



North Carolina Department of Environment and Natural Resources  
Division of Land Resources  
Land Quality Section

James D. Simons, PG, PE  
Director and State Geologist

Beverly Eaves Perdue, Governor  
Dee Freeman, Secretary

November 24, 2010

Mr. David Lee  
Wake Stone Corporation  
PO Box 190  
Knightdale, North Carolina 27545

RE: Permit No. 92-10  
Triangle Mine  
Wake County  
Neuse River Basin

Dear Mr. Lee:

Your recent request to have the above referenced mining permit modified has been approved. The modification is to increase the affected acreage at this site to 156.6 acres as indicated on the Site Plan Maps last revised November 22, 2010. The modification includes the construction of a stockpile area contiguous to the existing plant and stockpile yard and includes the installation and maintenance of all associated erosion and sediment control measures. A copy of the modified permit is enclosed.

The conditions in the modified permit were based primarily upon the initial application. Modifications were made as indicated by the modification request and as required to insure compliance with The Mining Act of 1971. The expiration date, mine name and permit number shall remain the same as before the modification. I would like to draw your particular attention to the following conditions where minor additions or changes were made: Operating Condition Nos. 3K, 4E, 7A, and 12B and Reclamation Condition Nos. 3 and 5.

The issuance of a mining permit and/or any modification to it does not supersede local zoning regulations. The responsibility of compliance with any applicable zoning regulations lies with you.

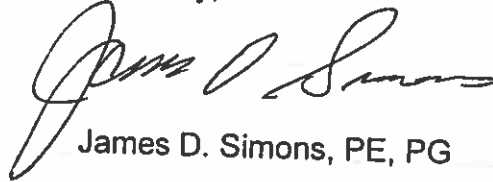
As a reminder, your permitted acreage at this site is 223 acres and the amount of land you are approved to disturb is 156.6 acres.

Please be aware that Mining Permit No. 92-10 expires April 20, 2011. If your company wishes to continue mining operations at this site after April 20, 2011, a renewal request must be submitted prior to said date.

Mr. Lee  
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Please review the modified permit and contact Ms. Judy Wehner, Assistant Mining Specialist, at (919) 733-4574 should you have any questions concerning this matter.

Sincerely,



James D. Simons, PE, PG

JDS/jw

Enclosures

cc: Mr. John Holley, PE  
Ms. Shannon Deaton - WRC, w/permit  
Mr. William Gerring-Mine and Quarry Bureau, w/o enclosures

**DEPARTMENT OF ENVIRONMENT  
AND NATURAL RESOURCES**

**DIVISION OF LAND RESOURCES**

**LAND QUALITY SECTION**

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**P E R M I T**

for the operation of a mining activity

In accordance with the provisions of G.S. 74-46 through 68, "The Mining Act of 1971," Mining Permit Rule 15A NCAC 5 B, and other applicable laws, rules and regulations

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Permission is hereby granted to:

Wake Stone Corporation

Triangle Quarry

Wake County - Permit No. 92-10

for the operation of a

Crushed Stone Quarry

which shall provide that the usefulness, productivity and scenic values of all lands and waters affected by this mining operation will receive the greatest practical degree of protection and restoration.

MINING PERMIT EXPIRATION DATE: April 20, 2011

In accordance with the application for this mining permit, which is hereby approved by the Department of Environment and Natural Resources hereinafter referred to as the Department, and in conformity with the approved Reclamation Plan attached to and incorporated as part of this permit, provisions must be made for the protection of the surrounding environment and for reclamation of the land and water affected by the permitted mining operation. This permit is expressly conditioned upon compliance with all the requirements of the approved Reclamation Plan. However, completed performance of the approved Reclamation Plan is a separable obligation, secured by the bond or other security on file with the Department, and may survive the expiration, revocation or suspension of this permit.

This permit is not transferable by the permittee with the following exception: If another operator succeeds to the interest of the permittee in the permitted mining operation, by virtue of a sale, lease, assignment or otherwise, the Department may release the permittee from the duties imposed upon him by the conditions of his permit and by the Mining Act with reference to the permitted operation, and transfer the permit to the successor operator, provided that both operators have complied with the requirements of the Mining Act and that the successor operator agrees to assume the duties of the permittee with reference to reclamation of the affected land and posts a suitable bond or other security.

In the event that the Department determines that the permittee or permittee's successor is not complying with the Reclamation Plan or other terms and conditions of this permit, or is failing to achieve the purposes and requirements of the Mining Act, the Department may give the operator written notice of its intent to modify, revoke or suspend the permit, or its intent to modify the Reclamation Plan as incorporated in the permit. The operator shall have right to a hearing at a designated time and place on any proposed modification, revocation or suspension by the Department. Alternatively and in addition to the above, the Department may institute other enforcement procedures authorized by law.

### Definitions

Wherever used or referred to in this permit, unless the context clearly indicates otherwise, terms shall have the same meaning as supplied by the Mining Act, N.C.G.S. 74-49.

### Modifications

April 1, 1991: This permit has been modified to include three pit expansions, the construction of a pit perimeter road, and the construction of the visual barrier berm along the 250 foot permanent buffer zone as indicated on the revised Site Plan and supplemental information dated February 14, 1991.

February 5, 1992: This permit has been modified to include and require compliance with the January 20, 1992 blast and rock slide investigative report prepared by Wake Stone Corporation in its entirety.

October 11, 1996: This permit has been modified to allow the shipping of material after 1:00 PM on Saturdays until such time as the Umstead State Park reopens or the repair of the Raleigh Outer Loop Project near RDU Airport is completed, whichever comes first.

November 24, 2010: This permit has been modified to increase the affected acreage at this site to 156.6 acres as indicated on the Site Plan Maps last revised November 22, 2010. The modification includes the construction of a stockpile area contiguous to the existing plant and stockpile yard and includes the installation and maintenance of all associated erosion and sediment control measures.

#### Expiration Date

This permit shall be effective from the date of its issuance until April 20, 2011.

#### Conditions

This Permit shall be subject to the provisions of the Mining Act, N.C.G.S. 74-46, et. seq., and to the following conditions and limitations:

#### OPERATING CONDITIONS:

1. Wastewater and Quarry Dewatering
  - A. Any wastewater processing or mine dewatering shall be in accordance with the permitting requirements and rules promulgated by the N.C. Environmental Management Commission.
  - B. Any storm water runoff from the affected areas at the site shall be in accordance with any applicable permit requirements and regulations promulgated by the Environmental Protection Agency and enforced by the N.C. Environmental Management Commission. It shall be the permittee's responsibility to contact the Division of Water Quality to secure any necessary storm water permits or other approval documents.
2. Air Quality and Dust Control
  - A. Any mining related process producing air contaminant emissions including fugitive dust shall be subject to the requirements and rules promulgated by the N.C. Environmental Management Commission and enforced by the Division of Air Quality.
  - B. The provisions of Air Quality Permit No. 4386 shall be followed.
  - C. The permanent access (plant entrance) road shall be paved from the scale house to SR 1790. During quarry operation, water trucks or other means that may be necessary shall be utilized to prevent dust from leaving the permitted area.
  - ~~D.~~ The permittee shall cooperate with DOT in paving SR 1790 from the entrance to the quarry to the intersection of SR 1790 and SR 1654.
  - E. Dust suppression systems shall be used throughout the plant to control dust.

- F. Drill holes dust shall be controlled by wetting or other means.
- G. Dust control at the crushers and screens shall be maintained by the use of water sprays.
- H. A water spray shall be provided for highway haul trucks.
- I. Washed stone shall be stockpiled within the part of the designated plant area which is closest to the park.

### 3. Buffer Zones

- A. Any mining activity affecting waters of the State, waters of the U. S., or wetlands shall be in accordance with the requirements and regulations promulgated and enforced by the N. C. Environmental Management Commission.
- B. Sufficient buffer shall be maintained between any affected land and any adjoining waterway or wetland to prevent sedimentation of that waterway or wetland from erosion of the affected land and to preserve the integrity of the natural watercourse or wetland.
- ~~C.~~ The dotted line labeled as buffer along the northern permit boundary and along the eastern boundary is the permanent buffer as designated by the Mining Commission (see Site Plan dated March 10, 1981).
- ~~D.~~ An undisturbed buffer of existing natural vegetation shall be maintained between the mining disturbance and both Crabtree Creek and Umstead Park property as indicated by the "permanent buffer" shown on the site plans dated March 10, 1981 and February 14, 1991 with the exception of the installation of the two vegetated earthen berms as specified by the revised Site Plan dated February 14, 1991.
- ~~E.~~ An undisturbed buffer zone of existing natural vegetation shall also be maintained between the top of the bank of Crabtree Creek and any mining disturbance within the 10 year permit area. The buffer zone shall be of sufficient width to prevent offsite sedimentation and to preserve the integrity of the natural watercourse. In any event, the buffer shall meet the US Corps of Engineers requirement for Crabtree Creek Watershed.
- ~~F.~~ A minimum buffer zone of 100 feet shall be maintained between Crabtree Creek and the new pit expansions along the west side of the mine site as delineated on the revised Site Plan and supplemental information dated January 14, 1991 and approved in the mining permit on April 1, 1991.
- ~~G.~~ A minimum buffer zone of 50 feet shall be maintained between Crabtree Creek and the outer edge of the perimeter haul road that runs along the western edge of the existing pit denoted as "Pit Expansion Initiated During 1989".

c H

A minimum buffer zone of 250 feet shall be maintained between any mining activity and Crabtree Creek along the north side of the mine site.

I.

A minimum buffer zone of 100 feet shall be maintained between any mining activity and both the Umstead Park property and adjoining property along the east and south sides of the mine site, respectively.

J.

The only exceptions to the above referenced undisturbed buffers of natural vegetation are as follows:

1. The construction of berms as approved by the Department for visual and noise screening.
2. The installation of drainage and erosion and sedimentation control measures as approved by the Department to protect Crabtree Creek.
3. The construction of a water supply dam as shown on drawings submitted in a permit modification request dated September 30, 1986 and approved by the Department.

~~K.~~ All buffer zones shown on the Site Plan Maps last revised November 22, 2010 shall be maintained to protect adjoining property. These buffer zones, with the exception of the installation of required sediment control measures and approved earthen berms, shall remain undisturbed.

4. Erosion and Sediment Control

A. Adequate mechanical barriers including, but not limited to diversions, earthen dikes, check dams, sediment retarding structures, rip rap pits, or ditches shall be provided in the initial stages of any land disturbance and maintained to prevent sediment from discharging onto adjacent surface areas or into any lake, wetland or natural watercourse in proximity to the affected land.

~~L.~~ B.

The existing lakes shall be used to trap sediment from initial mining disturbances. The spillways of the existing lakes shall be further stabilized as necessary to prevent erosion of the spillway from runoff from the affected lands. The embankments of the existing lakes shall be improved if necessary to ensure the stability of the embankments.

~~C~~ The three pit expansions, the construction of the pit perimeter road, and the construction of the visual barrier berm along the 250 foot permanent buffer zone shall be conducted according to the revised Site Plan and supplemental information dated February 14, 1991 with the following stipulations: (1) that Sediment Basin "C" be constructed as an arched stone filter, (2) as Culvert No. 3 requires a headwater depth of at least five feet, the minimum elevations of the top of the road fill shall be set at elevation of the top of the road fill shall be set at elevation 292, (3) temporary diversions TD-1A, TD-1B, and TD-7B shall be provided with a temporary liner (straw with net recommended as a minimum), (4) the minimum stone thickness of Class B stone for all rip-rap lined ditches shall be 22 inches (Class A stone could be used for all rip-rap lined ditches in lieu of Class B stone due to the low velocities and small discharges), and (5) all overburden cut slopes shall be graded to a 1 ½ to 1 slope or flatter.

B D. All mining activities, including the installation and maintenance of all erosion and sedimentation control measures, shall be conducted as indicated on the Site Plan Map dated March 1, 2001.

~~E~~ All mining activities associated with the construction of a stockpile area contiguous to the existing plant and stockpile yard, including the installation and maintenance of all associated erosion and sediment control measures, shall be conducted as indicated on the Site Plan maps last revised November 22, 2010 and supplemental information received by the Land Quality Section on October 29, 2010 and November 23, 2010.

C F. An erosion and sediment control plan(s) shall be submitted to the Department for approval prior to any land disturbing activities not indicated on the revised erosion control plan or mine maps submitted with the approved application for a mining permit and any approved revisions to it. Such areas include, but are not limited to, expansion outside of the approved pit area, creek crossings, or expansion of overburden or waste disposal areas.

5. Groundwater Protection

Groundwater monitoring wells shall be installed and monitored as deemed appropriate by the Department.

6. Noise Abatement

All reasonable precautions shall be taken to minimize the impacts of operational noise upon Umstead Park. Said measures shall include, but not be limited to the following:



- A. Noise barriers between the park boundary and the crushers and screening towers to minimize noise levels at the park shall be provided from the onset of the operation. Noise barriers may be enclosures, walls, bins, structures, stockpiles or natural terrain. In the event there is disagreement over the required noise control measure, the final design and placement of noise barriers shall be determined by qualified noise and engineering consultants mutually agreed upon by both parties.
- B. The plant shall be located at the lowest feasible elevation.
- C. The plant shall be designed so that the primary crusher can be relocated in the pit at the earliest possible date.
- D. The chutes used in processing shall be rubberized.
- E. Compressors with noise abatement enclosures (currently called whispered compressors) shall be used with track drills to open the quarry. Once the quarry is opened, either hydraulic or down-in-the-hole drills shall be used to further reduce noise.
- F. Pit haul trucks shall be equipped to exhaust through the beds of the trucks to muffle engine noise.
- G. Conveyors rather than trucks shall be used for stockpiling material.
- H. The quarry and stone process operations shall be operated on Monday through Friday and shall not be operated on the following recognized holidays: New Years Day, Easter Monday, Fourth of July, Labor Day, Thanksgiving Day, and Christmas Day. A reasonable amount of hauling of processed stone from the stockpile areas is permitted until 1:00 PM on Saturdays but hauling shall not be done at any other time on weekends or on holidays without prior approval from the Department.

7. Processing Plant Location

- A. The processing and stockpiling facilities shall be located as indicated on the Site Plan Maps last revised November 22, 2010.
- B. The plant shall be located to place the processing and stockpiling activities at the lowest possible elevation to reduce visibility and noise impacts on Umstead State Park.
- C. The location of the pit shall be such that once the overburden is removed, the quarry excavating equipment (i.e., compressor and drill, shovels, and trucks) can be placed at an elevation lower than the surrounding natural ground in the initial phases of quarrying.

## 8. Graded Slopes and Fills

- A. The angle for graded slopes and fills shall be no greater than the angle which can be retained by vegetative cover or other adequate erosion control measure, structure, or device. In any event, exposed slopes or any excavated channels, the erosion of which may cause off-site damage because of siltation, shall be planted or otherwise provided with groundcover, devices or structures sufficient to restrain such erosion.
- B. Overburden cut slopes along the perimeter of the quarry opening shall be graded to a minimum 2 horizontal to 1 vertical or flatter and shall be stabilized within 60 days of completion. Furthermore, a minimum ten (10) foot wide horizontal safety bench shall be provided at the top of the rock and at the toe of any overburden slope.

## 9. Surface Drainage

The affected land shall be graded so as to prevent collection of pools of water that are, or likely to become, noxious or foul. Necessary structures such as drainage ditches or conduits shall be constructed or installed when required to prevent such conditions.

## 10. Blasting

**The operator shall monitor each blast with a seismograph located at a distance no farther than the closest off site regularly occupied structure not owned or leased by the operator.** A seismographic record including peak particle velocity, air overpressure, and vibration frequency levels shall be kept for each blast (except as provided under Operating Condition Nos. 8B and 8D of this permit). The following blasting conditions shall be observed by the mine operator to prevent hazard to persons and adjacent property from surface blasting:

### A. Ground Vibration With Monitoring:

In all blasting operations, the maximum peak particle velocity of any component of ground motion shall not exceed Figure 1 (below) at the immediate location of any regularly occupied building outside of the permitted area such as a dwelling house, church, school, or public, commercial or institutional building.

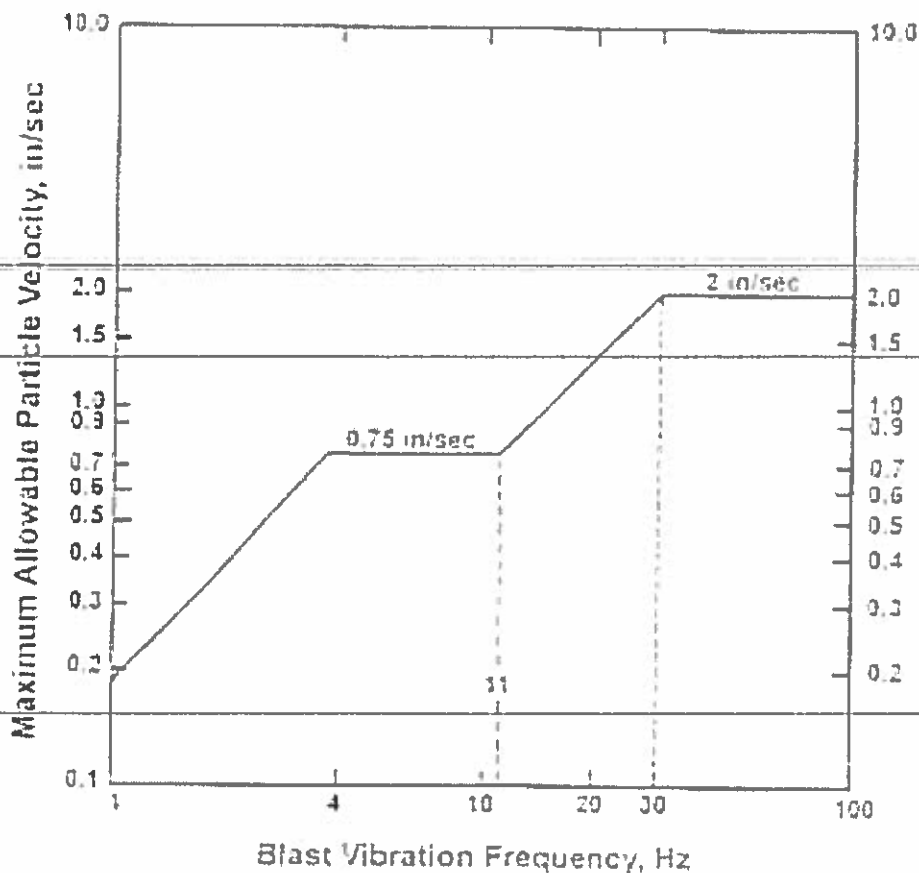


Figure 1 Alternative blasting level criteria  
(Source modified from figure B-1 Bureau of Mines R18507)

**B. Ground Vibration Without Monitoring:**

In the event of seismograph malfunction or other condition which prevents monitoring, blasting shall be conducted in accordance with the following formulas:

$$W = (D/D_s)^2 \quad D_s = \frac{D}{W^{1/2}}$$

$$V = 160(D_s)^{-1.6}$$

**W** = Maximum charge weight of explosives per delay period of 8.0 milliseconds or more (pounds).

**D** = Distance from the blast site to the nearest inhabited building not owned or leased by the mine operator (feet).

$D_s$  = Scaled distance factor.

$V$  = Peak Particle Velocity (inches per second).

The peak particle velocity of any component shall not exceed 1.0 inch per second, for the purposes of this Section.

C. Air blast With Monitoring:

Air blast overpressure resulting from surface blasting shall not exceed 129 decibels linear (dBL) as measured at the immediate location of any regularly occupied building not owned or leased by the operator outside of the permitted area such as a dwelling house, church, school, or public, commercial or institutional building, unless an alternate level based on the sensitivity of the seismograph microphone as specified below is being used:

<u>Lower Frequency Limit of Measuring System, in Hz</u>	<u>Max Level, in dBL</u>
0.1 Hz or lower-flat response	134 peak
2.0 Hz or lower-flat response	133 peak
6.0 Hz or lower-flat response	129 peak

D. Air blast Without Monitoring:

In the event of seismograph malfunction or other condition which prevents monitoring, blasting shall be conducted in accordance with the following formulas:

$$U = 82 (DW^{0.33})^{-1.2}$$

To convert U (psi) to P (dBL):

$$P = 20 \times \log (U/2.9 \times 10^{-9})$$

Confined Air blast/Overpressure (dBL)  
for quarry situation:

$$A = P - 35$$

$U$  = Unconfined air overpressure (pounds per square inch).

$W$  = Maximum charge weight of explosives per delay period of 8.0 milliseconds or more (pounds).

$D$  = Distance from the blast site to the nearest inhabited building not owned or leased by the mine operator (feet).

$P$  = Unconfined air overpressure (decibels).

$A$  = Air blast or air overpressure for typical quarry situations (decibels).

The air blast/overpressure shall not exceed 129 decibels, for the purposes of this Section.

E. Record Keeping:

The operator shall maintain records on each individual blast describing: the total number of holes; pattern of holes and delay of intervals; depth and size of holes; type and total pounds of explosives; maximum pounds per delay interval; amount of stemming and burden for each hole; blast location; distance from blast to closest offsite regularly occupied structure; and weather conditions at the time of the blast. Records shall be maintained at the permittee's mine office and copies shall be provided to the Department upon request.

F. Excessive Ground Vibration/Air blast Reporting:

If ground vibration or Air blast limits are exceeded, the operator will immediately report the event with causes and corrective actions to the Department. Use of explosives at the blast site that produced the excessive reading shall cease until corrective actions approved by the Department are taken. However, blasting may occur in other approved areas within the permitted boundary. Authorization to blast at the blast site may be granted at the time of the verbal reporting of the high ground vibration or high air blast reading if the circumstances justify verbal approval. Failure to report will constitute a permit violation.

G. Flyrock Prevention:

The operator shall take all reasonable precautions to ensure that flyrock is not thrown beyond areas where the access is temporarily or permanently guarded by the operator. Failure to take corrective measures to prevent flyrock and repeated instances of flyrock shall be considered a violation of the Mining Permit.

H. Flyrock Reporting:

Should flyrock occur beyond the permitted and guarded areas, the operator shall immediately report the incident to the Department. Further use of explosives on the mine site shall be suspended until the following actions have been taken:

1. A thorough investigation as to the cause(s) of the incident shall be conducted.
2. A report detailing the investigation shall be provided to the Department within 10 days of the incident. The report shall, at a minimum, document the cause(s) of the incident along with technical and management actions that will be taken to prevent further incidents. The report shall meet with the approval of the Department before blasting may resume at the mine site.

I. Studies:

The operator shall provide to the Department a copy of the findings of any seismic studies conducted at the mine site in response to an exceedence of a level allowed by these blasting conditions. The operator shall make every reasonable effort to incorporate the studies' recommendations into the production blasting program.

J. Notice:

The operator shall, when requested by the Department, give 24-hour advance notice to the Land Quality Section Regional Office prior to any blast during a period for which notice is requested.

- K. Regarding blasting activities conducted to lower the haul road along the western boundary of the "Pit Expansion Initiated During 1989" area and Crabtree Creek, all of the corrective actions/steps outlined in the blast and rock slide investigation report prepared by Wake Stone Corporation dated January 20, 1992 shall be followed. In addition, any areas disturbed as a result of the previous rock slide and its subsequent removal shall be restored to its natural, pre-disturbed state or an alternative acceptable to the Department.

11. High Wall Barrier

A physical barrier consisting of large boulders placed end-to-end or fencing shall be maintained at all times at the mining permit boundary to prevent inadvertent public access. In addition, a minimum 10 foot wide horizontal safety bench shall be provided at the junction between the top of rock and the toe of any overburden cut slope.

*highwall*

*or other suitable  
Barrier  
materials*

12. Visual Screening

- A. Existing vegetation shall be maintained between the mine and public thoroughfares to screen the operation from the public. Additional screening methods, such as constructing earthen berms, shall be employed as deemed appropriate by the Department.

*(C)*

- B. Vegetated earthen berms shall be located and constructed as shown on the Site Plan Maps last revised November 22, 2010. In addition to grasses, long leaf and/or Virginia pines or other acceptable evergreen species shall be planted as deemed appropriate by the Department to improve visual and noise buffering.

C. The operation shall be situated to optimize natural screening of the operation from public view from Interstate 40 and Umstead State Park property. The visual screening plan shall include maintaining undisturbed buffer areas of natural vegetation as shown on the site plan dated March 10, 1981. Additionally a vegetated earthen berm shall be constructed east of the processing plant and stockpile area as shown on the revised site plan dated March 10, 1981 and February 14, 1991. Visual screening such as vegetated earthen berms and/or evergreen trees shall be placed as necessary to supplement natural screening.

D. A vegetated earthen berm shall be constructed between the Wake Stone Corporation plant and the western boundary of Umstead State Park as shown on Wake Stone Corporation's site plan dated March 10, 1981 and February 14, 1991.

E. Berm dimensions shall be no less than indicated on Wake Stone Corporation's site plans dated March 10, 1981 and February 14, 1991 and may be higher and longer than shown.

F. The side slopes of all berms shall be graded to a two horizontal to one vertical or flatter and revegetated on the sides and top with grasses and evergreen trees. The toe of the berm shall not encroach on the park property boundary and shall be at least 50 feet from the boundary. The alignment of the berm may vary from the approved site plans is necessary to provide the 50 feet of undisturbed land between the park boundary and the toe of the berm and assuring an acceptable angle for the slope of the berm.

G. Other berms may be required as mining progresses to reduce the noise and visual impact upon Umstead State Park.

## 11. Plan Modification

The operator shall notify the Department in writing of the desire to delete, modify or otherwise change any part of the mining, reclamation, or erosion/sediment control plan contained in the approved application for a mining permit and any approved revisions to it. Approval to implement such changes must be obtained from the Department prior to on-site implementation of the revisions.

## 12. Refuse Disposal

A. No on-site disposal of refuse or other solid waste that is generated outside of the mining permit area shall be allowed within the boundaries of the mining permit area unless authorization to conduct said disposal has first been obtained from both the Division of Waste Management and the Land Quality Section, Department of Environment and Natural Resources. The method of disposal shall be consistent with the approved reclamation plan.

B. Mining refuse as defined by G.S. 74-49 (14) of The Mining Act of 1971 generated on-site and directly associated with the mining activity may be disposed of in a designated refuse area. All other waste products must be disposed of in a disposal facility approved by the Division of Waste Management. No petroleum products, acids, solvents or their storage containers or any other material that may be considered hazardous shall be disposed of within the permitted area.

C. For the purposes of this permit, the Division of Land Resources considers the following materials to be "mining refuse" (in addition to those specifically listed under G.S. 74-49 (14) of the N.C. Mining Act of 1971):

1. on-site generated land clearing debris
2. conveyor belts
3. wire cables
4. v-belts
5. steel reinforced air hoses
6. drill steel

D. If mining refuse is to be permanently disposed within the mining permit boundary, the following information must be provided to and approved by the Division of Land Resources prior to commencement of such disposal:

1. the approximate boundaries and size of the refuse disposal area;
2. a list of refuse items to be disposed;
3. verification that a minimum of 4 feet of cover will be provided over the refuse;
4. verification that the refuse will be disposed at least 4 feet above the seasonally high water table; and
5. verification that a permanent vegetative groundcover will be established

### 13. Annual Reclamation Report

An Annual Reclamation Report shall be submitted on a form supplied by the Department by February 1 of each year until reclamation is completed and approved.

### 14. Bonding

The security, which was posted pursuant to N.C.G.S. 74-54 in the form of a \$500,000.00 blanket bond, is sufficient to cover the operation as indicated in the approved application. This security must remain in force for this permit to be valid. The total affected land shall not exceed the bonded acreage.

### 15. Archaeological Resources

Authorized representatives of the Division of Archives and History shall be granted access to the site to determine the presence of significant archaeological resources.



## APPROVED RECLAMATION PLAN

The Mining Permit incorporates this Reclamation Plan, the performance of which is a condition on the continuing validity of that Mining Permit. Additionally, the Reclamation Plan is a separable obligation of the permittee, which continues beyond the terms of the Mining Permit.

The approved plan provides:

### Minimum Standards As Provided By G.S. 74-53

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1. The final slopes in all excavations in soil, sand, gravel and other unconsolidated materials shall be at such an angle as to minimize the possibility of slides and be consistent with the future use of the land.
2. Provisions for safety to persons and to adjoining property must be provided in all excavations in rock.
3. All overburden and spoil shall be left in a configuration which is in accordance with accepted conservation practices and which is suitable for the proposed subsequent use of the land.
4. No small pools of water shall be allowed to collect or remain on the mined area that are, or are likely to become noxious, odious or foul.
5. The revegetation plan shall conform to accepted and recommended agronomic and reforestation practices as established by the North Carolina Agricultural Experiment Station and the North Carolina Forest Service.
6. Permittee shall conduct reclamation activities pursuant to the Reclamation Plan herein incorporated. These activities shall be conducted according to the time schedule included in the plan, which shall to the extent feasible provide reclamation simultaneous with mining operations and in any event, provide reclamation at the earliest practicable time after completion or termination of mining on any segment of the permit area and shall be completed within two years after completion or termination of mining.

### RECLAMATION CONDITIONS:

1. Provided further, and subject to the Reclamation Schedule, the planned reclamation shall be to allow the quarry excavation to fill with water, provide a permanent barricade (fence) along the top of any high wall, and grade and revegetate any areas in unconsolidated material.
2. The specifications for surface gradient restoration to a surface suitable for the planned future use are as follows:

- A. All areas of unconsolidated material such as overburden or waste piles shall be graded to a 2 horizontal to 1 vertical or flatter slope and terraced as necessary to insure slope stability.
- B. Any settling ponds and sediment control basins shall be backfilled, graded, and stabilized or cleaned out and made into acceptable lake areas.
- C. The processing, stockpile, and other disturbed areas neighboring the mine excavation shall be leveled and smoothed.

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- D. Compacted surfaces shall be disced, subsoiled or otherwise prepared before revegetation.

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- E. No contaminants shall be permanently disposed of at the mine site. On-site disposal of waste shall be in accordance with Operating Conditions Nos. 12.A. through D.
- F. The affected land shall be graded to prevent the collection of noxious or foul water.
- G. Any diverted or re-established drainage channels shall be restored to a stable condition.

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3. Revegetation Plan:

Disturbed areas shall be permanently revegetated according to the following provisions:

Site Preparation: The land surfaces shall be graded and/or shaped as necessary to create grades applicable to the subsequent use of the site, but in no case will any slope greater than 26 degrees in unconsolidated material be left. Loose rock, woody material and other obstructions that would interfere with the establishment of vegetation planned for the site shall be removed and either buried or properly disposed of off-site in accordance with Operating Condition Nos. 12A through D above. Surface runoff shall be controlled by terraces or diversions to allow discharge through protected outlets.

Lime and Fertilizer: Lime and fertilizer shall be applied in accordance with soil test result or at a rate of 2,000 lbs/acre of lime and 1000 lbs/acre of 10-20-20 fertilizer.

Seedbed Preparation: Lime and fertilizer shall be mixed with the soil to a depth of three to four inches where conventional equipment can be used. On slopes steeper than about 2:1, soils shall be grooved or scarified along the contour to provide for retention of seeds and nutrients on the slope until germination and growth is started. On steep slopes not accessible to seeding equipment, seed, nutrients and mulch, shall be applied by hand.

Revegetation: Typical seed mixtures to be utilized include fescue-rye, fescue-rye-lespedeza, and fescue-lespedeza, where the lespedeza used may be Korean or Kobe or Sericea. All rye species to be utilized shall be rye grain rather than rye grass. In fall or spring plantings, seeding mixtures shall utilize 100 lbs. Fescue and 50 lbs. Rye per acre to be planted. Late spring plantings in certain areas may contain up to 40 lbs. Kobe/Korean per acre where desirable to supplement natural deer browse. Sericea lespedeza shall be utilized at a rate of 20 to 40 lbs. per acre in combination with Fescue when planting excessively droughty soils or steep slopes. When using lespedeza species in fall plantings, non-scarified seed shall be utilized. Scarified seed shall be utilized in spring plantings. Newly seeded areas shall be mulched with unchopped small grain straw applied at a rate of 1.5 to 2 tons per acre, or until approximately 75% of the soil is hidden.

Loblolly pines (or other acceptable evergreen species) and red cedar seedlings shall be planted at selected sites to provide visual screens and revegetation. Evergreen seedling plantings shall be done on a staggered 4 feet by 4 feet pattern.

Maintenance: Plant placement and other maintenance that may be required to establish vegetative cover appropriate to the reclamation plan for this site shall be carried out until vegetation is properly established.

~~Whenever possible, disturbed areas should be vegetated with native warm season grasses such as switch grass, Indian grass, bluestem and gamma grass.~~

In addition, the permittee shall consult with a professional wildlife biologist with the N.C. Wildlife Resources Commission to enhance post-project wildlife habitat at the site.

4. Reclamation Plan:

Reclamation shall be conducted simultaneously with mining to the extent feasible. In any event, reclamation shall be initiated as soon as feasible after completion or termination of mining of any mine segment under permit. Final reclamation, including revegetation, shall be completed within two years of completion or termination of mining.

5. Donation to State

This provision is pursuant to Wake Stone Corporation's offer to donate the quarry site to the State as part of its reclamation plan.

The term "quarry site" shall include the entire pit as it exists after quarrying has been completed, a strip extending at least 50 feet back from the top of the slope of the pit on all sides, and a reasonable area to connect the pit and surrounding strip to the Park, constituting a total area of at least 75 acres.

During the option period, Wake Stone Corporation shall have the right to encumber all of its remaining property from time to time by mortgage, deed of trust or other security agreement then in common use for the purpose of securing one or more bona fide obligations of Wake Stone Corporation, such as the payment of money or the providing of any goods or services. The option to the State shall be subordinate to each such encumbrance in the same manner and to the same extent as if such option has been recorded after the restoration of each such encumbrance.

The right of the State to exercise its option shall be subject to:

- A. Wake Stone Corporation not being prohibited by the US Government, State of North Carolina, Wake County, any municipality having jurisdiction, or by any other court from removing from Wake Stone Corporation's property all quarryable stone which is outside of the buffer zones referred to in Operating Condition No.3 of this permit. The requirements by the State that Wake Stone Corporation comply with laws and rules and regulations generally applicable to stone quarrying shall not be deemed a prohibition of quarrying for the purpose of the option agreement.
- B. The operation of a quarry on Wake Stone Corporation's property for a minimum period of five years.

The conveyance of the quarry site, if approved by the State, shall be by deed containing the usual covenants of warranty and conveying the quarry site free and clear of all encumbrances except those existing at the time of Wake Stone Corporation's purchase, and valorem taxes at the time of conveyance (which shall be prorated), and such drainage and utility easements as shall have been installed in connection with the development of the property.

The option may include such other terms as are mutually acceptable to the State and Wake Stone Corporation.

The method by which the quarry site may be donated to the State is as follows: ~~Upon acquisition of the land by Wake Stone Corporation (by exercise of its option to purchase),~~ Wake Stone Corporation will grant to the State an option which, if exercised by the State, will require that Wake Stone Corporation convey a fee simple title to the quarry site to the State. The State shall have no obligations to exercise its option to accept a conveyance of the quarry site.

The terms and conditions of the option shall be as follows:

- A. When all quarryable stone has been removed from all of the land and belonging to or under the control of Wake Stone Corporation during the period of its quarrying operations and which lies between Umstead State Park and Interstate Highway 40, it shall be the duty of Wake Stone Corporation to notify the State of this fact. Upon receipt of such notice, the State shall have six months within which it may elect to have Wake Stone Corporation convey the quarry site to the

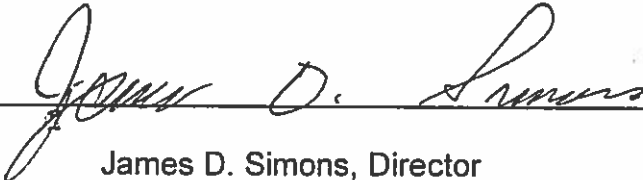
State. If the State elects to have Wake Stone Corporation convey the quarry site to the State, it shall notify Wake Stone Corporation of such election within said six month period. All notices shall be by certified mail and return receipt requested. If the State fails to make election within said six month period or shall elect not to accept a conveyance of the quarry site, the option shall be thereupon terminate and Wake Stone Corporation shall have no further obligation to convey the quarry site to the State.

B. If all quarryable stone is not removed, the right of the State to acquire the quarry site shall ~~accure~~ at the end of 50 years from the date quarrying commences or 10 years after quarrying operations have ceased without having been resumed, ~~whichever is sooner, and notices shall be exchanged at that time in the same manner and with the same time limitations as set forth in Paragraph A above.~~

C. Until the option has expired, Wake Stone Corporation shall not encumber by mortgage or deed of trust of any of the area designated "BUFFER AREA" on Wake Stone Corporation's site plan dated February 17, 1981, revised March 10, 1981 and February 14, 1991 (and the Site Plan Map dated March 1, 2001 and Site Plan Maps last revised November 22, 2010), except for purchase money security interests.

~~The terms and conditions relating to the donation are placed herein to prescribe generally the boundaries of the Wake Stone Corporation offer. The acceptance by the State is subject to approval by the Department of Administration and the council of State and the ascertaining that the offer is in accord with the laws of the State and lawfully adopted rules and regulations. Further, the Department's analysis of the conditions of the land to be transferred will be in accordance with the criteria identified in the "Principles' Governing the Establishment of Extension and Development of State Parks, State Recreation Areas and State Natural Areas."~~

This permit, issued May 13, 1981, modified April 15, 1986, renewed and modified April 1, 1991, modified February 5, 1992 and October 11, 1996 and renewed April 20, 2001, is hereby modified the 24th day of November, 2010 pursuant to G.S. 74-52.

By: 

James D. Simons, Director  
Division of Land Resources  
By Authority of the Secretary  
Of the Department of Environment and Natural Resources

## Wehner, Judy

---

**From:** David Lee [davidlee@wakestonecorp.com]  
**Sent:** Wednesday, November 24, 2010 9:59 AM  
**To:** Wehner, Judy  
**Subject:** Basin 2010-1 barrel outlet and slope drain outlet protection  
**Attachments:** revised outlet protection.pdf

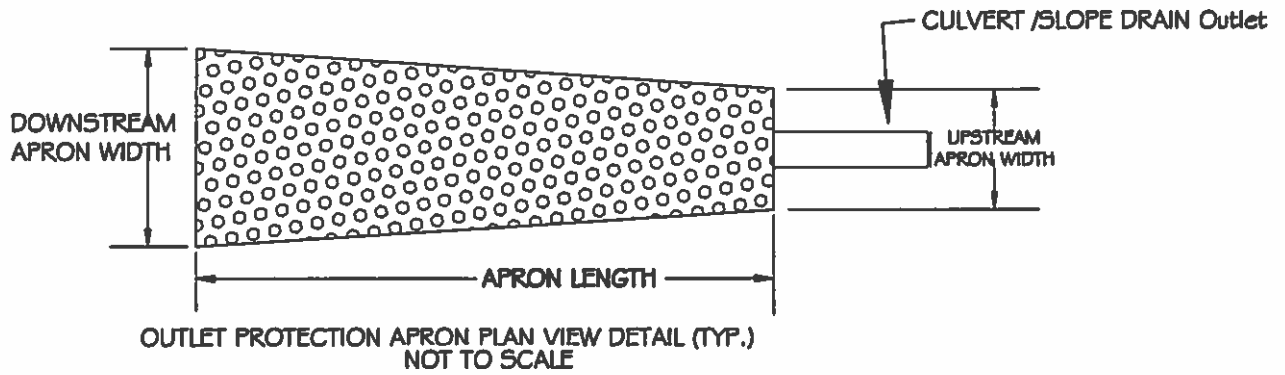
Judy-

I found a CAD/typo in the revised plan set - Sheet 4 of 4. The attached pdf provides the corrected dimensions for the outlet protection proposed for Basin 2010-1 barrel and the 24" slope drain that will direct runoff from the stockpile area to the fore bay of Basin 2010-1.

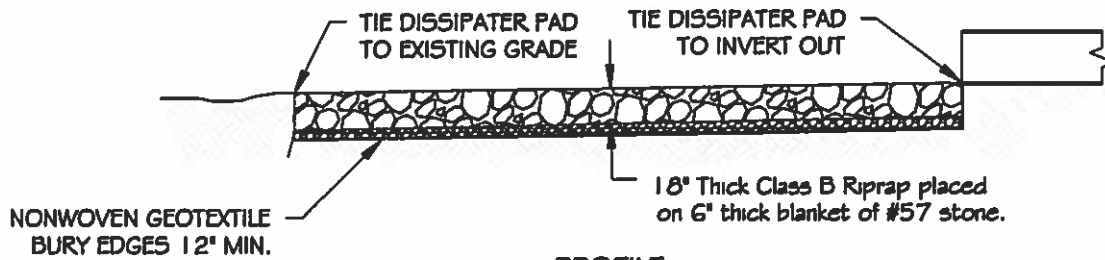
Sorry for the oversight.

-David

David F. Lee  
Chief Geologist/Environmental Supervisor  
**Wake Stone Corporation**  
PO Box 190  
Knightdale, North Carolina 27545  
Office: 919-266-1100, ext. 134  
Cell: 919-369-3449  
Home: 919-553-4666



PLAN



PROFILE

	Width at pipe outlet	Width at downslope end	Minimum Apron Length
Basin 2010-1 18" CMP Barrel	4.5'	17.0'	12.0'
24" Corrugated Plastic Pipe Slope Drain	6.0'	6.0'	10.0'

**Wehner, Judy**

---

**From:** Holley, John  
**Sent:** Friday, November 19, 2010 5:36 PM  
**To:** Wehner, Judy  
**Cc:** Davis, Tracy  
**Subject:** Triangle Quarry (92-10), Suspense Date 11/22/2010

The subject application has been reviewed, and I have consulted with Patrick Butler (DAQ) and Natalie Laundry (DWQ). I offer the following comments:

- (1) A basic construction sequence should be added to the plans addressing timing of E&S installation and handling of clearing debris (potential burning of woody debris was an issue for DAQ with the site so near the Park). I discussed with David Lee, and he indicates that they plan to install perimeter control first, then proceed with clearing. He also indicated that they plan to grind or chop the debris onsite for mulch. These clarifications should be added to the plans.
- (2) The outlet pipe orientation shown on Sheet 1 is not desirable in that it may impact the toe of the existing berm. The orientation shown on Sheet 2 is better since it is on the contour and will encourage more diffuse flow (this concern was noted by DWQ).
- (3) The slope drain size and dissipator stone specifications need to be reflected on the drawings. Also, the emergency spillway should be located on sheet 2 so that it will discharge on the natural grade.
- (4) A reinforced stone outlet should be added to the silt fence below the proposed basin, and the fence should be extended toward the existing berm at the north end sufficient to ensure that runoff will not bypass the sediment control system.
- (5) The existing forested buffer along the park property should be sufficient without further screening.
- (6) DWQ and DAQ did not indicate additional concerns.

With the above issues addressed, I can support approval of this application.

*E-mail correspondence to and from this address may be subject to the North Carolina Public Records Law and may be disclosed to third parties.*

Please note my email address has changed to  
[John.Holley@ncdenr.gov](mailto:John.Holley@ncdenr.gov)

3k  
4E  
7A





# North Carolina Wildlife Resources Commission

Gordon Myers, Executive Director

## MEMORANDUM

RECEIVED

TO: Brenda M. Harris, Mining Program Secretary  
Land Quality Section

NOV 16 2010

FROM: Shari L. Bryant, Piedmont Region Coordinator  
Habitat Conservation Program

*Shari L. Bryant*  
LAND QUALITY  
MINING PROGRAM

DATE: 15 November 2010

SUBJECT: Mining Permit Modification for Wake Stone Corporation, Triangle Quarry, – Permit No. 92-10, Wake County, North Carolina

Biologists with the North Carolina Wildlife Resources Commission have reviewed the subject permit modification and we are familiar with the habitat values of the area. Our comments are provided in accordance with provisions of the Mining Act of 1971 (as amended, 1982)(G.S. 74-76 through 74-68 15 NCAC 5).

Wake Stone Corporation is requesting a modification of its permit to mine overburden, saprolite, granitic-type stone. The total permitted area is 223 acres. The modification involves 3.6 acres within the previously permitted boundary and the area will be used to stockpile materials. The applicant indicates accumulated groundwater and runoff is pumped to a reservoir for make-up water in the process water closed loop, when not needed as make-up water, the water is discharged to an unnamed tributary to Crabtree Creek. The applicant indicates no land disturbing activities are currently underway or planned within 50 feet of any on site natural watercourse or wetland, and it appears there is a 100-foot undisturbed buffer maintained along Crabtree Creek. The applicant anticipates reclamation will include allowing the pit to fill with water and removing plant structures and stockpiles. The site will be re-vegetated according to future land use plans to be undetermined.

Crabtree Creek in the Neuse River basin flows along the western mine site boundary. There are records for the federal species of concern and state endangered Atlantic pigtoe (*Fusconaia masoni*), the federal species of concern and state significantly rare pinewoods shiner (*Lythrurus matutinus*), the state threatened triangle floater (*Alasmidonta undulata*) and creeper (*Strophitus undulatus*), the state special concern notched rainbow (*Villosa constricta*), and the state significantly rare Carolina ladle crayfish (*Cambarus davidi*) in Crabtree Creek. Also, there is a Significant Natural Heritage Area – William B. Umstead State Park – adjacent to and downstream of the site.

We have no objection to the proposed modification, and we offer the following recommendations to minimize impacts to aquatic and terrestrial wildlife resources.

15 November 2010  
Triangle Quarry  
Permit No. 92-10

1. Water discharges from the project site should be proportional to the size of the receiving stream so that the hydrology of the stream is not altered, and all discharges should comply with NPDES permit requirements. In particular, turbidity of the discharge should be maintained at or below the permit requirement. High water discharge rates and turbidity can negatively impact aquatic resources within and downstream of the project area. Excessive silt and sediment loads can have numerous detrimental effects on aquatic resources including destruction of spawning habitat, suffocation of eggs, and clogging of gills of aquatic species.
2. We encourage the applicant to consider using seed mixtures that are beneficial to wildlife such as native, warm season grasses in their reclamation plan. An exact seeding mixture would need to take into account soil types, moisture, pH, and degree of slope of areas to be stabilized. In addition, for relatively shallow sediment basin reclamation, we recommend these areas be reclaimed as wetlands where practicable. We refer the applicant to Joseph Folta, District Wildlife Biologist, at (919) 269-2767 for additional information and ideas on reclamation for wildlife.

Thank you for the opportunity to comment on this permit modification. If we can provide further assistance, please contact our office at (336) 449-7625.

cc: David F. Lee, Wake Stone Corporation  
Mark Bowers, USFWS



North Carolina Department of Environment and Natural Resources  
Division of Water Resources

Beverly Eaves Perdue  
Governor

Thomas A. Reeder  
Director

Dee Freeman  
Secretary

November 08, 2010

MEMORANDUM

RECEIVED

TO: Judy Wehner  
Land Quality Section

FROM: Paul Williams *PW*  
Ground Water Management Section  
Division of Water Resources

SUBJECT: Comments on the Mining Permit Modification Request for:  
Wake Stone Corporation  
Triangle Quarry  
Wake County

NOV 08 2010

LAND QUALITY  
MINING PROGRAM

Please find attached a copy of the mining permit modification request for the above referenced project.

The Triangle Quarry located in Wake County does not appear to have an unduly adverse effect on ground water supplies and has registered their annual withdrawals (facility ID 0202-0004) with the Division of Water Resources.

Facilities not in the fifteen county Central Coastal Plain Capacity Use Area are required to register their water withdrawals in accordance with the North Carolina General Statute G.S. 143-215.22H. This statute requires any non-agricultural water user who withdraws 100,000 gallons or more in any one day of ground water or surface water to register and update withdrawals. This statute also requires transfers of 100,000 gallons or more in any one day of surface water from one river basin to another river basin to register and update their water transfers. Water withdrawal registrants must complete the annual water use reporting form by April 1 for the previous year.

If you have further questions please contact the Division of Water Resources at (919) 733-4064 or send correspondence to 1611 Mail Service Center, Raleigh NC 27699-1611.



North Carolina Department of Environment and Natural Resources  
Division of Land Resources  
Land Quality Section

James D. Simons, P.G., P.E.  
Director and State Geologist

Beverly Eaves Perdue, Governor  
Dee Freeman, Secretary

October 29, 2010

MEMORANDUM

TO: Mr. Nat Wilson  
Habitat Hydrogeology Group  
Division of Water Resources

FROM: Brenda M. Harris *B. Harris*  
Mining Program Secretary  
Land Quality Section

SUBJECT: Mining Permit Modification for Wake Stone Corp  
Triangle Quarry  
Wake County

Mine Dewatering Proposed

No Mine Dewatering Proposed

Please find attached for your review a copy of the mining permit modification request for the above referenced project.

Please review this information and advise as to the probability of this operation having unduly adverse effect on **November 22, 2010** so that we may complete our review of this request within our statutory time limits.

Any comments your agency can provide regarding potential effects on potable groundwater supplies and groundwater quality will be appreciated. We would like to have any recommendations you may provide for permit conditions, for reasonable protection of groundwater quantity or quality.

If your staff wishes to perform a site inspection, it is recommended that they contact the person submitting this request to set up a convenient date and time. Also, please send a copy of your comments to the person noted in the application.

**PLEASE RETURN ALL APPLICATION MATERIALS AND MAPS WITH YOUR REVIEW COMMENTS TO THIS OFFICE.**

Your continued cooperation is greatly appreciated. Please contact Ms. Judy Wehner (919) 733-4574 if you have any questions.

/bmh

Attachments

cc: Mr. John Holley

**RECEIVED**

OCT 29 2010

DIVISION OF WATER RESOURCES

# MINING CHECKLIST FOR ROUTING

Applicant's Name: Wake Stone Corp Project Name: Greenville Quarry

Applic./Permit No.: 92-10 County: Wake Date Received: 10/29/10

Reviewer: [Signature] River Basin Name: Neuse

- New                       Renewal                       Modification (inside permit boundaries)
- Modification (outside permit boundaries)                       Transfer                       Release
- Partial Release                       Additional Information                       Fee Needed: \$ \_\_\_\_\_  Fee Received: \$ 750<sup>00</sup>

Please route entire application package to:

Raleigh Regional Office (2 complete copies; attach the "LQS Regional Office Mining Application Review Checklist" to one copy and attach both the DWQ and DAQ "Mining Application Review Form" to the other copy; send both copies to the Regional Engineer)

- |   |  |
|---|--|
| <input checked="" type="checkbox"/> Division of Water Resources<br><input checked="" type="checkbox"/> NC Wildlife Resources Commission<br><input type="checkbox"/> US Fish & Wildlife Service<br>(Only new applications and modification requests that add land to the permit) | Date: Routed <u>10/29/10</u> Rec'd <u>10/29/10</u><br>Date: Routed _____ Rec'd _____<br>Date: Routed _____ Rec'd _____<br>Date: Routed _____ Rec'd _____ |
|---|--|

Please route first 3 pages of the application and any location maps to:

- |   |  |
|---|--|
| <input type="checkbox"/> Division of Parks & Recreation<br><input type="checkbox"/> NC Geological Survey Section<br><input type="checkbox"/> Division of Marine Fisheries<br><input type="checkbox"/> Division of Soil & Water Conservation (plus LEA)<br>(Only new applications and modification requests that add land to the permit) | Date: Routed _____ Rec'd _____<br>Date: Routed _____ Rec'd _____<br>Date: Routed _____ Rec'd _____<br>Date: Routed _____ Rec'd _____ |
| <input type="checkbox"/> Division of Archives & History<br>(Only new applications)  | Date: Routed _____ Rec'd _____   |
| <input type="checkbox"/> Other: _____   | Date: Routed _____ Rec'd _____   |

\*\*Suspense Date for Comments: 11/22/10 (no later than 25 days from receipt)

Please note the following:

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

*35.8366  
-78.7666  
Don't have new  
+ file  
[Signature]*



North Carolina Department of Environment and Natural Resources  
Division of Land Resources  
Land Quality Section

James D. Simons, P.G., P.E.  
Director and State Geologist

Beverly Eaves Perdue, Governor  
Dee Freeman, Secretary

October 29, 2010

MEMORANDUM

TO: Ms. Shari Bryant  
Habitat Conservation Program Coordinator  
Wildlife Resources Commission

FROM: Brenda M. Harris *B. Harris*  
Mining Program Secretary  
Land Quality Section

SUBJECT: Mining Permit Modification for Wake Stone Corp  
Triangle Quarry  
Wake County

Please find attached for your review a copy of the mining permit modification request for the above referenced project.

Please review this information and advise as to the probability of this operation having unduly adverse effect on wildlife and freshwater fisheries (G.S. 74-51 (2)). Please respond by **November 22, 2010** so that we may complete our review of this request within our statutory time limits.

As is the case in our review of all mining permit applications, renewals and modifications, this office will carefully review all proposed erosion and sediment control measures to ensure that they are sufficient to restrain erosion and off-site sedimentation. However, any comments your agency can provide regarding effects on wildlife and freshwater fisheries would be greatly appreciated. If your staff wishes to perform a site inspection, it is recommended that they contact the person submitting this request to set up a convenient date and time. Also, please send a copy of your comments to the person noted in the application. **RETURN ALL APPLICATION MATERIALS AND MAPS WITH YOUR REVIEW COMMENTS TO THIS OFFICE.**

Your continued cooperation is greatly appreciated. Please contact Ms. Judy Wehner (919) 733-4574 if you have any questions.

/bmh

Attachments

cc: Mr. John Holley



North Carolina Department of Environment and Natural Resources  
Division of Land Resources  
Land Quality Section

James D. Simons, P.G., P.E.  
Director and State Geologist

Beverly Eaves Perdue, Governor  
Dee Freeman, Secretary

October 29, 2010

MEMORANDUM

TO: Mr. Nat Wilson  
Habitat Hydrogeology Group  
Division of Water Resources

FROM: Brenda M. Harris *BmH*  
Mining Program Secretary  
Land Quality Section

SUBJECT: Mining Permit Modification for Wake Stone Corp  
Triangle Quarry  
Wake County

Mine Dewatering Proposed

No Mine Dewatering Proposed

Please find attached for your review a copy of the mining permit modification request for the above referenced project.

Please review this information and advise as to the probability of this operation having unduly adverse effect on **November 22, 2010** so that we may complete our review of this request within our statutory time limits.

Any comments your agency can provide regarding potential effects on potable groundwater supplies and groundwater quality will be appreciated. We would like to have any recommendations you may provide for permit conditions, for reasonable protection of groundwater quantity or quality.

If your staff wishes to perform a site inspection, it is recommended that they contact the person submitting this request to set up a convenient date and time. Also, please send a copy of your comments to the person noted in the application.

**PLEASE RETURN ALL APPLICATION MATERIALS AND MAPS WITH YOUR REVIEW COMMENTS TO THIS OFFICE.**

Your continued cooperation is greatly appreciated. Please contact Ms. Judy Wehner (919) 733-4574 if you have any questions.

/bmh

Attachments

cc: Mr. John Holley

WAKE STONE CORPORATION  
P. O. BOX 190  
KNIGHTDALE, NC 27545

34  
66  
BPA

DATE October 28, 2010

PAY  
TO THE  
ORDER OF

NC DENR

\$ 750.00

Seven hundred fifty and <sup>00</sup>/<sub>100</sub>

DOLLARS 



**WACHOVIA**  
Wachovia Bank, N.A.  
wachovia.com

WAKE STONE CORPORATION

FOR PERMIT 92-10 MODIFICATION

Therese D. Briston





**Wehner, Judy**

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**From:** Wehner, Judy  
**Sent:** Friday, October 29, 2010 10:20 AM  
**To:** Smith, Danny  
**Cc:** Holley, John; Wehner, Judy  
**Subject:** Triangle Quarry 92-10  
**Attachments:** 92-10 DLR - Water Quality Review Sheet 2010.doc

Here's the review checklist for a modification of the Triangle Quarry, Wake Stone Corp. The modification is to add a new stockpile area.

-----  
E-mail correspondence to and from this address may be subject to the North Carolina Public Records Law and may be disclosed to third parties.

# MINING PERMIT APPLICATION REVIEW FORM

for the

## DIVISION OF WATER QUALITY

**THIS SECTION TO BE FILLED OUT BY DLR:**

Project Name: Triangle Quarry DLR Permit #: 92-10 County: Wake Address:  davidlee@wakestonecorp.com

	<u>YES</u>	<u>NO</u>	<u>Date Commencing</u>
Is this mine a new mine?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<u>1981</u>
Have land disturbing activities started? Date?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<u>1981</u>

Latitude: 35-50-57 Longitude: 80-45-57

Please return comments to (at DLR CO): Judy Wehner

Comments due by: 11/22/10

**SECTION BELOW TO BE FILLED OUT BY DWQ:**

Is the RO concerned that the operation, as proposed, would violate standards of water quality? \_\_\_\_\_

Comments: \_\_\_\_\_

Watershed/Stream Name & Classification: \_\_\_\_\_

DWQ Compliance Status of Mine: \_\_\_\_\_

	<u>YES</u>	<u>NO</u>
NPDES permit required?	<input type="checkbox"/> _____	<input type="checkbox"/> _____
NPDES permit existing?	<input type="checkbox"/> (Permit # _____)	<input type="checkbox"/> _____
If an NPDES permit is not required, is DWQ still concerned about wetland degradation by dewatering?	<input type="checkbox"/> _____	<input type="checkbox"/> _____
Should permittee contact DWQ RO immediately? (e.g. to schedule a site visit if mine has already begun digging or is dewatering without DWQ permit)	<input type="checkbox"/> RO Contact Name: _____ Contact Reason: _____	<input type="checkbox"/> _____
401 Wetland Cert. required?	<input type="checkbox"/> _____	<input type="checkbox"/> _____
401 Wetland Cert. existing?	<input type="checkbox"/> Permit # _____	<input type="checkbox"/> _____
Does DWQ RO currently have enough information to determine if a 401 certification is required?	<input type="checkbox"/> _____	<input type="checkbox"/> _____

	<u>YES</u>	<u>NO</u>
Are wetlands disturbed at this site?	<input type="checkbox"/> _____	<input type="checkbox"/> _____
Does DWQ RO suspect or know of nearby wetlands to the site?	<input type="checkbox"/> _____	<input type="checkbox"/> _____
Is a wetland delineation required prior to DWQ issuing the permit?	<input type="checkbox"/> By: <input type="checkbox"/> JD or <input type="checkbox"/> Consultant <input type="checkbox"/> Onsite? Or <input type="checkbox"/> Offsite?	<input type="checkbox"/> _____
Stream Determination Needed?	<input type="checkbox"/> _____	<input type="checkbox"/> _____
Stream Determination Completed?	<input type="checkbox"/> _____	<input type="checkbox"/> _____
Does DWQ RO need a statement that no wetlands/streams are disturbed for this project from applicant?	<input type="checkbox"/> _____	<input type="checkbox"/> _____
Buffer Determination Needed?	<input type="checkbox"/> _____	<input type="checkbox"/> _____
Buffer Determination Completed?	<input type="checkbox"/> _____	<input type="checkbox"/> _____
Recycle system permit existing?*	<input type="checkbox"/> Permit # _____	<input type="checkbox"/> _____
New Recycle System permit required?*	<input type="checkbox"/> _____	<input type="checkbox"/> _____
Enough information to determine?	<input type="checkbox"/> _____	<input type="checkbox"/> _____
Non-discharge permit existing?*	<input type="checkbox"/> Permit # _____	<input type="checkbox"/> _____
Will wastewaters discharge to HQW waters with a 7Q10=0? **	<input type="checkbox"/> _____ Unknown (permittee determine): <input type="checkbox"/> _____	<input type="checkbox"/> 7Q10 Flow: _____
Does DWQ require DLR to hold the permit (e.g. so DWQ can review it further or because DWQ requires more information)?	<input type="checkbox"/> Has Violation <input type="checkbox"/> O&M Requirements <input type="checkbox"/> HQW/7Q10 Concerns <input type="checkbox"/> Other. Reason: _____ RO contact: _____ <input type="checkbox"/> Hold Until: _____	<input type="checkbox"/> _____
Mine must wait to dewater until an O&M plan is approved?	<input type="checkbox"/> _____	<input type="checkbox"/> _____

*\*The NPDES SW and WW permit NCG020000 covers closed-loop recycle systems, designed to exclude all stormwater run-off from the system and operate at or below two-feet of freeboard. These systems may be permitted by a Non-discharge Recycle System Permit from the Aquifer Protection Section (APS), OR may instead be permitted under NCG020000 to eliminate an additional permit. Recycle systems that do not meet those criteria are considered discharging systems, and are subject to the NCG020000 discharge permit.*

*\*\*To obtain 7Q10 flows, permittees must contact the DWQ Stormwater Permitting Unit. If DWQ does not have a flow estimate for a specific stream, permittees will be asked to obtain one. Permittees should contact J. Curtis Weaver at the USGS: 919-571-4043, for more information on obtaining a 7Q10 flow. USGS will not determine a 7Q10 flow for tidally influenced water bodies.*

**Reviewed by:**

DWQ RO Surface Water: \_\_\_\_\_ Regional Office: \_\_\_\_\_ Date: \_\_\_\_\_

RO Aquifer Protection Section: \_\_\_\_\_ Regional Office: \_\_\_\_\_ Date: \_\_\_\_\_

SPU DWQ Central Office Reviewer (if applicable): \_\_\_\_\_

# Wake Stone Corporation

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Quarry Phone Numbers:  
919/266-9266–Knightdale  
919/677-0050–Triangle  
919/775-7349–Moncure  
252/985-4411–Nash County  
843/756-3400–N. Myrtle Beach

Locations:  
U.S. 64 East, Raleigh, N.C.  
I-40 at Harrison Ave., Cary, N.C.  
U.S. 1 at Deep River, Moncure, N.C.  
SR 1527 at I-95, Gold Rock, N.C.  
3990 Hwy. 9 Bus. East, Loris, S.C.

Business Office Address:  
P.O. Box 190  
Knightdale, N.C. 27545  
919/266-1100  
Fax 919/266-1149  
www.wakestonecorp.com

October 28, 2010



Judy Wehner Assistant Mining Specialist  
N. C. DENR - Land Quality Section  
512 North Salisbury Street  
Raleigh, North Carolina 27611-7687

**Subject: Wake Stone Corporation Triangle Quarry  
Mining Permit No. 92-10  
Permit Modification Request**

Dear Mr. Davis:

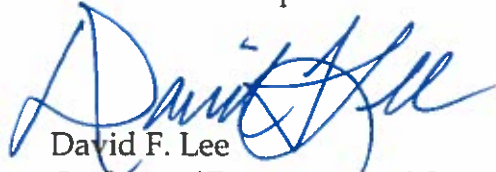
Enclosed are six copies of Mining Permit Application materials requesting modification of Mining Permit No. 92-10 for the Triangle Quarry. Wake Stone Corporation will be supplying aggregate products for the forthcoming NCDOT Western Wake Expressway project scheduled for construction during 2011. Manufacturing of the required aggregates will take several months, with the additional condition that the products be stored in dedicated stockpiles prior to shipment to the jobsite.

The enclosed permit modification application and amended E&SC Plan provides for 3.6 acres of new land disturbing activities within the existing permit boundary. Within the 3.6 acres of new disturbance area we will construct the required dedicated stockpile area and E&SC measures detailed in the plan modification materials. We have designed a skimmer-type sediment basin according to recent DENR guidance. This basin will provide protection against off-site sedimentation during clearing and grading for the stockpile area, and will remain as a permanent basin throughout the future life of the quarry.

Judy Wehner  
October 28, 2010  
Page 2

As indicated on the updated Site Plan Map, the amount of land currently covered under this permit is 223.0 acres +/-, with 153 acres approved for disturbance. Following the requested modification, 156.6 acres will be affected, with the total acreage under permit remaining at 223. Pursuant to the Application Fee Schedule we are enclosing our check in the amount of \$750.00 for the permit modification application-processing fee. If you have any question concerning this renewal request please call me at 266-1100.

Sincerely,  
Wake Stone Corporation



David F. Lee  
Geologist/ Environmental Supervisor

df/  
Enclosures

# MINING CHECKLIST FOR ROUTING

Applicant's Name: Wake Stone Mining Project Name: Triangle Quarry

Applic./Permit No.: 92-10 County: Wake Date Received: 11/23/10

Reviewer: M. Wilson River Basin Name: Roanoke

- New
- Renewal
- Modification (inside permit boundaries)
- Modification (outside permit boundaries)
- Transfer
- Release
- Partial Release
- Additional Information
- Fee Needed: \$ \_\_\_\_\_
- Fee Received: \$ \_\_\_\_\_

Please route entire application package to:

Roberta Regional Office (2 complete copies; attach the "LQS Regional Office Mining Application Review Checklist" to one copy and attach both the DWQ and DAQ "Mining Application Review Form" to the other copy; send both copies to the Regional Engineer)

- Division of Water Resources Date: Routed 11/23/10 Rec'd \_\_\_\_\_
  - NC Wildlife Resources Commission Date: Routed \_\_\_\_\_ Rec'd \_\_\_\_\_
  - US Fish & Wildlife Service Date: Routed \_\_\_\_\_ Rec'd \_\_\_\_\_
- (Only new applications and modification requests that add land to the permit)

Please route first 3 pages of the application and any location maps to:

- Division of Parks & Recreation Date: Routed \_\_\_\_\_ Rec'd \_\_\_\_\_
  - NC Geological Survey Section Date: Routed \_\_\_\_\_ Rec'd \_\_\_\_\_
  - Division of Marine Fisheries Date: Routed \_\_\_\_\_ Rec'd \_\_\_\_\_
  - Division of Soil & Water Conservation (plus LEA) Date: Routed \_\_\_\_\_ Rec'd \_\_\_\_\_
- (Only new applications and modification requests that add land to the permit)
- Division of Archives & History (Only new applications) Date: Routed \_\_\_\_\_ Rec'd \_\_\_\_\_
  - Other: \_\_\_\_\_ Date: Routed \_\_\_\_\_ Rec'd \_\_\_\_\_

\*\*Suspense Date for Comments: N/A (no later than 25 days from receipt)

Please note the following:

\_\_\_\_\_ How you file

\_\_\_\_\_ thanks

\_\_\_\_\_ [Signature]

# Wake Stone Corporation

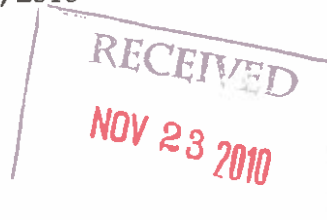
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Quarry Phone Numbers:  
919/266-9266-Knightdale  
919/677-0050-Triangle  
919/775-7349-Moncure  
252/985-4411-Nash County  
843/756-3400-N. Myrtle Beach

Locations:  
U.S. 64 East, Raleigh, N.C.  
I-40 at Harrison Ave., Cary, N.C.  
U.S. 1 at Deep River, Moncure, N.C.  
SR 1527 at I-95, Gold Rock, N.C.  
3990 Hwy. 9 Bus. East, Loris, S.C.

Business Office Address:  
P.O. Box 190  
Knightdale, N.C. 27545  
919/266-1100  
Fax 919/266-1149  
www.wakestonecorp.com

November 22, 2010



Judy Wehner Assistant Mining Specialist  
N. C. DENR - Land Quality Section  
512 North Salisbury Street  
Raleigh, North Carolina 27611-7687

**Subject: Wake Stone Corporation Triangle Quarry  
Mining Permit No. 92-10  
Permit Modification Request**

Ms. Wehner:

Enclosed please find duplicate copies of revisions to the plan set submitted on October 28, 2010 as part of our request to modify the affected acreage at the Triangle Quarry. These revisions provide the additional information and clarification requested by Mr. Holley following his review of the application. Specifically, these revisions provide the requested basic construction sequence, clarification on the orientation of the outlet pipe for Basin 2010-1, sizing information for the proposed slope drain and outlet protection, location of the basin emergency spillway, and provisions for a reinforced stone outlet for the proposed silt fencing. Please let me know if you require additional information.

Sincerely,  
Wake Stone Corporation

A handwritten signature in blue ink, appearing to read "David F. Lee". The signature is fluid and cursive, with a long horizontal stroke extending to the right.

David F. Lee  
Geologist/Environmental Supervisor

**Wehner, Judy**

---

**From:** Witherspoon, Lauren  
**Sent:** Monday, November 22, 2010 2:49 PM  
**To:** Wehner, Judy  
**Cc:** Jones, Jennifer; Holley, John  
**Subject:** RE: revised Triangle Quarry Sheet  
**Attachments:** 92-10 DLR - Water Quality Review Sheet 2010\_Wake Stone.doc

Attached are DWQ comments for the revised Triangle Quarry DLR permit. Please let me know if you need anything else.

Thanks,  
Lauren

---

**From:** Smith, Danny  
**Sent:** Monday, November 22, 2010 2:03 PM  
**To:** Witherspoon, Lauren  
**Subject:** FW: revised Triangle Quarry Sheet

Fyi  
ds

*My email has changed to [danny.smith@ncdenr.gov](mailto:danny.smith@ncdenr.gov)*

*\*\*E-mail correspondence to and from this address may be subject to the North Carolina Public Records Law and may be disclosed to third parties.*

---

**From:** Wehner, Judy  
**Sent:** Friday, October 29, 2010 10:26 AM  
**To:** Smith, Danny  
**Cc:** Holley, John  
**Subject:** revised Triangle Quarry Sheet

Forgot to put David Lee's email address on it.

---

E-mail correspondence to and from this address may be subject to the North Carolina Public Records Law and may be disclosed to third parties.

3k  
4E  
7B  
12B  
RC3  
RC5



# MINING PERMIT APPLICATION REVIEW FORM

for the

## DIVISION OF WATER QUALITY

**THIS SECTION TO BE FILLED OUT BY DLR:**

Project Name: Triangle Quarry DLR Permit #: 92-10 County: Wake Address:  davidlee@wakestonecorp.com

	<u>YES</u>	<u>NO</u>	<u>Date Commencing</u>
Is this mine a new mine?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<u>1981</u>
Have land disturbing activities started? Date?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<u>1981</u>

Latitude: 35-50-57 Longitude: 80-45-57

Please return comments to (at DLR CO): Judy Wehner

Comments due by: 11/22/10

**SECTION BELOW TO BE FILLED OUT BY DWQ:**

Is the RO concerned that the operation, as proposed, would violate standards of water quality? No  
 Comments: basins should be properly maintained and appropriate monitoring should be conducted at this new outfall because wetlands are downstream of this location on Umstead Park land

Watershed/Stream Name & Classification: Crabtree Creek

DWQ Compliance Status of Mine: Compliant

	<u>YES</u>	<u>NO</u>
NPDES permit required?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
NPDES permit existing?	<input checked="" type="checkbox"/> (Permit # <u>NCG020001</u> )	<input type="checkbox"/>
If an NPDES permit is not required, is DWQ still concerned about wetland degradation by dewatering?	<input type="checkbox"/>	<input type="checkbox"/>
Should permittee contact DWQ RO immediately? (e.g. to schedule a site visit if mine has already begun digging or is dewatering without DWQ permit)	<input type="checkbox"/> RO Contact Name: _____ Contact Reason: _____	<input checked="" type="checkbox"/>
401 Wetland Cert. required?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
401 Wetland Cert. existing?	<input checked="" type="checkbox"/> Permit # _____	<input type="checkbox"/>
Does DWQ RO currently have enough information to determine if a 401 certification is required?	<input checked="" type="checkbox"/>	<input type="checkbox"/>

	<u>YES</u>	<u>NO</u>
Are wetlands disturbed at this site?	<input type="checkbox"/> _____	<input checked="" type="checkbox"/> _____
Does DWQ RO suspect or know of nearby wetlands to the site?	<input checked="" type="checkbox"/> <u>There are wetlands downstream from the proposed basin</u>	<input type="checkbox"/> _____
Is a wetland delineation required prior to DWQ issuing the permit?	<input type="checkbox"/> By: <input type="checkbox"/> JD or <input type="checkbox"/> Consultant <input type="checkbox"/> Onsite? Or <input type="checkbox"/> Offsite?	<input checked="" type="checkbox"/> _____
Stream Determination Needed?	<input type="checkbox"/> _____	<input checked="" type="checkbox"/> _____
Stream Determination Completed?	<input type="checkbox"/> _____	<input checked="" type="checkbox"/> _____
Does DWQ RO need a statement that no wetlands/streams are disturbed for this project from applicant?	<input type="checkbox"/> _____	<input checked="" type="checkbox"/> _____
Buffer Determination Needed?	<input type="checkbox"/> _____	<input checked="" type="checkbox"/> _____
Buffer Determination Completed?	<input type="checkbox"/> _____	<input checked="" type="checkbox"/> _____
Recycle system permit existing?*	<input type="checkbox"/> Permit # _____	<input type="checkbox"/> _____
New Recycle System permit required?*	<input type="checkbox"/> _____	<input checked="" type="checkbox"/> _____
Enough information to determine?		
Non-discharge permit existing?*	<input type="checkbox"/> Permit # _____	<input checked="" type="checkbox"/> _____
Will wastewaters discharge to HQW waters with a 7Q10=0? **	<input type="checkbox"/> _____ Unknown (permittee determine): <input type="checkbox"/>	<input type="checkbox"/> 7Q10 Flow: _____
Does DWQ require DLR to hold the permit (e.g. so DWQ can review it further or because DWQ requires more information)?	<input type="checkbox"/> Has Violation <input type="checkbox"/> O&M Requirements <input type="checkbox"/> HQW/7Q10 Concerns <input type="checkbox"/> Other. Reason: _____ RO contact: _____ <input type="checkbox"/> Hold Until: _____	<input checked="" type="checkbox"/> _____
Mine must wait to dewater until an O&M plan is approved?	<input type="checkbox"/> _____	<input checked="" type="checkbox"/> _____

*\*The NPDES SW and WW permit NCG020000 covers closed-loop recycle systems, designed to exclude all stormwater run-off from the system and operate at or below two-feet of freeboard. These systems may be permitted by a Non-discharge Recycle System Permit from the Aquifer Protection Section (APS), OR may instead be permitted under NCG020000 to eliminate an additional permit. Recycle systems that do not meet those criteria are considered discharging systems, and are subject to the NCG020000 discharge permit.*

*\*\*To obtain 7Q10 flows, permittees must contact the DWQ Stormwater Permitting Unit. If DWQ does not have a flow estimate for a specific stream, permittees will be asked to obtain one. Permittees should contact J. Curtis Weaver at the USGS: 919-571-4043, for more information on obtaining a 7Q10 flow. USGS will not determine a 7Q10 flow for tidally influenced water bodies.*

**Reviewed by:**

DWQ RO Surface Water: LCW Regional Office: Raleigh Date: 11-22-2010

RO Aquifer Protection Section: \_\_\_\_\_ Regional Office: \_\_\_\_\_ Date: \_\_\_\_\_

SPU DWQ Central Office Reviewer (if applicable): \_\_\_\_\_

RECEIVED  
OCT 29 2010

**Wake Stone Corporation Triangle Quarry**

**Mining Permit No. 92-10**

**Erosion & Sediment Control Plan Modification**

**October 27, 2010**

**Wake Stone Corporation Triangle Quarry  
Mining Permit No. 92-10  
Application for E& SC Plan Modification  
October 27, 2010**

**Project Description**

The purpose of this requested modification to Permit No. 92-10 for the Triangle Quarry is for construction of a new 2.7 acre stockpile area located contiguous to the existing plant and stockpile yard. This stockpile expansion area is totally contained within the currently permitted acreage, adjacent the quarry entrance road. Construction and utilization of this new stockpile area is required for the storage of aggregate products dedicated to NC DOT's Western Wake Expressway Project. Paving on this project is scheduled to begin in 2011. Due to the time needed for production of the products needed for this DOT project, Wake Stone must begin production of these products during November 2010. Aggregate for this project must be stored in dedicated stockpiles.

**2.7 Acre Stockpile Expansion Area**

As indicated on the accompanying Site Plan maps, this requested modification is for the addition of 2.7 acres of stockpile area located contiguous to the southeast portion of the existing plant and stockpile yard area. This expansion area is within the previously permitted acreage. Total land disturbance required to accommodate the stockpile area will be 3.6 acres.

**Planned Erosion and Sedimentation Control Measures**

Erosion and sedimentation control for the planned stockpile expansion activities will be provided as detailed on the accompanying plans. Proposed Sediment Basin #2010-01 will be constructed as a skimmer basin at the northeast corner of the new disturbance area. Detailed design and construction details for this structure are provided in the accompanying materials. The skimmer basin is designed to allow passage of the Q-10 flow through the skimmer device alone. Passage of the Q-25 flow will activate the barrel and riser principal spillway in addition to the skimmer device. An adequately designed emergency spillway weir is provided in the earthen embankment to pass the Q-100 flow.

Installation of the proposed Basin #2010-01 will immediately follow initial clearing and grading. The basin will serve to collect sediment-laden runoff during not only the construction phase, but will continue to function as a permanent basin throughout the remaining life of the quarry operation. All structures will be maintained during and following the construction phase. All disturbed areas not utilized for stockpiling of aggregates will be provided vegetative cover immediately following final grading. A vegetation plan is provided on the Plan Details Sheet. Basins will be cleaned and repaired as necessary, or when they become one-half filled with sediment.



**North Carolina Mining Permit  
Application**

# **NORTH CAROLINA MINING PERMIT APPLICATION**

**State of North Carolina  
Department of Environment  
and Natural Resources  
Division of Land Resources  
Land Quality Section**

**1612 Mail Service Center  
Raleigh, North Carolina 27699-1612  
(919) 733-4574**

Revised: January 30, 2008

NORTH CAROLINA DEPARTMENT OF ENVIRONMENT  
AND NATURAL RESOURCES  
LAND QUALITY SECTION  
APPLICATION FOR A MINING PERMIT  
(PLEASE PRINT OR TYPE)

1. Name of Mine Wake Stone Corporation Triangle Quarry County Wake  
River Basin Neuse  
Latitude (dd.mm.ss) 35dd.50mm.57ss North Longitude (dd.mm.ss) 78dd.45mm.57ss West

2. Name of Applicant\* Wake Stone Corporation

3. Permanent address for receipt of official mail\*\* PO Box 190  
Knightdale, North Carolina 27545

Telephone (919) 266-1100

4. Mine Office Address 222 Star Lane  
Cary, North Carolina 27513 Telephone (919) 677-0050

5. Mine Manager Paul Pierce, Superintendent

We hereby certify that all details contained in this Permit Application are true and correct to the best of our knowledge. We fully understand that any willful misrepresentation of facts will be cause for permit revocation.

\*\*\*Signature  Date 10/27/2010

Print Name David E. Lee

Title Geologist/Environmental Supervisor

\* This will be the name that the mining permit will be issued to and the name that must be indicated on the reclamation bond (security) that corresponds to this site.

\*\* The Land Quality Section must be notified of any changes in the permanent address or telephone number.

\*\*\* Signature of company officer required.

G.S. 74-51 provides that the Department shall grant or deny an application for a permit within 60 days of receipt of a complete application or, if a public hearing is held, within 30 days following the hearing and the filing of any supplemental information required by the Department. **All questions must be addressed and all required maps provided before this application can be considered complete. Attach additional sheets as needed.**

**APPLICATION FOR A MINING PERMIT**

**NOTE:** All of the following questions must be thoroughly answered regarding your mining operation for the intended life of the mine. All responses must be clearly conveyed on a corresponding, detailed mine map.

**A. GENERAL CHARACTERISTICS OF THE MINE**

1. Answer all of the following that apply:

If this is an application for a **NEW** permit, indicate the total acreage at the site to be covered by the permit (this is the acreage that the "new permit" fee will be based upon): \_\_\_\_\_

Of this acreage, how much is owned and how much is leased? Acres owned: \_\_\_\_\_  
Acres leased: \_\_\_\_\_ Property owner if leased: \_\_\_\_\_

If this is an application for **RENEWAL** of a mining permit, indicate the mining permit number and the total (overall) acreage covered by the existing permit: Mining Permit No.: \_\_\_\_\_  
Total permitted acreage (this is the acreage that the "renewal" fee will be based upon): \_\_\_\_\_

If this is an application for a **MODIFICATION** to a mining permit, indicate the mining permit number and the total (overall) acreage covered by the existing permit.  
Mining Permit No.: 92-10 Total permitted acreage: 223

Does the modification involve acreage within the previously approved permitted boundary?  
Yes  No . If yes, indicate the acreage to be covered by this modification (this is the acreage that the "major modification" fee will be based upon): 3.6 acres

Does the modification involve acreage outside the previously approved permitted boundary?  
Yes  No . If yes, indicate the additional acreage to be covered by this modification: \_\_\_\_\_. (NOTE: you must complete all of Section F. of this application form entitled Notification of Adjoining Landowners).

Of this acreage to be added to the permit, will any portion of this acreage be affected (i.e.: disturbed, ground cover removed) by the mining operation? Yes  No  (If no, a "minor modification" fee of \$100.00 is required, despite the "undisturbed" acreage to be added). If yes, indicate the acreage to be affected within the acreage to be added to the permit (the total acreage to be added to the permit is the acreage that the "major modification" fee will be based upon): \_\_\_\_\_

If this is an application for **TRANSFER** of a mining permit, indicate the mining permit number and the total (overall) acreage covered by the existing permit.  
Mining Permit No.: \_\_\_\_\_ Total permitted acreage: \_\_\_\_\_

**SEE THE FEE SCHEDULE AT THE END OF THIS FORM FOR THE PROPER FEE AMOUNT TO BE PAID FOR THE REQUESTED PERMIT ACTION(S) AND CORRESPONDING ACREAGE NOTED ABOVE**

2. Name of all materials mined: overburden, saprolite, granitic-type stone

3. Mining method:

- Hydraulic Dredge       Front-end Loader & Truck       Shovel & Truck  
 Dragline & Truck       Self-loading Scraper

Other (explain): \_\_\_\_\_

4. a. Expected maximum depth of mine (feet) -200' MSL  
Depth is relative to what benchmark? (e.g., natural ground level, mean sea level, road elevation, etc.)  
Mean Sea Level

b. Expected average depth of mine (feet) -200' MSL



## APPLICATION FOR A MINING PERMIT

5. Has any area(s) at this site been mined in the past? Yes  No   
If yes, when and by whom was this activity conducted? Continuously since 1982 by Wake Stone
6. Number of years for which the permit is requested (10 years maximum): 10

### B. MAPS

1. Clearly mark and label the location of your mining operation on **six (6) copies** of a 7.5-minute quadrangle and a county highway map. These maps, in addition to **six (6) copies** of all mine maps and reclamation maps, must be submitted with each permit application.

7.5-minute quadrangles may be obtained from the N.C. Geological Survey:

Mailing Address:

1612 Mail Service Center  
Raleigh, North Carolina 27699-1612  
(919) 733-2423  
[www.geology.enr.state.nc.us/](http://www.geology.enr.state.nc.us/)

OR

Physical Address:

512 North Salisbury Street, 5<sup>th</sup> Floor  
Raleigh, North Carolina 27604

County highway maps may be obtained from the N.C. Department of Transportation:

North Carolina Department of Transportation – Geographic Information Systems (GIS)

Mailing Address:

NCDOT GIS Unit  
1587 Mail Service Center  
Raleigh, North Carolina 27699-1587

Physical Address:

NCDOT GIS Unit  
3401 Carl Sandburg Court  
Raleigh, North Carolina 27610  
(919) 212-6000

[www.ncdot.org/it/gisContact/default.html](http://www.ncdot.org/it/gisContact/default.html)

2. Mine maps must be accurate and appropriately scaled drawings, aerial photographs or enlarged topographic maps of the entire mine site. **All aspects of the mine site must be clearly labeled on the maps along with their corresponding (approximate) acreage. As a reminder, mining permits can only be issued for up to 10 years; thus, all mine and reclamation maps must only denote those activities that are intended to be conducted during the life of the mining permit.** All maps must be of a scale sufficient (see minimum requirements listed below) to clearly illustrate the following, **at a minimum**:
- Property lines of the tract or tracts of land on which the proposed mining activity is to be located including easements and rights-of-way.
  - Existing or proposed permit boundaries.
  - Initial and ultimate limits of clearing and grading.
  - Outline and width of all buffer zones (both undisturbed and unexcavated).
  - Outline and acreage of all pits/excavations.
  - Outline and acreage of all stockpile areas.
  - Outline and acreage of all temporary and/or permanent overburden disposal areas.
  - Location and acreage of all processing plants (processing plants may be described as to location and distance from mine if sufficiently far removed).
  - Locations and names of all streams, rivers and lakes.
  - Outline and acreage of all settling and/or processing wastewater ponds.
  - Location and acreage of all planned and existing access roads and on-site haul roads.
  - Location of planned and existing on-site buildings.
  - Location and dimensions of all proposed sediment and erosion control measures.
  - Location of 100-year floodplain limits and wetland boundaries.
  - Names of owners of record, both public and private, of all tracts of land that are adjoining the mining permit boundary; if an adjoining tract is owned or leased by the applicant or is owned by the lessor of the mine tract, names of owners of record of tracts adjoining these tracts, that are within 1,000 feet of the mining permit boundary, must be provided on the mine map.

## APPLICATION FOR A MINING PERMIT

- p. Names of owners of record, both public and private, of all tracts of land that are adjoining the mining permit boundary which lie directly across and are contiguous to any highway, creek, stream, river, or other watercourse, railroad track, or utility or other public right-of-way. If an adjoining tract is owned or leased by the applicant or is owned by the lessor of the mine tract, names of owners of record of tracts adjoining these tracts, that are within 1,000 feet of the mining permit boundary, must be provided on the mine map(s). NOTE: "Highway" means a road that has four lanes of travel or less and is not designated as an Interstate Highway.
- q. Map legend:
1. Name of applicant
  2. Name of mine
  3. North arrow
  4. County
  5. Scale
  6. Symbols used and corresponding names
  7. Date prepared and revised
  8. Name and title of person preparing map

Map scales should meet the following guidelines:

<u>PERMITTED ACREAGE</u>	<u>MAP SCALE</u>
0-49 Acres	1 inch = 50 feet
50-199 Acres	1 inch = 100 feet
200+ Acres	1 inch = 200 feet

(NOTE: Smaller scaled maps may be acceptable if they clearly illustrate the above items)

## APPLICATION FOR A MINING PERMIT

A table/chart must be provided on the mine map that clearly lists the approximate acreage of tailings/sediment ponds, stockpiles, wastepiles, processing area/haul roads, mine excavation and any other major aspect of the mining operation that is proposed to be affected/disturbed during the life of the mining permit. A table/chart similar to the following will be acceptable:

CATEGORY(as of 10/27/2010)	AFFECTED ACREAGE
Tailings/Sediment Ponds, Stockpiles, Processing Area/Haul Roads	45
Wastepiles (Vegetated Berms)	18
Mine Excavation	90
Other (Explain)	
Total Disturbed Acreage	153

CATEGORY(Post Modification)	AFFECTED ACREAGE
Tailings/Sediment Ponds, Stockpiles, Processing Area/Haul Roads	48.6
Wastepiles (Vegetated Berms)	18
Mine Excavation	90
Other (Explain)	
Total Disturbed Acreage	156.6

**NOTE:**

**IN ADDITION TO THE ABOVE, THE MAPS MUST ALSO INCLUDE ANY SITE-SPECIFIC INFORMATION THAT IS PROVIDED IN THE ANSWERS TO THE FOLLOWING QUESTIONS IN THIS APPLICATION FORM (*PLEASE NOTE THE ITALICIZED QUESTIONS/STATEMENTS THROUGHOUT THE FORM*). THIS APPLICATION WILL NOT BE CONSIDERED COMPLETE WITHOUT ALL RELEVANT ITEMS BEING ADEQUATELY ADDRESSED ON THE MINE MAPS.**

## APPLICATION FOR A MINING PERMIT

### C. PROTECTION OF NATURAL RESOURCES

1. Describe in detail the sequence of events for the development and operation of the mine and *reference the sequence to the mine map(s)*. Attach additional sheets as needed.

**Triangle Quarry is a currently active crushed stone quarry operation. This application is for renewal of the current mining permit. No new land disturbance activities or expansion activities are planned at this time. Mining of fine grained granitic-type bedrock for the production of crushed stone construction aggregate will continue through the new permit term.**

2. Describe specific erosion control measures to be installed prior to land disturbing activities and during mining to prevent offsite sedimentation (*include specific plans for sediment and erosion control for mine excavation(s), waste piles, access/mine roads and process areas*), and give a detailed sequence of installation and schedule for maintenance of the measures. *Locate and label all sediment and erosion control measures on the mine map(s) and provide typical cross-sections/construction details of each measure.* Engineering designs and calculations are required to justify the adequacy of any proposed measures.

**Currently existing erosion control measures are indicated on the Site Plan map. No new expansion activities are planned under this renewal request. Therefore, no new erosion control measures are anticipated.**

3. a. Will the operation involve washing the material mined, recycling process water, or other waste water handling? Yes  No . If yes, briefly describe all such processes including any chemicals to be used.

**A three deck rinse screen is utilized for production of washed stone. Process wash water is retained in a closed-loop recycle system consisting of a reservoir and three settling ponds, pumps and piping equipment. Wash plant overflow returns to the closed loop system for settling of fines. A hydrocyclone fines recovery system is currently being installed to increase recovery of mineral fines contained in the process water overflow. Mineral fines recovered by the hydrocyclone and associated high frequency screen or excavated from the settling ponds are blended with over burden material and removed from the site by grading contractors as borrow/fill material.**

- b. Will the operation involve discharging fresh or waste water from the mine or plant as a point discharge to the waters of the State? Yes  No . *If yes, briefly describe the nature of the discharge and locate all proposed discharge points (along with their method of stabilization) on your mine map(s).*

**Accumulated groundwater and runoff water is collected in a sump in the pit and pumped to the reservoir when needed as make-up water in the process water closed loop. When not needed as make-up water, this accumulated water is discharged under NPDES/Stormwater General Permit No. NCG020001 to an un-named tributary to Crabtree Creek. Discharge is through the reservoir emergency spillway.**

**APPLICATION FOR A MINING PERMIT**

- c. Will any part of the proposed mine excavation(s) extend below the water table? Yes  No .  
If yes, do you intend to dewater the excavation(s)? Yes  No .  
If yes, what impact, if any, will mine dewatering have on neighboring wells? Estimated withdrawal rate in gallons per day: 120,000 (historical average). *Locate all existing wells on the mine map(s) that lie within 500 feet of the proposed excavation area.* Provide data to support any conclusions or statements made, including any monitoring well data, well construction data and current water withdrawal rates. Indicate whether the proposed mine locale is served by a public water system or private wells.

**No non-company owned wells are known to exist within 500 feet of the mine excavation area. Company owned wells are located and delineated on the Site Plan Map. The surrounding area is served by Cary's public water system.**

- d. If you answered yes to any of the above questions, provide evidence that you have applied for or obtained the appropriate water quality permit(s) (i.e., non-discharge, NPDES, Stormwater, etc.) from the Division of Water Quality, Water Quality Section. In addition, the applicant is required to register water use with the Division of Water Resources if the operation withdraws more than 10,000 gallons per day and needs a capacity use permit from the Division of Water Resources if the operation lies in a capacity use area and withdraws more than 100,000 gallons per day.

**A copy of the cover sheet of NPDES/Stormwater General Permit No. NCG020001 is inserted after this page as evidence of NPDES Permit coverage.**

4. a. Will the operation involve crushing or any other air contaminant emissions? Yes  No .  
If yes, indicate evidence that you have applied for or obtained an air quality permit issued by the Division of Air Quality or local governing body.

**A copy of the cover sheet of NC DAQ Air Quality Permit No. 4386R12 is inserted after this page as evidence of DAQ permit coverage.**

- b. How will dust from stockpiles, haul roads, etc., be controlled?

**Fugitive dust from processing equipment, stockpiles, and haul roads is controlled through the use of a water truck. Dust suppressant chemicals (chloride solutions) are periodically applied to haul roads and sales yard areas.**

## APPLICATION FOR A MINING PERMIT

5. a. A buffer will be required between any mining activity and any mining permit boundary or right-of-way. It may be an unexcavated buffer (no excavation, but roadways, berms and erosion & sedimentation control measures may be installed within it), an undisturbed buffer (no disturbance within the buffer whatsoever), or a combination of the two, depending upon the site conditions. Note that all buffers must be located within the mining permit boundaries.

How wide a buffer will be maintained between any mining activity and any mining permit boundary or right-of-way at this site? A minimum buffer of 25 feet is recommended, although a wider buffer may be needed depending on site conditions. *Show all buffer locations and widths on the mine map(s).*

**West side along Crabtree Creek – 100’ undisturbed vegetated buffer.**

**North side along Crabtree Creek and Umstead State Park – 250’ Unexcavated buffer.**

**East side along Umstead State Park – 100’ unexcavated buffer containing vegetated earthen berm.**

**All buffers are noted on Site Plan Map.**

- b. A minimum 50 foot wide undisturbed buffer will be required between any land disturbing activities within the mining permit boundaries and any natural watercourses and wetlands unless smaller undisturbed buffers can be justified. Depending on site conditions, a buffer wider than 50 feet may be needed.

How wide an undisturbed buffer will be maintained between any land disturbing activities within the mining permit boundaries and any natural watercourses and wetlands at this site? *Show all buffer locations and widths on the mine map(s).*

**No land disturbing activities are currently underway or planned within 50’ of any on-site natural watercourse or wetland.**

6. a. Describe methods to prevent landslide or slope instability adjacent to adjoining permit boundaries during mining. Minimum 2 horizontal to 1 vertical slopes or flatter for clayey material and minimum 3 horizontal to 1 vertical slopes or flatter for sandy material are generally required, unless technical justification can be provided to allow steeper slopes.

**Graded overburden cut slopes are maintained at a maximum gradient of 2H:1V and stabilized with vegetation.**

## APPLICATION FOR A MINING PERMIT

- b. *Provide a cross-section on the mine map(s) for all fill slopes (berms, wastepiles, overburden disposal areas, etc.), clearly indicating the intended side slope gradient, installation of any benches and/or slope drains (with supporting design information) if needed, and the method of final stabilization.*

**See Site Plan Map.**

- c. In excavation(s) of unconsolidated (non-rock) materials, specify the angle of all cut slopes including specifications for benching and sloping. *Cross-sections for all cut slopes must be provided on the mine map(s).*

**Graded overburden cut slopes are, and will continue to be established at a maximum gradient of 2H:1V.**

- d. In hardrock excavations, specify proposed bench widths and heights in feet. *Provide cross-sections of the mine excavation clearly noting the angles of the cut slopes, widths of all safety benches and mine benches, and the expected maximum depth of the excavation.*

7. Describe other methods to be taken during mining to prevent physical hazard to any neighboring dwelling house, public road, public, commercial or industrial building from any mine excavation. *Locate all such structures on the mine map if they are within 300 feet of any proposed excavation.*

**Continuing excavations in bedrock will utilize 40' bench heights. Bench width will vary according to ongoing mine development plans.**

8. Describe what kind of barricade will be used to prevent inadvertent public access along any high wall area and when it will be implemented. Vegetated earthen berms, appropriate fencing and adequate boulder barriers may be acceptable high wall barricades. *A construction detail/cross-section and location of each type of barricade to be used must be indicated on the mine map(s).*

**End-to-end boulder barriers and vegetated earthen berms are currently in place along highwalls. Fencing is currently in place along southern property boundary (R/W I-40). Warning/Posted signs are in place along all property boundaries.**

## APPLICATION FOR A MINING PERMIT

9. Are acid producing minerals or soils present? Yes  No .  
If yes, how will acid water pollution from the excavation, stockpiles and waste areas be controlled?

10. a. Describe specific plans (including a schedule of implementation) for screening the operation from public view such as maintaining or planting trees, bushes or other vegetation, building berms or other measures. *Show the location of all visual screening on the mine map(s) and provide cross-sections through all proposed berms or proposed spacing, sizes and species for tree plantings.*

**Triangle Quarry has been in operation since 1982. The site is screened on all sides by vegetated earthen berms or expansive vegetation.**

- b. Could the operation have a significantly adverse effect on the purposes of a publicly owned park, forest or recreation area? If so, how will such effects (i.e., noise, visibility, etc.) be mitigated?

**Triangle Quarry has operated since 1982 without posing significantly adverse impacts to publicly owned Umstead Park which is adjacent to the site.**

11. Will explosives be used? Yes  No .  
If yes, specify the types of explosive(s) and describe what precaution(s) will be used to prevent physical hazard to persons or neighboring property from flying rocks or excessive air blasts or ground vibrations. Depending on the mine's location to nearby structures, more detailed technical information may be required on the blasting program (such as a third-party blasting study). *Locate the nearest offsite occupied structure(s) to the proposed excavation(s) on the mine map and indicate its approximate distance to the proposed excavation.*

**Blasting is conducted nearly daily at the Triangle Quarry utilizing latest industry methods and technology. All blasts are monitored by seismograph, and all blasts comply with airblast and ground vibration limits dictated by the Mining Permit**

12. Will fuel tanks, solvents, or other chemical reagents be stored on-site? Yes  No .  
*If yes, describe these materials, how they will be stored and method of containment in case of spill. Indicate the location(s) of all storage facilities on the mine map(s).*  
**Fuels and lubricants are stored within a concrete retaining wall at the fuel/lube station as noted on the Site Plan Map.**



# APPLICATION FOR A MINING PERMIT

## D. RECLAMATION PLAN

1. Describe your intended plan for the final reclamation and subsequent use of all affected lands and indicate the sequence and general methods to be used in reclaiming this land. This must include the method of reclamation of settling ponds and/or sediment control basins and the method of restoration or establishment of any permanent drainage channels to a condition minimizing erosion, siltation and other pollution. *This information must be illustrated on a reclamation map and must correspond directly with the information provided on the mine map(s). In addition, design information, including typical cross-sections, of any permanent channels to be constructed as part of the reclamation plan and the location(s) of all permanent channels must be indicated on the reclamation map.*

**Once depleted of reserves the pit will be allowed to fill with groundwater/runoff waters to create a lake with water surface elevation at approximately +270' msl. All plant components will be disassembled and removed from the site. All stockpiles will be removed and the plant and stockpile areas graded to provide positive drainage. Bare land surfaces will be provided with vegetative cover according to future land use plans, which are undetermined at this time. Process water settling ponds and obsolete sediment basins will be backfilled and stabilized with vegetation.**

2. Is an excavated or impounded body of water to be left as a part of the reclamation? Yes X No   
*If yes, illustrate the location of the body(s) of water on the reclamation map and provide a scaled cross-section(s) through the proposed body(s) of water. The minimum water depth must be at least 4 feet, measured from the normal low water table elevation, unless information is provided to indicate that a more shallow water body will be productive and beneficial at this site.*

Will the body(s) of water be stocked with fish? Yes  No   
If yes, specify species.

**It is undecided at this time if the post reclamation lake will be stocked with fish.**

3. Describe provisions for safety to persons and to adjoining property in all completed excavations in rock including what kind of permanent barricade will be left. Acceptable permanent barricades are appropriate fencing, large boulders placed end-to-end, etc. *Construction details and locations of all permanent barricades must be shown on the reclamation map.*

**Acceptable fencing, such as woven wire right-of-way type fencing with barbed wire top strand or chain-link fencing will be installed as determined to be necessary upon final reclamation. Large boulders placed end-to-end may be used in some instances.**

## APPLICATION FOR A MINING PERMIT

4. Indicate the method(s) of reclamation of overburden, refuse, spoil banks or other such on-site mine waste areas, including specifications for benching and sloping. *Final cross-sections and locations for such areas must be provided on the reclamation map.*

**Reclamation of overburden cut slopes and earthen berms constructed of overburden are reclaimed concurrent with on-going mining activities. Overburden cut slopes and berm fill slopes are established at 2H:1V gradients and stabilized with various grasses and legumes, and planted with loblolly pines.**

5. a. Describe reclamation of processing facilities, stockpile areas, and on-site roadways.

**All plant equipment will be disassembled and removed from the site. Stockpiles will be depleted and all sales yard areas re-graded to provide positive drainage, and stabilized with vegetation in accordance with future land development plans to be determined upon final reclamation.**

- b. Will any on-site roadways be left as part of the reclamation? Yes  No .

*If yes, identify such roadways on the reclamation map and provide details on permanent road and ditch line stabilization.*

**The main site entrance road and a perimeter roadway around the completed pit area will remain on-site for general access and maintenance. Permanent ditches will be stabilized with rip rap or vegetation as dictated by site conditions existing upon completion of operations.**

6. Describe the method of control of contaminants and disposal of scrap metal, junk machinery, cables, or other such waste products of mining. (Note definition of refuse in The Mining Act of 1971.)

**No off-site generated waste shall be disposed of on the mine site without prior written approval from the NC Department of Environment and Natural Resources, Land Quality Section and either the Division of Waste Management (DWM) or local governing body. If a disposal permit has been issued by DWM for the site, a copy of said permit must be attached to this application. All temporary and permanent refuse disposal areas must be clearly delineated on the mine map(s) and reclamation map, along with a list of items to be disposed in said areas.**

**All such scrap will be disposed of off-site in proper recycling and disposal facilities.**

**APPLICATION FOR A MINING PERMIT**

7. Describe your plan for revegetation or other surface treatment of the affected areas. This plan must include recommendations for year-round seeding, including the time of seeding and the amount and type of seed, fertilizer, lime and mulch per acre. The recommendations must include general seeding instructions for both permanent and temporary revegetation. Revegetation utilizing only tree plantings is not acceptable. Recommendations can be sought from:
- a. Authorized representatives of the local Soil and Water Conservation District;
  - b. Authorized representatives of the Division of Forest Resources, Department of Environment and Natural Resources;
  - c. Authorized county representatives of the North Carolina Cooperative Extension Service, specialists and research faculty with the Colleges of Agriculture and Life Sciences and Forest Resources at North Carolina State University;
  - d. North Carolina licensed landscape architects;
  - e. Private consulting foresters referred by the Division of Forest Resources, Department of Environment and Natural Resources;
  - f. N.C. Erosion and Sedimentation Control Planning and Design Manual;
  - g. N.C. Surface Mining Manual: A Guide for Permitting, Operation and Reclamation;
  - h. Others as may be approved by the Department.

**LIME - RATE OF APPLICATION (tons/acre):**

**FERTILIZER - ANALYSIS AND RATE OF APPLICATION (pounds/acre):**

**SEED - TYPE(S) AND RATE(S) OF APPLICATION INCLUDING YEAR-ROUND SEEDING SCHEDULE (pounds/acre): [NOTE: Include Legumes]**

**Seed Types:**

**Seeding Dates:**

**Seeding Rates:**

**MULCH - TYPE AND RATE OF APPLICATION (pounds/acre) AND METHOD OF ANCHORING:**

**OTHER VEGETATIVE COVERS – TYPE (S) AND RATE (S) OF APPLICATION INCLUDING SEEDING SCHEDULE (pounds/acre, trees/acre, spacing of trees/shrubs, etc):**

Revegetation and/or reforestation plan approved by:

Signature \_\_\_\_\_ Date \_\_\_\_\_

Print Name \_\_\_\_\_

Title \_\_\_\_\_

Agency \_\_\_\_\_

**APPLICATION FOR A MINING PERMIT**

**E. DETERMINATION OF AFFECTED ACREAGE AND BOND**

*The following bond calculation worksheet is to be used to establish an appropriate bond (based upon a range of \$500 to \$5,000 per affected acre) for each permitted mine site based upon the acreage approved by the Department to be affected during the life of the mining permit. Please insert the approximate acreage, for each aspect of the mining operation, that you intend to affect during the life of this mining permit (in addition, please insert the appropriate reclamation cost/acre for each category from the Schedule of Reclamation Costs provided with this application form) OR you can defer to the Department to calculate your bond for you based upon your maps and standard reclamation costs:*

CATEGORY	AFFECTED ACREAGE		RECLAMATION COST/ACRE*	=	RECLAMATION COST
Tailings/Sediment Ponds:	_____ Ac.	X	\$ _____/Ac.	=	\$ _____
Stockpiles:	_____ Ac.	X	\$ _____/Ac.	=	\$ _____
Wastepiles:	_____ Ac.	X	\$ _____/Ac.	=	\$ _____
Processing Area/Haul Roads:	_____ Ac.	X	\$ _____/Ac.	=	\$ _____
Mine Excavation:	_____ Ac.	X	\$ _____/Ac.	=	\$ _____
Other:	_____ Ac.	X	\$ _____/Ac.	=	\$ _____
<b>TOTAL AFFECTED AC.:</b>	_____ Ac.				
<b>(TOTAL PERMITTED AC.:</b>	_____ Ac.)				

Temporary & Permanent Sedimentation & Erosion Control Measures:

Divide the **TOTAL AFFECTED AC.** above into the following two categories: a) affected acres that drain into proposed/existing excavation and/or b) affected acres that will be graded for positive drainage where measures will be needed to prevent offsite sedimentation and sedimentation to onsite watercourses and wetlands.

- a) Internal Drainage \_\_\_\_\_ Ac.
- b) Positive Drainage \_\_\_\_\_ Ac. X \$1,500.00 = \$ \_\_\_\_\_

**SUBTOTAL COST: \$ \_\_\_\_\_**

Inflation Factor:

0.02 X SUBTOTAL COST: \$ \_\_\_\_\_ X Permit Life (1 to 10 years): \_\_\_\_\_

**INFLATION COST: \$ \_\_\_\_\_**

**TOTAL COST = SUBTOTAL COST + INFLATION COST = \$ \_\_\_\_\_**

**Triangle Quarry is covered under Wake Stone Corporation's Blanket Bond**

APPLICATION FOR A MINING PERMIT

G. LAND ENTRY AGREEMENT

We hereby grant to the Department or its appointed representatives the right of entry and travel upon our lands or operation during regular business hours for the purpose of making necessary field inspections or investigations as may be reasonably required in the administration of the Mining Act of 1971.

We further grant to the Department or its appointed representatives the right to make whatever entries on the land as may be reasonably necessary and to take whatever actions as may be reasonably necessary in order to carry out reclamation which the operator has failed to complete in the event a bond forfeiture is ordered pursuant to G.S. 74-59.

LANDOWNER: Wake Stone Corp

APPLICANT: Wake Stone Corp.

Signature: *David F. Lee*

Signature:\* *David F. Lee*

Print Name: David F. Lee

Print Name: David F. Lee

Address: PO Box 190

Title: Geologist/Environmental Supervisor

Knightdale, North Carolina 27545

Company: Wake Stone Corporation

Telephone: (919) 266-1100

Mine Name: Triangle Quarry

\*Signature must be the same as the individual who signed Page 1 of this application.

**Six (6) copies of the completed application, six (6) copies of all location maps, mine maps and reclamation maps, and the appropriate processing fee (see next page for fee schedule) in the form a check or money order payable to the North Carolina Department of Environment and Natural Resources must be sent to the Land Quality Section Central Office at the address listed on the front cover of this application form.**

Inquiries regarding the status of the review of this application should be directed to the Mining Program staff at (919) 733-4574.



**Erosion and Sediment Control Plan Modification  
Supporting Design Calculations**

**October 27, 2010**



## **Design of Proposed Skimmer Basin #2010-01**

### **Drainage Area: 4.0 Acres (from Site Plans)**

**Sub-drainage Area "A": 2.7 Acres (stockpile yard area)**

**Sub-drainage Area "B": 0.2 Acre (undisturbed wooded area)**

**Sub-drainage Area "C": 0.2 Acre (grassed entrance road shoulder)**

**Sub-drainage Area "D": 0.9 Acre (to be grassed at completion of basin construction)**

### **Runoff Volumes: (see worksheets for calculations)**

**Q-10 = 11.1 cubic feet per second**

**Q-25 = 12.2 cubic feet per second**

**Q-100 = 13.7 cubic feet per second**

### **Design Considerations:**

- **Per DLR/DWQ policy, utilize skimmer basin design,**
- **Provide for Length:Width ratio of greater than 2:1,**
- **Provide for Coir baffles,**
- **Provide principal spillway (barrel and riser) to pass Q-25 runoff,**
- **Provide emergency spillway to pass Q-100.**

### **Supporting Calculations:**

- **See Skimmer Basin Design Worksheet,**
- **See Construction Details and Proposed Grading on Plan Set Sheets,**
- **See Barrel Outlet Protection/Energy Dissipater worksheet,**
- **See Slope Drain Outlet Protection/Energy Dissipater worksheet.**

# ESTIMATING RUNOFF

Rational Method

User Input Data

Calculated Value

Reference Data

Designed By:	JHB	Date:	10/26/2010
Checked By:	LCA, DFL	Date:	10/26/2010
Company:	WSC		
Project Name:	Triangle		
Project No.:			

Site Location (City/Town)	Cary
Watershed Basin Id.	Skimmer Basin 2010-1

The rational formula is:

$$Q = CIA$$

where:

- Q = peak rate of runoff in cubic feet per second (cfs)
- C = runoff coefficient, an empirical coefficient representing the relationship between rainfall rate and runoff rate
- I = average intensity of rainfall in inches/hour, for a storm duration equal to the time of concentration,  $T_c$
- A = drainage area in acres

The general procedure for determining peak discharge using the rational formula is presented below and illustrated in Sample Problem 8.03a.

Step 1. Determine the drainage area in acres.

Total Drainage Area 4

Step 2. Determine the runoff coefficient, C, for the type of soil/cover in the drainage area (Table 8.03b).

If the land use and soil cover is homogenous over the drainage area, a C



value can be determined directly from Table 8.03b. If there are multiple soil cover conditions, a weighted average must be calculated, or the area may be subdivided.

Subarea A (acres)	2.7	
Subarea A Runoff Coefficient	0.45	<u>Runoff Coefficient</u>
Subarea B (acres)	0.2	
Subarea B Runoff Coefficient	0.15	
Subarea C (acres)	0.2	
Subarea C Runoff Coefficient	0.3	
Subarea D (acres)	0.9	
Subarea D Runoff Coefficient	0.3	
Weighted Runoff Coefficient	<b>0.39375</b>	

**Step 3.**

[Go to Intensity Worksheet](#)

**Step 4.**

2-year Rainfall Intensity, $i$ (in/hr)	5.53
10-year Rainfall Intensity, $i$ (in/hr)	7.04

Step 5. Determine peak discharge,  $Q$  (cubic feet per second), by multiplying the previously determined factors using the rational formula (Sample Problem 8.03a);

$$Q = CIA$$

$Q_2$ Flow (cfs)	8.70975
$Q_{10}$ Flow (cfs)	11.1

# ESTIMATING RUNOFF

Rational Method

User Input Data

Calculated Value

Reference Data

Designed By:	JHB	Date:	10/26/2010
Checked By:	LCA, DFL	Date:	10/26/2010
Company:	WSC		
Project Name:	Triangle		
Project No.:			

Site Location (City/Town)	Cary
Watershed Basin Id.	Skimmer Basin 2010-1

The rational formula is:

$$Q = CIA$$

where:

- Q = peak rate of runoff in cubic feet per second (cfs)
- C = runoff coefficient, an empirical coefficient representing the relationship between rainfall rate and runoff rate
- I = average intensity of rainfall in inches/hour, for a storm duration equal to the time of concentration,  $T_c$
- A = drainage area in acres

The general procedure for determining peak discharge using the rational formula is presented below and illustrated in Sample Problem 8.03a.

Step 1. Determine the drainage area in acres.

Total Drainage Area 4

Step 2. Determine the runoff coefficient, C, for the type of soil/cover in the drainage area (Table 8.03b).

If the land use and soil cover is homogenous over the drainage area, a C

value can be determined directly from Table 8.03b. If there are multiple soil cover conditions, a weighted average must be calculated, or the area may be subdivided.

Subarea A (acres)	2.7	
Subarea A Runoff Coefficient	0.45	<u>Runoff Coefficient</u>
Subarea B (acres)	0.2	
Subarea B Runoff Coefficient	0.15	
Subarea C (acres)	0.2	
Subarea C Runoff Coefficient	0.3	
Subarea D (acres)	0.9	
Subarea D Runoff Coefficient	0.3	
Weighted Runoff Coefficient	<b>0.39375</b>	

**Step 3.**

[Go to Intensity Worksheet](#)

**Step 4.**

25-year Rainfall Intensity,  $i$  (in/hr) **7.75**

Step 5. Determine peak discharge,  $Q$  (cubic feet per second), by multiplying the previously determined factors using the rational formula (Sample Problem 8.03a);

$$Q = CIA$$

**$Q_{25}$  Flow (cfs)** **12.2**

# ESTIMATING RUNOFF

Rational Method

User Input Data

Calculated Value

Reference Data

Designed By:	JHB	Date:	10/26/2010
Checked By:	LCA, DFL	Date:	10/26/2010
Company:	WSC		
Project Name:	Triangle		
Project No.:			

Site Location (City/Town)	Cary
Watershed Basin Id.	Skimmer Basin 2010-1

The rational formula is:

$$Q = CIA$$

where:

- Q = peak rate of runoff in cubic feet per second (cfs)
- C = runoff coefficient, an empirical coefficient representing the relationship between rainfall rate and runoff rate
- I = average intensity of rainfall in inches/hour, for a storm duration equal to the time of concentration,  $T_c$
- A = drainage area in acres

The general procedure for determining peak discharge using the rational formula is presented below and illustrated in Sample Problem 8.03a.

Step 1. Determine the drainage area in acres.

Total Drainage Area 4

Step 2. Determine the runoff coefficient, C, for the type of soil/cover in the drainage area (Table 8.03b).

If the land use and soil cover is homogenous over the drainage area, a C

value can be determined directly from Table 8.03b. If there are multiple soil cover conditions, a weighted average must be calculated, or the area may be subdivided.

Subarea A (acres)	2.7	
Subarea A Runoff Coefficient	0.45	<u>Runoff Coefficient</u>
Subarea B (acres)	0.2	
Subarea B Runoff Coefficient	0.15	
Subarea C (acres)	0.2	
Subarea C Runoff Coefficient	0.3	
Subarea D (acres)	0.9	
Subarea D Runoff Coefficient	0.3	
Weighted Runoff Coefficient	<b>0.39375</b>	

### Step 3.

[Go to Intensity Worksheet](#)

### Step 4.

100-year Rainfall Intensity,  $i$  (in/hr) **8.71**

Step 5. Determine peak discharge,  $Q$  (cubic feet per second), by multiplying the previously determined factors using the rational formula (Sample Problem 8.03a);

$$Q = CIA$$

$Q_{100}$  Flow (cfs) **13.7**

## Skimmer Basin # 2010-01

Okay

3.6 Disturbed Area (Acres)  
 11.1 Peak Flow from 10-year Storm (cfs)

6480 Required Volume ft<sup>3</sup>  
 3608 Required Surface Area ft<sup>2</sup>  
 42.5 Suggested Width ft  
 84.9 Suggested Length ft

37 Trial Top Width at Spillway Invert ft  
 117 Trial Top Length at Spillway Invert ft  
 1 Trial Side Slope Ratio Z:1  
 4.5 Trial Depth ft (2 to 3.5 feet above grade)

28 Bottom Width ft  
 108 Bottom Length ft  
 3024 Bottom Area ft<sup>2</sup>  
 16484 Actual Volume ft<sup>3</sup>  
 4329 Actual Surface Area ft<sup>2</sup>

Okay

Okay

13 Trial Weir Length ft  
 0.5 Trial Depth of Flow ft

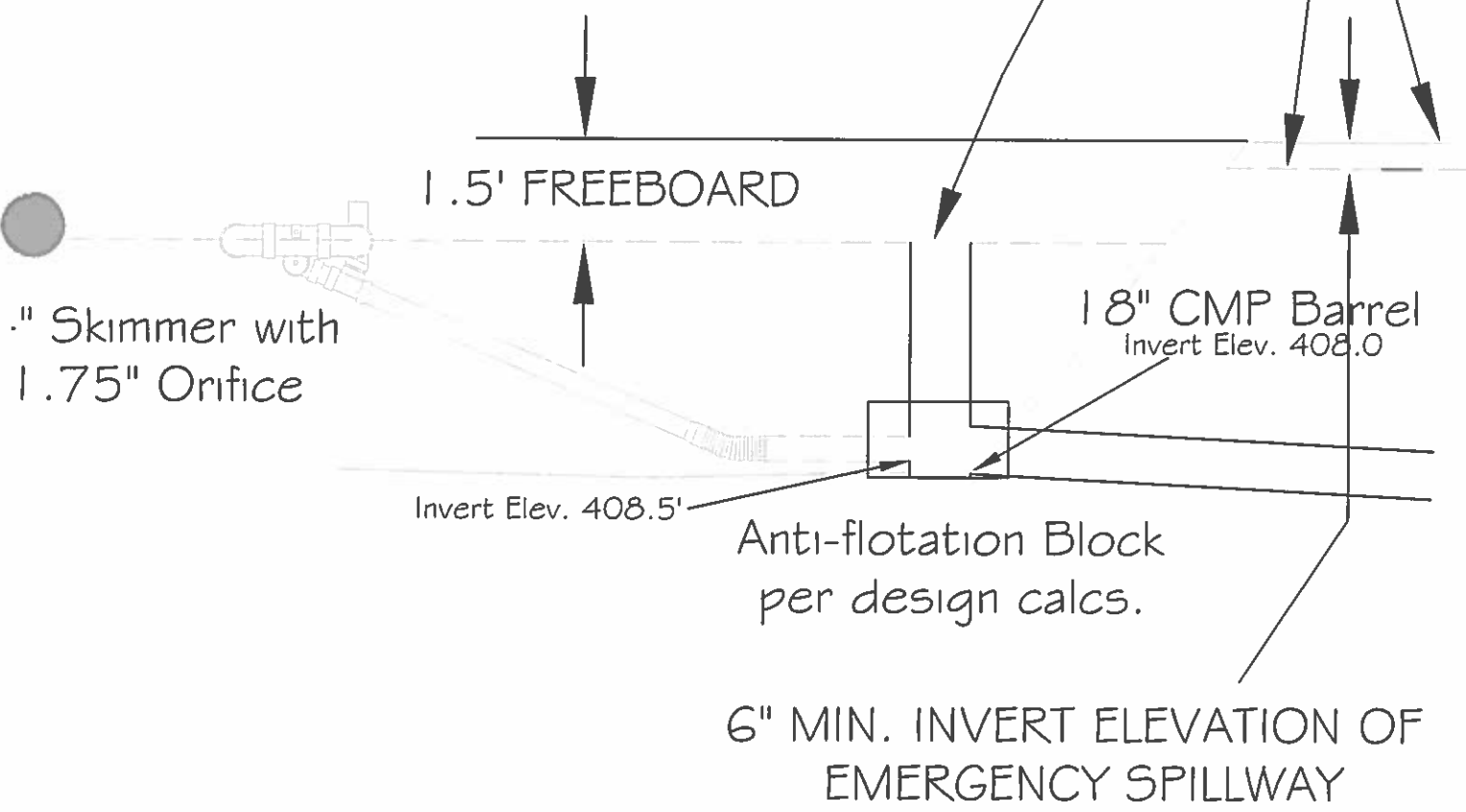
13.8 Spillway Capacity cfs

\* Note: Barrel and riser is principal spillway for basin with a capacity of 13.2 cfs, which safely passes the Q<sub>25</sub> of 12.2 cfs.

4 Skimmer Size (inches)  
 0.333 Head on Skimmer (feet)  
 1.75 Orifice Size (1/4 inch increments)  
 4.04 Dewatering Time (days)  
 Suggest about 3 days

Skimmer Size (Inches)
1.5
2
2.5
3
4
5
6
8

EMBANKMENT CREST @ Elev. 414'  
EMERGENCY SPILLWAY CREST @ 413.5'  
PRINCIPAL SPILLWAY (24" CMP) CREST @ 412.5'



BASIN DEWATERING & SPILLWAY DETAILS

# SEDIMENT BASIN DESIGN

This structure is intended for less than 3 years of use. Structures intended for more than 3 years of use should be designed as permanent structures.

<b>User Input Data</b>
<b>Calculated Value</b>
<b>Reference Data</b>

<b>Designed By:</b>	David Lee	<b>Date:</b>	10/27/2010
<b>Checked By:</b>		<b>Date:</b>	
<b>Company:</b>	WSC		
<b>Project Name:</b>	Triangle		
<b>Project No.:</b>			

<b>Site Location (City/Town)</b>	Cary, NC
<b>Sediment Basin Id.</b>	2010-01
<b>Total Drainage Area (acres)</b>	4.00

**Step 1.** Determine peak flow,  $Q_{10}$ , for the basin drainage area (*Appendix 8.03*).

Q10 (cfs) 11.10

**Step 2.** Determine any site limitations for the sediment pool elevation, emergency spillway or top of the dam.

Minimum pool elevation (ft) 408.00

Maximum pool elevation (ft) 412.50

**Step 3.** Determine basin volumes:

- Compute minimum volume required (1800 ft<sup>3</sup>/acre disturbed).
- Specify sediment cleanout level to be marked on riser (one-half the design volume referenced to the top of the riser) and sediment storage area to be cleared after the dam is built.

Disturbed acreage (ac) 3.60

Min Volume (ft<sup>3</sup>) 6480.00

Sediment cleanout elevation (ft) 410.50

Sediment Storage Area 3729.00



**Step 4. Determine area and shape of basin:**

- Check length/width ratio (should be 2:1 to 6:1).
- Compute the basin surface area at principal spillway elevation.
- Check the ratio of basin surface area to peak inflow rate (should be greater than or equal to 435 ft<sup>2</sup>/cfs). Employ diversions with additional traps and basins to reduce area drained.

Determine barrel capacity required for site conditions (minimum capacity for  $Q_p$  is the 2-year peak runoff,  $Q_2$ ).

Length/width ratio	3.10	
Is length/width ratio between 2-6?	YES, PROCEED	
Basin surface area @ principal spillway (ft <sup>2</sup> )	4239.00	
Ratio: basin surface area/ $Q_{10}$	381.89	
Is ratio $\geq$ 435 ft <sup>2</sup> /cfs?	NO, REVISE DESIGN	
	**per Skimmer Basin Design Criteria	
	basin surface area/ $Q_{10}$ of 381.89 exceeds 325 ft <sup>2</sup> /cfs	

**Step 5. Determine the principal spillway discharge capacity.**

- The combined capacities of the principal and emergency spillways must be at least the 10-year peak flow for the entire watershed of the basin.
- The principal spillway is analyzed for three possible limiting flow types: Weir flow, Orifice flow, and Pipe flow. The principal spillway discharge capacity is the smallest of these three flow rates. Discharges through a skimmer should be disregarded during this computation. Weir, orifice and pipe flow may be determined by the following equations:

1. Weir Flow:  $Q = CLH^{1.5}$

where:

- Q = discharge in cubic feet per second (cfs)
- C = weir coefficient, use 3.1 for corrugated metal pipe risers.
- L = circumference of the riser in feet
- H = head above riser crest in feet

Weir coefficient, C	3.10	$C_{CMP}=3.1$
Riser circumference, L (ft)	6.80	
Head above riser crest, H (ft)	1.00	
$Q_w$ (cfs)	21.08	

2. Orifice Flow:  $Q = CA (2gH)^{0.5}$

where:

Q = discharge in cubic feet per second (cfs)

C = orifice coefficient, use C = 0.6 for corrugated metal pipe risers.

A = cross-sectional area of the riser pipe in square feet

g = acceleration due to gravity, 32.2 ft/sec<sup>2</sup>

H = head above riser crest in feet

Orifice coefficient, C <sub>o</sub>	0.60
Riser cross-sectional area, A (ft <sup>2</sup> )	3.14
Acceleration due to gravity, g (ft/s <sup>2</sup> )	32.20
Head above riser crest, H (ft)	1.00
Discharge, Q <sub>o</sub> (cfs)	15.12

C<sub>CMP</sub> = 0.6

3. Pipe Flow:  $Q = a \left[ \frac{2gh}{1 + K_m + K_p L} \right]^{0.5}$

where:

Q = discharge in cubic feet per second (cfs)

a = cross-sectional area of the barrel in square feet

g = acceleration due to gravity, 32.2 ft/sec<sup>2</sup>

h = head above the centerline of the outlet end of the barrel

K<sub>m</sub> = coefficient of minor losses, can be assumed to be 1.0 for most principal spillway systems

L = barrel length in feet

K<sub>p</sub> = pipe friction coefficient:

$$= \frac{5087n^2}{d_i^{4/3}} \quad (\text{See Table 8.07a for } K_p \text{ values for common size of pipe.})$$

n = Manning's coefficient of roughness, use n = 0.025 for corrugated metal pipe

n = 0.015 for reinforced concrete pipe

d<sub>i</sub> = inside diameter of the barrel in inches

Select riser and barrel dimensions so that the riser has a cross-sectional area at least 1.5 times that of the barrel. Spillway hydraulics are improved by maximizing weir flow and minimizing orifice flow. See Table 8.07b for recommended riser/barrel proportions.

Barrel diameter (ft)	1.50
Barrel cross-sectional area, a (ft <sup>2</sup> )	1.77
Acceleration due to gravity, g (ft/s <sup>2</sup> )	32.20
Head above outlet end of barrel, h (ft)	7.00

Minor loss coefficient,  $K_m$

Barrel length,  $L$  (ft)

Mannings coefficient of roughness,  $n$

Inside diameter of barrel,  $d_i$  (in)

Pipe friction coefficient,  $K_p$

Discharge,  $Q_o$  (cfs)

1.00

40.00

0.03

15.00

0.09

16.09 26.5307395

$K_m=1.0$  (typical)

$n_{CMP}=0.025$

[Table 8.07a](#)

### RISER

Select riser and barrel dimensions. Use the weir, orifice and pipe flow equations to determine if the 2-year peak discharge is passed without activating the emergency spillway. Determine riser size from Figure 8.07b. Check the head and stage requirements. If the design stage is too high, choose larger dimensions and recalculate. As a minimum, set the elevation of the riser at the same elevation as the top of the sediment pool. A riser height 2 to 5 times the barrel diameter is recommended. Select the type of trash guard.

[Table 8.07b](#)

Select a dewatering device. If a skimmer is used, refer to the manufacturers dewatering data, or Table 6.64.b.

#### Step 6. Design antiseep collar.

Ensure that antiseep collars are no closer than 2 ft from a pipe joint. Collar must project at least 1.5 ft from the pipe. Indicate watertight connections.

#### Step 7. Design antiflotation block.

Determine the weight of water displaced by the empty riser, and design a block with buoyant weight 1.1 times the weight of water displaced.

Weight of water displaced by the empty riser

883.00

Buoyant weight

971.30 \*\*0.27 cu. Yds 2500 psi concrete

#### Step 8. Design outlet.

Determine discharge velocity from the barrel. Design outlet protection to assure stable conditions. Riprap placement is usually necessary (Appendix 8.06).

Discharge velocity,  $V$  (ft/s)

9.11 15.0133274

See Appendix 8.06 for riprap sizing, if necessary



# WAKE STONE CORPORATION

Project NEW STOCK YARD Quarry TRIANGLE Sheet 1 of 1  
Description BASIN 2010-01 Computed By DFL Date 10/27/2010  
BARREL OUTLET STABILIZ. Reviewed By \_\_\_\_\_ Date \_\_\_\_\_

DESIGN STABILIZED OUTLET / DISSIPATER FOR PRINCIPAL  
SPILLWAY BARREL USING DLR SPREADSHEET

$$Q_{25} = 12.2 \text{ CFS}$$

$$\text{OUTLET PIPE DIAMETER} = D_0 = 18'' = 1.25'$$
$$\text{MINIMUM TAILWATER DEPTH} = 7.5''$$

$$\text{VELOCITY} = Q/A \text{ WHERE } A = \pi r^2, r = 0.75'$$

$$V = 12.2 \text{ cfs} / \pi (0.75)^2$$

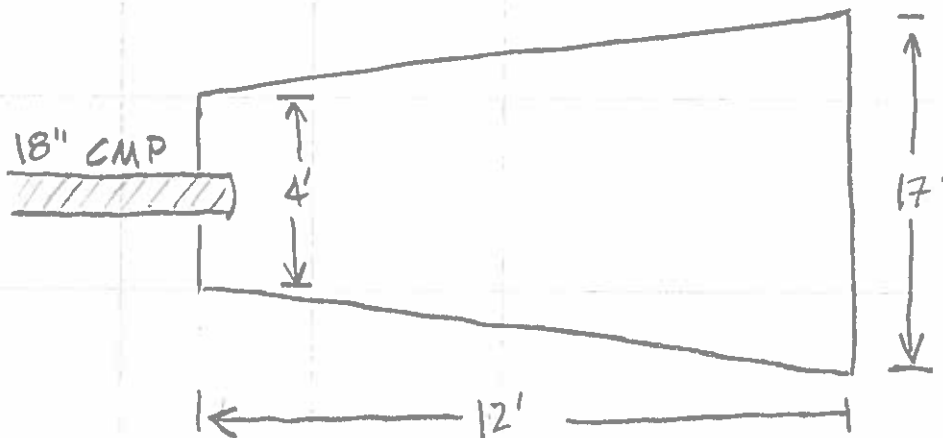
$$= 6.9 \text{ FT/SEC.}, \text{ USE } 10 \text{ FT/SEC.}$$

FROM FIG. 8.06.3.1 SELECT RIPRAP  $d_{50} = 1'$

MINIMUM APRON LENGTH  $L_2 = 12'$

APRON WIDTH AT PIPE OUTLET =  $3 \times D_0 = 4.50' \Rightarrow 5'$

APRON WIDTH AT DOWNSLOPE END =  $L_2 + D_0 = 12 + 5 = 17'$



USE CLASS B RIPRAP  $D_{50} = +/- .9''$ .

PLACE 18" THICK BLANKET OF CLASS B RIP RAP ON  
6" THICK BLANKET OF # 57 STONE UNDERLAIN  
BY NON WOVEN GEOTEXTILE.

# DESIGN OF RIPRAP OUTLET PROTECTION

User Input Data
Calculated Value
Reference Data

Designed By:	David F. Lee	Date:	10/27/2010
Checked By:		Date:	
Company:	Wake Stone Corporation		
Project Name:	Triangle Quarry - Stockpile Yard		
Project No.:			

Site Location (City/Town)	Cary, NC
Culvert Id.	Basin 2010-01 Barrel Outlet
Total Drainage Area (acres)	4

**Step 1.** Determine the tailwater depth from channel characteristics below the pipe outlet for the design capacity of the pipe. If the tailwater depth is less than half the outlet pipe diameter, it is classified **minimum tailwater condition**. If it is greater than half the pipe diameter, it is classified **maximum condition**. Pipes that outlet onto wide flat areas with no defined channel are assumed to have a minimum tailwater condition unless reliable flood stage elevations show otherwise.

Outlet pipe diameter, $D_o$ (in.)	18
Tailwater depth (in.)	7
Minimum/Maximum tailwater?	Min TW (Fig. 8.06a)
Discharge (cfs)	12.2
Velocity (ft./s)	10

**Step 2.** Based on the tailwater conditions determined in step 1, enter Figure 8.06a or Figure 8.06b, and determine  $d_{50}$  riprap size and minimum apron length ( $L_a$ ). The  $d_{50}$  size is the median stone size in a well-graded riprap apron.

**Step 3.** Determine apron width at the pipe outlet, the apron shape, and the apron width at the outlet end from the same figure used in Step 2.

	Minimum TW Figure 8.06a	Maximum TW Figure 8.06b
Riprap $d_{50}$ , (ft.)	0.75	
Minimum apron length, $L_a$ (ft.)	12	
Apron width at pipe outlet (ft.)	4.5	4.5
Apron shape		

Apron width at outlet end (ft.)	13.5	1.5
---------------------------------	------	-----

Step 4. Determine the maximum stone diameter:

$$d_{\max} = 1.5 \times d_{50}$$

	Minimum TW	Maximum TW
Max Stone Diameter, dmax (ft.)	1.125	0

Step 5. Determine the apron thickness:

$$\text{Apron thickness} = 1.5 \times d_{\max}$$

	Minimum TW	Maximum TW
Apron Thickness(ft.)	1.6875	0

Step 6. Fit the riprap apron to the site by making it level for the minimum length,  $L_a$ , from Figure 8.06a or Figure 8.06b. Extend the apron farther downstream and along channel banks until stability is assured. Keep the apron as straight as possible and align it with the flow of the receiving stream. Make any necessary alignment bends near the pipe outlet so that the entrance into the receiving stream is straight.

Some locations may require lining of the entire channel cross section to assure stability.

It may be necessary to increase the size of riprap where protection of the channel side slopes is necessary (Appendix 8.05). Where overfalls exist at pipe outlets or flows are excessive, a plunge pool should be considered, see page 8.06.8.



# WAKE STONE CORPORATION

Project NEW STOCK YARD Quarry TRIANGLE Sheet 1 Of       
Description SLOPE DRAIN Computed By DFL Date 10/27/2010  
Reviewed By      Date     

SIZE SLOPE DRAIN TO CONVEY YARD RUNOFF  
TO FOREBAY OF BASIN 2010-01

USE  $Q_{25}$  RUNOFF FROM YARD AREA

$$Q_{25} = CIA = (0.45)(7.75''/\text{hr})(2.7\text{ac.}) = 9.4 \text{ cfs, use } 10 \text{ cfs}$$

DETERMINE MINIMUM PIPE DIAMETER USING ORIFICE EQ.  
(assume head to top of pipe)

$$Q = (0.6)(A)\sqrt{2gh}$$

Where,  $Q$  = runoff vol. in cfs

$A$  = cross sectional area of pipe

$g$  = Acceleration due to gravity =  $32.2 \text{ ft/sec}^2$

$h$  = Head pressure ( $h = D/2$  for head to top of pipe)

$$\begin{aligned} 10 &= (0.6)(A)\sqrt{(2)(32.2)\left(\frac{D}{2}\right)} \\ &= (0.6)\left(\pi\left(\frac{D}{2}\right)^2\right)\sqrt{(2)(32.2)\left(\frac{D}{2}\right)} \end{aligned}$$

ITER. #1: TRY  $D = 18''$  or  $1.5'$

$$\begin{aligned} (0.6)\left(\pi\left(\frac{1.5}{2}\right)^2\right)\left(\sqrt{(2)(32.2)\left(\frac{1.5}{2}\right)}\right) &= \\ 0.6 \times 1.77 \times 6.5 &= 7.38 < 10 \text{ cfs: Too Small!} \end{aligned}$$

ITER. #2: TRY  $D = 24''$ , or  $2'$

$$(0.6)\left(\pi\left(\frac{2}{1}\right)^2\right)\left(\sqrt{(2)(32.2)\left(\frac{2}{2}\right)}\right) = 15.1 > 10 \text{ cfs; OKAY.}$$

USE  $24''$  DUAL WALL CORRUGATED PLASTIC (HDPE) PIPE  
WITH FLARED INLET.