemoor subdivision and particularly described on plat in Book of Maps pending Page pending Wake County Registry,

DO HEREBY AGREE AND COVENANT with all persons, firms or corporations, now owning or hereafter acquiring and ownership and or riparian right to the pond as referenced above, that all are hereby subjected to the following Pond and Dam Maintenance Agreement, running with said properties by whomever owned, to wit:

1. The parties acknowledge that the dam is located within the subdivision of, Stonemoor described in Book of Maps pending Page pending Wake County Registry. The parties further acknowledge that the spillway for said dam is located on the property of Creedmoor Partners, LLC Pin Number pending with emergency spillway being on the property of Creedmoor Partners, LLC.
2. As Creedmoor Partners, LLC is planning to develop the tract or parcel of land upon which the dam and pond are located, Creedmoor Partners, LLC does agree to perform any and all maintenance and repair required by the appropriate governmental authorities to bring the pond, dam and spillways into compliance with current applicable governmental regulations.
3. Whereas Creedmoor Partners, LLC will be deeding the open space upon which the dam and spillway and emergency spillway sit upon to the Stonemoor Homeowners Association, both Creedmoor Partners, LLC and Stonemoor Homeowners Association, give, grant, and convey unto Wake County, the right and easement to come upon their property for the purpose of cleaning, improving and repairing any portion of the pond, dam and spillway which may be required by the appropriate governmental authorities to bring the pond, dam and spillways into compliance with current governmental requirements.
4. Upon completion of the initial improvements (whether or not the same are actually required by the appropriate governmental authorities), the parties of this Agreement, for themselves as well as their successors in interest, agree that thereafter all maintenance, improvements, upkeep and maintenance of the pond, dam and spillways shall be the responsibility of the Stonemoor Homeowners Association, their heirs, successors, and assigns, regardless of whether the required work is to the dam, pond or spillways. To accomplish such upkeep and maintenance, the parties to this agreement hereby grant to the other party reciprocal easements for the purpose of going upon the property of the other, for construction and maintenance of the required improvements and or repairs.

5. While Creedmoor Partners, LLC is in the process of developing the parcel, and to insure that the pond, dam and spillways are at all times operable, Creedmoor Partners, LLC and Stonemoor Homeowners Association will obtain periodic maintenance services on the pond, dam and spillways. The cost of said maintenance shall be the responsibility of the Stonemoor Homeowners Association.

Maintenance services should include but are not limited to:

- Removal of all trees with four inch diameter or greater from the dam.
- Inspection of riser and spillway to insure proper functionality.
- Debris and sediment removal from riser and barrel.
- Maintain proper pond depth.
- Repair any eroded areas.
- Repair any broken pipes.
- Mow side slopes according to season.

6. Upon completion of development by Creedmoor Partners, LLC, then the homeowners association as established by Creedmoor Partners, LLC shall select a person or firm to undertake the responsibility of periodic pond, dam and spillway maintenance. In the event that said association or its successors to the task of maintenance do not perform the necessary maintenance, then Creedmoor Partners, LLC or their successors in title, as applicable, may have the pond, dam and or spillways maintained as needed and apportion the cost to the Stonemoor Homeowners Association.

IN TESTIMONY WHEREOF, _____
has caused this instrument to be executed, by its Manager, and
have hereunto set their hand and seals, this the ___ day of _____.

for Creedmoor Partners, LLC

_____(SEAL)

_____(SEAL)
for Stonemoor Homeowners Assoc.

_____(SEAL)

NORTH CAROLINA

WAKE COUNTY

I, the undersigned, a Notary Public in and of the State and County aforementioned do hereby certify that _____, personally appeared before me this day and acknowledged the execution of the forgoing instrument, for and in behalf of said Company.

WITNESSED my hand and notarial seal, this the _____ day of _____.

Notary Public
My Commission Expires _____

NORTH CAROLINA

WAKE COUNTY

I, the undersigned a Notary Public in the State and County aforesaid, do hereby certify that _____ personally appeared before me this day and acknowledged the execution of the forgoing instrument.

WITNESSED my hand and notarial seal, this the _____ day of _____.

Notary Public
My Commission Expires _____

OPERATIONS AND MAINTENANCE MANUAL

Project: Stonemoor Rec Center

EARTHEN DAM STRUCTURE

Wake County, North Carolina

Owners: **Creedmoor Partners, LLC**

Prepared By: Withers & Ravenel, Inc.

Date: 5-12-05

Project: Stonemoor Rec Center

Date Constructed: March-April 2005

Location: In the southeast quadrant of the intersection of Norwood Rd. and Old Creedmoor Road

Receiving Water Course: Tributary of Lower Barton Creek

Contractor: (List below)

Impoundment & Dam	Percy Johnson, Inc. (Raleigh, NC) (919) 772-2987
Spillway	Percy Johnson, Inc. (Raleigh, NC) (919) 772-2987

Material Supplies:

Riser Structure	4'x4' Precast Concrete Box Riser
Bottom Drain	12" orifice into riser
Drain Gate Valve	N/A – Dry Pond
Outlet Pipe	18" Reinforced Concrete Pipe, 40' long
Trash Rack	No trash rack, slab top riser box

OPERATIONS & MAINTENANCE MANUAL

Stonemoor Rec Center: Earthen Dam Structure

This manual established procedures for maintenance and operation of the development known as **Stonemoor Rec Center: Earthen Dam Structure**.

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. Grass should be fertilized every October and April.

- ◆ Re-Seeding – periodically re-seeding may be required to establish grass on areas where seed 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 sown at a rate of three pounds per 1,000 SF. The seed should be covered with soil to the depth of approximately $\frac{1}{4}$ ". 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.

- ◆ 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

- ◆ 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 $\frac{1}{4}$ "), well defined cracks indicate a serious problem. There are two types of cracks: transverse and longitudinal.
 - Transverse 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

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. 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. 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

There is no trashrack located on the principal spillway structure; therefore no maintenance is necessary.

III. OPERATION

A. Pond Drains

The 12-inch opening at the bottom the principal spillway will serve to drain the pond completely. Period inspections should occur to ensure that there are no obstructions blocking the flow of water through the opening. Remove any material from the opening to provide a clear path for the water to flow.

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.
- ◆ 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. 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: Earthen Dam / Drop Spillway Structure

SPILLWAYS – DRAINS – OUTLETS

Check/Circle Noted	Condition	Observations	Action Repair --	Action Monitor --	Action Investigative --
Principal/Emergency Spillway		Type:			
	Cracks/Deterioration				
	Joint Deterioration				
	Improper Alignment				
	Cracks/Deterioration				
	Joint Deterioration				
	Seepage/Piping				
	Undercutting				
	Erosion				
	Debris				

General Comments, Sketches & Field Measurements

POND INSPECTION CHECKLIST

Date: _____
Time: _____

Project: Earthen Dam / Drop Spillway Structure

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

