received 1/3/91

RECEIVED
FEB 15 1991
LAND QUALITY SECTION

State of North Carolina
Department of Environment, Health, and Natural Resources
Division of Environmental Management
512 North Salisbury Street • Raleigh, North Carolina 27611

James G. Martin, Governor
William W. Cobey, Jr., Secretary

George T. Everett, Ph.D.
Director

December 26, 1990

Mr. David F. Lee
Wake Stone Corporation
P.O. Box 190
Knightdale, North Carolina 27545

Dear Mr. Lee:

Subject: Proposed Fill in Headwaters or Isolated Wetlands
Wake Stone Corporation - Triangle Quarry Expansion
Wake County

Upon review of your request for Water Quality Certification to place fill material in waters of tributaries of Crabtree Creek (approximately 0.4 acres), we have determined that the proposed fill can be covered by General Water Quality Certification No. 2176 issued November 4, 1987. A copy of the General Certification is attached. This Certification may be used in qualifying for coverage under Corps of Engineers' Nationwide Permit No. 26.

If you have any questions, please contact Bill Mills at 919/733-5083.

Sincerely,

William C Mills

George T. Everett

GTE:BM
Attachment

cc: Wilmington District Corps of Engineers
Raleigh Regional Office

GENERAL CERTIFICATION

THIS GENERAL CERTIFICATION is issued in conformity with the requirements of Section 401, Public Laws 92-500 and 95-217 of the United States and subject to the North Carolina Division of Environmental Management Regulations in 15NCAC2H, Section .0500 for the discharge of fill material to navigable waters or adjacent wetlands areas which are above the headwaters or to wetland areas that are not a part of the surface tributary system to interstate waters or navigable waters of the United States (i.e. isolated wetlands) as described in 33 CFR 330.5(a)(26) of the Corps of Engineers' regulations. The category of activities shall include any fill activity in these headwaters and isolated wetlands areas where the activity does not result in the loss or substantial modification of 10 acres or more of waters of the United States, including wetlands.

The State of North Carolina certifies that the specified category of activity will not violate Sections 301, 302, 303, 306 and 307 of the Public Laws 92-500 and 95-217 if conducted in accordance with the conditions hereinafter set forth.

Conditions of Certification:

1. Proposed fill or substantial modification of 1 to 10 acres of such waters, including wetlands, requires a written concurrence from the Division of Environmental Management. Activities involving less than one acre do not require written concurrence.
2. Excluded from this General Certification are discharges of fill in waters classified WS I, II, or III (public water supplies) and SA (shellfish waters). This exclusion also applies to fill in wetlands adjacent to these waters. Discharge proposed for these waters or wetlands must be considered for certification on a case-by-case basis;

3. That the discharge will consist of suitable material free from toxic pollutants in other than trace quantities;
4. That established erosion control practices are utilized to prevent excessive increases in turbidity and settleable solids concentrations in the water body as a result of the discharge;
5. That the discharge of fill material shall be in accordance with the conditions and management practices specified by the Corps of Engineers in 33 CFR 330.5 and 330.6 for nationwide permit number 26.

Non-compliance with or violation of the conditions herein set forth by a specific fill project shall result in revocation of this Certification for the project.

The Director of the North Carolina Division of Environmental Management may require submission of a formal application for certification for any project in this category of activity, if it is determined that the project is likely to have a significant adverse effect upon water quality or degrade the waters so that existing uses are precluded.

Public Hearings may be held for specific applications or group of applications prior to Certification if deemed in the public's best interest by the Director of the North Carolina Division of Environmental Management.

This the 5th day of November 1987.

DIVISION OF ENVIRONMENTAL MANAGEMENT

By _____

R. Paul Wilms, Director

Received 2/4/91
DFL

DEPARTMENT OF THE ARMY
WILMINGTON DISTRICT, CORPS OF ENGINEERS
P.O. BOX 1890
WILMINGTON, NORTH CAROLINA 28402-1890

IN REPLY REFER TO

February 1, 1991

Regulatory Branch

SUBJECT: CESAW-CO90-J-092, NWP 14, and NWP 26

Mr. David Lee
Wake Stone
Post Office Box 190
Knightdale, North Carolina 27545

Dear Mr. Lee:

Reference is made to your meeting of November 27, 1990, with Mr. Eric Alsmeyer of my staff, and Mr. Michael Ortosky of Soil and Environmental Consultants, on your property on Quarry Road in Cary, Wake County, North Carolina, adjacent to Crabtree Creek. The purpose of that meeting was to discuss fill activities proposed on your property in association with your proposed expansion of the existing Triangle Quarry, and to determine the limits of adjacency to Crabtree Creek. Reference is also made to Soil and Environmental Consultants' December 18, 1990, letter transmitting plans for the proposed expansion, showing a total impact of waters of the United States, including wetlands, of 0.32 acre.

For the purposes of the Corps of Engineers' Regulatory Program, Title 33, Code of Federal Regulations (CFR), Part 330, published in the Federal Register on November 13, 1986, lists nationwide permits. Authorization was provided for minor road crossing fills including all attendant features, both temporary and permanent, that are part of a single and complete project for crossing of a non-tidal waterbody, provided that the crossing is culverted, bridged or otherwise designed to prevent the restriction of, and to withstand expected high flows and provided further that discharges into any wetlands adjacent to the waterbody do not extend beyond 100 feet on either side of the ordinary high water mark of that waterbody. Authorization was also provided for discharges of dredged or fill material into non-tidal rivers, streams, and their lakes and impoundments, including adjacent wetlands, that are located above the headwaters and other non-tidal waters of the United States, including adjacent wetlands, that are not a part of a surface tributary system to interstate waters or navigable waters of the United States.

Your proposal, involving a minor road crossing of an unnamed tributary to Crabtree Creek and adverse modification to less than 1 acre of non-adjacent waters and wetlands, is authorized by nationwide permit provided the work is accomplished in strict accordance with the enclosed conditions. This verification will be valid until the nationwide permit is modified, reissued, or revoked. All nationwide permits are scheduled to be modified, reissued, or revoked prior to January 13, 1992. It is incumbent upon you to remain informed of changes to the nationwide permits. We will issue a public notice announcing changes when they occur. Furthermore, if you commence, or are

under contract to commence, this activity before the date the nationwide permit is modified or revoked, you will have 12 months from the date of the modification or revocation to complete the activity under the present terms and conditions of this nationwide permit.

Please be aware that this authorization does not relieve you of the responsibility to obtain any required State or local approval.

If you have questions, please contact Mr. Eric Alsmeyer, Raleigh Regulatory Field Office, at telephone (919) 846-0749.

Sincerely,

G. Wayne Wright
Chief, Regulatory Branch

Enclosure

Copy Furnished

Soil and Environmental Consultants
1125 Cedarhurst Drive
Raleigh, North Carolina 27609

Copies Furnished (without enclosure)

Mr. William Mills
Water Quality Section
Division of Environmental Management
North Carolina Department of Health,
Environment and Natural Resources
Post Office Box 27687
Raleigh, North Carolina 27611-7687

Mr. John Parker
Division of Coastal Management
North Carolina Department of
Environment, Health and
Natural Resources
Post Office Box 27687
Raleigh, North Carolina 27611-7687

CONDITIONS

a. Any discharge of dredged or fill material will not occur in the proximity of a public water supply.

b. The activity will not jeopardize a threatened or endangered species as identified under the Endangered Species Act, or destroy or adversely modify the critical habitat of such species.

c. The activity will not significantly disrupt the movement of those species of aquatic life indigenous to the waterbody (unless the primary purpose of the fill is to impound water).

d. Any discharge of dredged or fill material will consist of suitable material free from toxic pollutants.

e. Any structure or fill will be properly maintained.

f. If the activity may adversely affect historic properties which the National Park Service has listed on, or determined eligible for listing on, the National Register of Historic Places, or if significant historic properties are encountered before or during work, the permittee will notify the District Engineer.

g. An individual state water quality certification must be obtained or waived. Conditions of certification will be considered to be special conditions of the Federal nationwide permit.

h. The following management practices will be followed to the maximum extent:

(1) Discharges of dredged or fill material into waters of the United States will be avoided or minimized through the use of other practical alternatives.

(2) Discharges in spawning areas during spawning seasons will be avoided.

(3) Discharges will not restrict or impede the movement of aquatic species indigenous to the waters or the passage of normal or expected high flows or cause the relocation of the waters (unless the primary purpose of the fill is to impound water).

(4) If the discharge creates an impoundment of water, adverse impacts on the aquatic system caused by the accelerated passage of water and/or the restriction of its flow will be minimized.

(5) Discharge in wetland areas will be avoided.

(6) Heavy equipment working in wetlands will be placed on mats.

(7) Discharges into breeding areas for migratory waterfowl will be avoided.

(8) All temporary fills will be removed in their entirety.

Wake Stone Corporation

Quarry Phone Numbers:
919/266-9266—Knightdale
919/677-0050—Triangle
919/775-7349—Moncure
919/985-4411—Nash County

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.

Business Office Address:
P.O. Box 190
Knightdale, N.C. 27545
919/266-1100

December 18, 1990

Mr. Tracy E. Davis, Mining Specialist
Land Quality Section - NC DEHNR
PO Box 27687
Raleigh, North Carolina 27611-7687

SUBJECT: Wake Stone Corporation ~~Triangle~~ Cary Quarry
Mining Permit Renewal

Dear Mr. Davis:

State mining permit No. 92-10 for our ~~Triangle~~ Cary Quarry will expire on May 13, 1991. By this letter we respectfully request renewal of the permit for an additional ten years.

The mining operation will continue to operate as it has over the past permit period with the addition of three pit expansion phases bordering the existing pit on the north side. As a part of the future expansion of the pit, we plan to construct a pit perimeter road, and a visual barrier berm along the 250' permanent buffer.

Enclosed you will find duplicate copies of the following application materials:

- -the mining permit application booklet,
- -a revised ~~Triangle~~ Cary Quarry Site Plan,
- -a revised ~~Triangle~~ Cary Quarry Reclamation Plan,
- -a detailed sequence of land disturbing activities associated with our proposed expansion activities, and
- -engineering design calculations and specifications for the proposed erosion control structures.

We are proud of our record of having operated the ~~Triangle~~ Cary Quarry for ten years without invoking any of the seven denial criteria listed in the Mining Act (G.S. 74-51). State and federal monitoring under the NPDES and Air Quality programs ensure that the operation has not, and will not:

- -have an adverse effect on wildlife or fisheries, or
- -violate any air or water quality standards.

The screening of the property by vegetated earthen berms and vegetative buffers provide adequate buffering to prevent any significantly adverse effects on the purpose of the neighboring Umstead State Park. The property's isolation from houses, schools, churches, hospitals, commercial or industrial buildings, public roads, or other properties prevents any physical hazard to any such structures or properties.

We have operated the Triangle (CAMP) Quarry in this unique location for ten years without a violation of any State or Federal regulation governing mining. We have not caused any substantial deposits of sediment in the adjoining Crabtree Creek, nor have we caused any landslides or acid water pollution. Our record of operation is sufficient evidence to address how this renewal and expansion will not invoke any of the seven denial criteria listed in G.S. 74-51.

Pursuant to the new mining permit fee schedule as adopted in 15A NCAC 5B.0012, we are enclosing our check in the amount of $500.00 made payable to the NC Dept. EHNR. If you have any questions concerning this renewal request please call me at (919) 266-1100.

Sincerely,
Wake Stone Corporation

David F. Lee

David F. Lee

Enclosures

CHRONOLOGICAL SEQUENCE OF LAND DISTURBING ACTIVITIES

The Site Plan accompanying this Permit Renewal Application outlines three pit expansion areas or phases. By the end of the next ten year permit period we would expect to have incorporated all three areas into our active mining area. To that end, we anticipate establishing the 30' wide perimeter road and northern berm along the permanent 250' buffer area as the initial step in the expansion of the mining area. This early establishment of the road and berm will allow the perimeter of the mining area to be stabilized and revegetated prior to the activation of the area nearest Crabtree Creek and Umstead State Park.

Sequence of Land Disturbing Activities

-Flag clearing limits of 30' perimeter road, 250' buffer berm, and temporary and permanent sediment control measures.
-Clear timber from right-of-way for perimeter road to allow access to sediment detention structures.
-Construct sediment detention basins (temporary and permanent) and associated diversions. Revegetate disturbed diversion and basin areas immediately following completion of construction of structures.
-Clear timber from area for construction of buffer berm.
-Install culverts 1, 2, 3, and 4 as construction of the perimeter road progresses.
-Flag clearing limits for initiation of Phase I pit expansion area.
-Clear timber from pit expansion area I.
-Initiate removal of overburden from pit expansion area I proceeding from the present pit area into the expansion area such that drainage is maintained into the pit. (The perimeter sediment basins are sized to handle runoff from the entire drainage areas, but stripping of overburden will proceed in such a manner as to direct runoff to the pit.)
-Utilize overburden removed from pit expansion area I to construct the 250' buffer berm.
-Maintain all perimeter road surfaces, diversions, and sediment detention structures during construction of the buffer berm.
-Stabilize and revegetate the berm side slopes immediately upon completion.

Once pit expansion area I is cleared of overburden and mining in rock is underway, pit expansion area II will be activated in the same sequence of disturbance activities: timber removal - overburden removal - incorporation of area into mining of rock. Expansion area III will follow expansion area II in a similar fashion.

As has been the case in the initial ten year permit period, we expect a large percentage of the overburden removed from the site to be used off-site by private grading contractors. Therefore, no on-site disposal is anticipated other than the construction of the 250' buffer berm.

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

15672

66-763/531
003

Dec 18, 1992

PAY TO THE ORDER OF N.C. Dept of E.H.N.R. $ 500 00

Five Hundred + NO/100 DOLLARS

Wachovia
Wachovia Bank & Trust Company, N.A.
Raleigh, NC 27611-7886

WAKE STONE CORPORATION

FOR Permit Renewal

John R Dutton

[redacted]

Speed Letter

To John Holley — RRO-EAS — Date

From Tracy Davis — EAS — Date 12/21/90

cc

Subject Renewal Request - Wakestone Corp. - Tailfeather Quarry, Wake Co. (#92-10)

Message

Please find attached a copy of the above referenced request (with maps, forms and check copy attached) for your office's review and comment. Please provide your written comments by January 10, 1990 if possible. I will route my copy to Wildlife for their review and comment.

(* Can you please route this to your local groundwater personnel to see if monitoring wells are needed. If so, please have them locate them on a copy of the mine map. Either way, we need a written memo from them regarding this renewal request.))

= ALSO, WATER QUALITY / AIR QUALITY MAY BE INTERESTED IN COMMENTING - THANKS!

Thanks

Signed Tracy Davis

Reply

Signed

WilsonJones
44-803 3-PART PRINTED IN U.S.A.
Carbonless

SENDER—DETACH AND RETAIN YELLOW COPY. SEND WHITE AND PINK COPIES.

State of North Carolina
Department of Environment, Health, and Natural Resources
Division of Land Resources

James G. Martin, Governor
William W. Cobey, Jr., Secretary

JANUARY 18, 1991

Charles H. Gardner
Director

Dear MR. DAVID LEE :

We are in receipt of your:

____ Mining permit application for _____

____ Mining permit modification for _____

✓ Mining permit renewal for THE CAMP QUARRY (#92-10). ALTHOUGH WE HAVE RECEIVED YOUR CHECK FOR $500.00 TO COVER THE RENEWAL, AN ADDITIONAL $500 FEE IS REQUIRED TO COVER THE 40 ACRES OF PIT EXPANSION ALSO REQUESTED (MAJOR MODIFICATION).

~~We regret that we cannot begin processing the above materials until we have received the necessary fees~~ as authorized by the 1990 North Carolina General Assembly in G.S. 143B - 290 and as set forth in the fee schedule adopted by the North Carolina Mining Commission 15A NCAC 5B.0012.

Please remit by check or money order $500 (FOR MAJOR MODIFICATION OF 40 ACRES) payable to the North Carolina Department of Environment, Health, and Natural Resources. DO NOT SEND CASH. Payments should be mailed to:

Attention: Beth Studenberg
Assistant Mining Specialist
Division of Land Resources
North Carolina Department of Environment, Health, and Natural Resources
P.O. Box 27687,
Raleigh, N.C. 27611

Full payment must be received by this office within 30 days or your materials will be returned unprocessed.

A copy of the fee schedule as adopted by the North Carolina Mining Commission is attached. The section pertaining to the materials that you have submitted has been highlighted. See the fee schedule for further explanation. If you have any additional questions, please call our office.

THANKS FOR YOUR COOPERATION,

cc: JOHN HOLLEY, P.E.

attachment

10/90

MINING

• A nonrefundable permit application fee when filing for a new mining permit, a major permit modification or a renewal permit as follows:

TYPE	ACRES**	NEW PERMIT	MAJOR MODIFICATION	RENEWAL
Clay	1 but less than 25	$500	$250	$250
	25 but less than 50	1000	500	500
	50 or more	1500	500	500
Sand & Gravel, Gemstone, and Borrow Pits	1 but less than 5	150	100	100
	5 but less than 25	250	100	100
	25 but less than 50	500	250	500
	50 or more	1000	500	500
Quarry, Industrial Minerals, Dimension Stone	1 but less than 10	250	100	100
	10 but less than 25	1000	250	500
	25 but less than 50	1500	500 (40 ACRES OF PIT EXPANSIONS)	500
	50 or more	2500	500	500
Peat & Phosphate	1 or more	2500	500	500
Gold (Heap Leach), Titanium & Others	1 or more	2500	500	500

• A nonrefundable $50.00 permit application processing fee is required for minor permit modifications. Minor permit modifications include ownership transfers, name changes and bond substitutions. A minor permit modification also includes lands added to a permitted area, outside of the minimum permit buffer zone requirements, where no plans for mining related disturbance of the added lands have been approved. All other changes are considered major modifications.

** Acres for new permits and renewal permits means the total acreage at the site. Acres for major modification of permits means that area of land affected by the modification within the permitted mine area, or any additional land that is to be disturbed and added to an existing permitted area, or both.

"PERMANENT" SEDIMENT BASIN DESIGN SPECIFICATIONS

SEDIMENT BASIN A

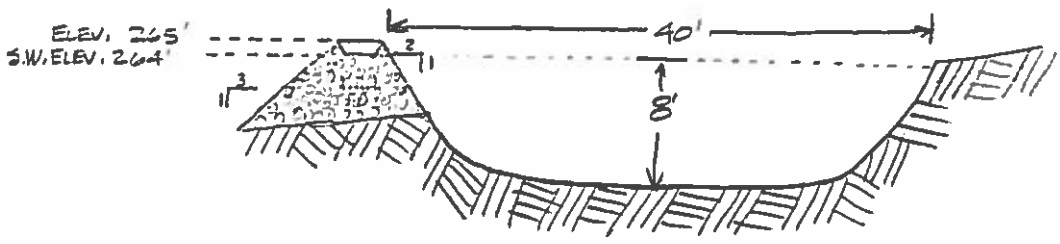
1- DETERMINE REQUIRED BASIN VOLUME : (STD. & SPEC. 6.61)
1800 FT.^{3}/AC. × 7.6 AC. DRAINAGE AREA = 13,680 FT.^{3}

2- EXCAVATED PIT AND ROCK DAM STRUCTURE (STD. & SPEC. 6.63)

LENGTH OF PIT - 40'
WIDTH OF PIT AT ROCK DAM - 50'
DEPTH OF PIT - 7'

TOP OF ROCK DAM ELEVATION - 265'
TOP WIDTH OF ROCK DAM - 8'
SPILLWAY ELEVATION - 264'
SPILLWAY DIMENSIONS - 8' × 15'
3:1 DOWNSTREAM SIDESLOPE
2:1 UPSTREAM SIDESLOPE
1 FT. THICK BLANKET OF #5 STONE ON UPSTREAM FACE OF DAM.

TYPICAL SECTION THROUGH ROCK DAM AND BASIN.



SEDIMENT BASIN B

1- DETERMINE REQUIRED BASIN VOLUME :

1800 FT.^{3}/AC. × 6.7AC. = 12,060 FT.^{3}

2- DETERMINE SIZE AND SHAPE OF BASIN:

A) BY EXAMINATION OF EXISTING CONTOURS ON SITE PLAN:

ELEVATION (FT.)	AREA (FT^2)	DEPTH (FT.)	STORAGE VOL. (FT^3)
272'	1000	2	2,000
274'	1500	4	5,000
276'	2000	6	9,000
278'	4000	8	17,000

ELEVATION 278' YIELDS 17,000 FT^3 OF STORAGE VOLUME.

B) BASIN DESIGN :

- CREST ELEVATION 277.0'
- ABUTMENTS TO EXTEND TO 278' ELEV.
- 12' TOP WIDTH
- 3:1 DOWNSTREAM - 2:1 UPSTREAM SIDE SLOPES.
- 1 FT. THICK BLANKET OF #5 STONE ON UPSTREAM FACE OF DAM.

SEDIMENT BASIN C

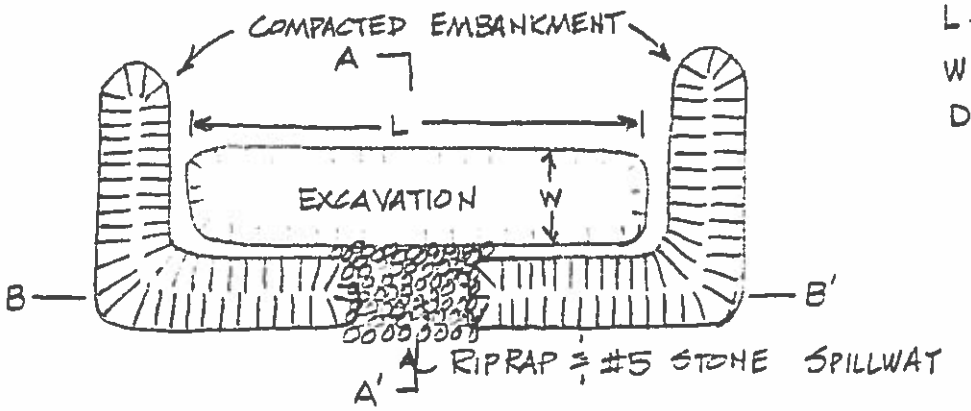
1- DETERMINE REQUIRED BASIN VOLUME:
1800 FT.^{3}/AC. x 12.4 AC. = 22,320 FT.^{3}.

2- DETERMINE SIZE AND SHAPE OF BASIN:
A) USE COMBINATION OF EXCAVATED SUMP 40' x 60' x 10' (W x L x D)
B) BASIN DESIGN:
- CONSTRUCT ROCK DAM TO ELEV. 233'
- DIMENSIONS: LENGTH 50'
TOP WIDTH 15'
CENTER SPILLWAY 10' x 15' AT ELEV. 232'
- EXCAVATE SUMP TO ELEV 372', 40' WIDE x 60' LONG.
- FACE DAM WITH 1' THICK BLANKET OF #5 STONE.
- 2:1 UPSTREAM SIDESLOPE.
- 3:1 DOWNSTREAM SIDESLOPE.

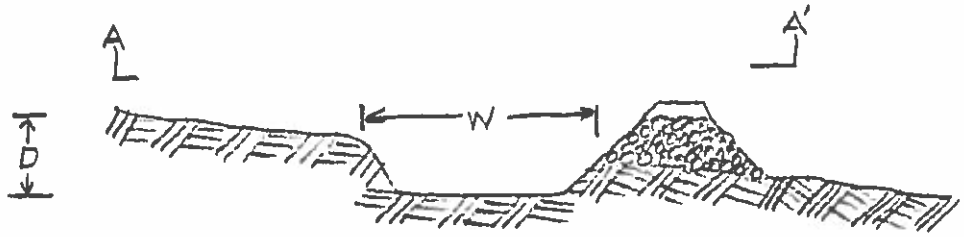
TEMPORARY SEDIMENT TRAP DESIGN SPECIFICATIONS

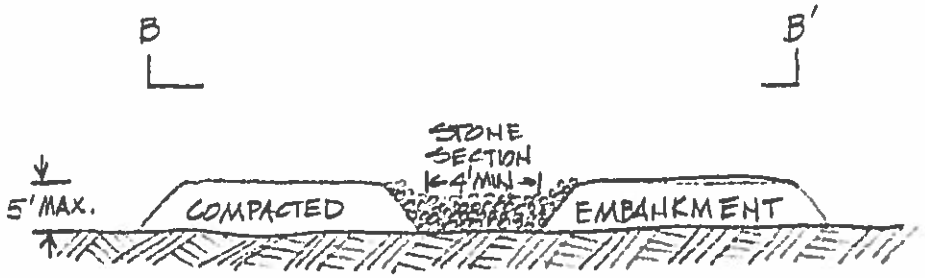
EXISTING TOPOGRAPHY DICTATES THAT TST-1 THROUGH TST-5 BE CONSTRUCTED AS A COMBINATION OF EXCAVATION AND COMPACTED EARTHFILL EMBANKMENT. EACH WILL BE PROVIDED WITH A RIP RAP AND #5 STONE FILTER/SPILLWAY SECTION. THE FOLLOWING SKETCHES PROVIDE BASIC CONSTRUCTION DETAILS.

PLAN VIEW



L = LENGTH
W = WIDTH
D = DEPTH





TEMPORARY SEDIMENT TRAPS

DESIGN CRITERIA

- MINIMUM OF 1800 FT.^{3} STORAGE CAPACITY PER ACRE OF DRAINAGE AREA
- SEDIMENT TO BE REMOVED WHEN BASIN IS ONE-HALF FULL.
- MAXIMUM EMBANKMENT HEIGHT OF 5 FT. WITH 2:1 SIDESLOPES AND MINIMUM TOP WIDTH OF 5 FT.
- 2:1 SIDESLOPES IN EXCAVATION.
- STONE OUTLET SECTION OF CLASS B RIP RAP WITH MINIMUM OF 1 FT. THICK BLANKET OF #5 STONE ON INSIDE FACE.
- SPILLWAY: MINIMUM OF 1.5 FT. BELOW TOP OF EMBANKMENT
  MINIMUM OF 5 FT. WIDTH
  2:1 SIDESLOPES.
  MINIMUM LENGTH 8.0 FT. (FROM TABLE 6.60a.)

CONSTRUCTION SPECIFICATIONS

1- CLEAR, GRUB, AND STRIP EMBANKMENT AND EXCAVATION AREA OF VEGETATION AND ROOT MAT. DISPOSE OF PROPERLY.
2- EXCAVATE SUMP AREA TO DESIGN DIMENSIONS. USE EXCAVATED MATERIAL TO CONSTRUCT EMBANKMENT AND MACHINE COMPACT.
3- CONSTRUCT OUTLET SECTION IN EMBANKMENT TO MINIMUM OF 5 FT. WIDTH, 8 FT. LENGTH, AND 1.5 FT. DEPTH BELOW TOP OF EMBANKMENT.
4- STABILIZE (VEGETATE) EMBANKMENT AND DISTURBED AREA ABOVE SEDIMENT POOL IMMEDIATELY AFTER CONSTRUCTION.

MAINTENANCE

- INSPECT AFTER EACH SIGNIFICANT RAINFALL EVENT.
- REMOVE ACCUMULATED SEDIMENT WHEN AT ONE-HALF DESIGN CAPACITY.
- REPLACE CONTAMINATED CRUSHED STONE FACING.
- IMMEDIATELY MAKE ANY NEEDED REPAIRS TO EMBANKMENT AND SPILLWAY.
- REMOVE STRUCTURE, RE-GRADE, AND STABILIZE AREA ONCE ALL SEDIMENT-PRODUCING AREAS ARE PERMANENTLY STABILIZED.

TEMPORARY SEDIMENT TRAPS

STRUCTURE #	DRAINAGE AREA	REQUIRED VOLUME	EXCAVATION		
			LENGTH	WIDTH	DEPTH
TST-1	2.8 Ac.	5040 Ft.^{3}	35 Ft.	15 Ft.	10 Ft.
TST-2	2.8 Ac.	5040 Ft.^{3}	35 Ft.	15 Ft.	10 Ft.
TST-3	0.3 Ac.	540 Ft.^{3}	15 Ft.	8 Ft.	5 Ft.
TST-4	0.9 Ac.	1620 Ft.^{3}	20 Ft	12 Ft.	7 Ft.
TST-5	1.9 Ac.	3420 Ft.^{3}	30 Ft.	15 Ft	8 Ft.

SIZING OF CULVERTS UNDER 30' PERIMETER ROAD

CULVERT #1

COMPUTE Q_{10} FOR 2.8 AC. DRAINAGE AREA

$Q_{10} = CiA$

$A = 2.8$ AC.

2.8 AC AREA IS TOTALLY WOODLAND

FROM TABLE 8.03a ASSIGN MEDIAN VALUE FOR RUNOFF COEFFICIENT C

2.8AC WOODLAND C(RANGE): 0.05-0.25 USE: 0.15

DETERMINE i - AVE. RAINFALL INTENSITY FOR TIME OF CONCENTRATION T_c.

OUTLET ELEVATION - 282'

ELEV. POINT MOST REMOTE ABOVE OUTLET - 350' (350'-282' = 68')

MAX. LENGTH OF TRAVEL = 350'

T_c = 1.4 MINUTES (FIG. 8.03a)

RAINFALL INTENSITY - RALEIGH CHART = 8"/HR.
(USING 5 MIN. AS DURATION)

$Q_{10} = CiA = (0.15)(8)(2.8) = 3.36$ CFS.

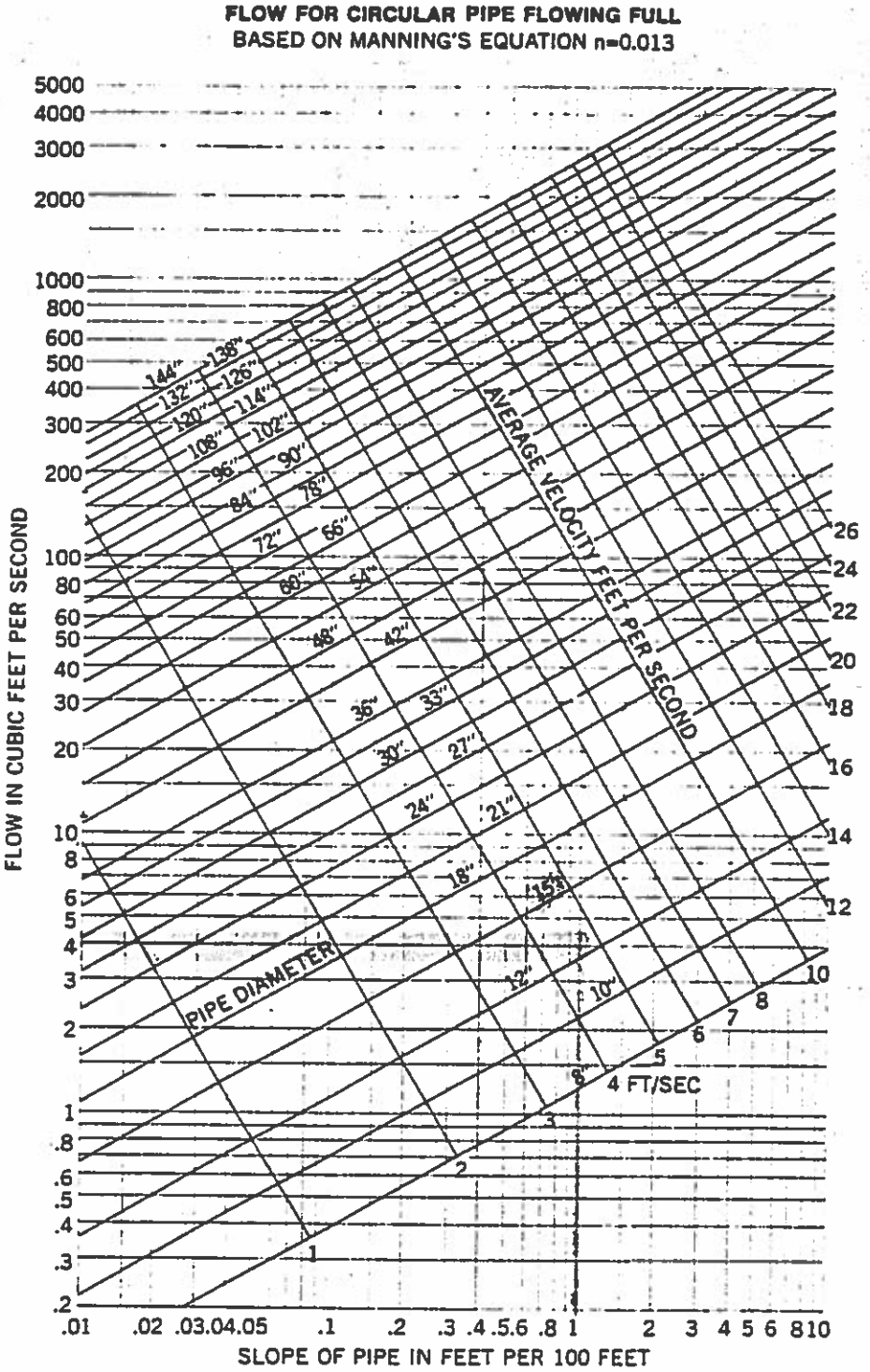
FROM FIG. 5 pg. 192 CONCRETE PIPE DESIGN MANUAL
by AMERICAN CONCRETE PIPE ASSOCIATION

SLOPE OF PIPE IN FT/100 FT. = 1 FT/100 FT. = 1%

FLOW IN CFS = 4.0

USE: 15" RCP

FIGURE 5


FLOW FOR CIRCULAR PIPE FLOWING FULL
BASED ON MANNING'S EQUATION n=0.013
FLOW IN CUBIC FEET PER SECOND
SLOPE OF PIPE IN FEET PER 100 FEET
AVERAGE VELOCITY FEET PER SECOND
PIPE DIAMETER
4 FT/SEC
5000
4000
3000
2000
1000
800
600
500
400
300
200
100
80
60
50
40
30
20
10
8
6
5
4
3
2
1
.8
.6
.5
.4
.3
.2
.01
.02
.03
.04
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.8
1
2
3
4
5
6
8
10
144"
138"
132"
126"
120"
114"
108"
102"
96"
90"
84"
78"
72"
66"
60"
54"
48"
42"
36"
33"
30"
27"
24"
21"
18"
15"
12"
10"
8"
26
24
22
20
18
16
14
12
10
8
7
6
5
4
3
2
1

CULVERT # 2

COMPUTE Q_{10} FOR 7.6 AC. DRAINAGE AREA

$Q_{10} = CiA$

$A = 7.6$ AC.

7.6 AC. AREA IS TOTALLY WOODED

FROM TABLE 8.03a ASSIGN MEDIAN VALUE FOR C

7.6 AC WOODLAND C(RANGE): 0.05 - 0.25 USE: 0.15

DETERMINE i - AVE. RAINFALL INTENSITY FOR T_c.

OUTLET ELEVATION - 264'

ELEV. PT. MOST REMOTE ABOVE OUTLET - 380' (380 - 264' = 116')

MAXIMUM LEHGTH OF TRAVEL = 1100'

T_c = 4 MIN. (FIG. 8.03a)

RAINFALL INTENSITY - RALEIGH CHART = 8.0"/HR.
(USING 5 MIN. AS DURATION)

$Q_{10} = CiA = (0.15)(8)(7.6) = 9.12$ cfs.

FROM CONCRETE PIPE CHART.

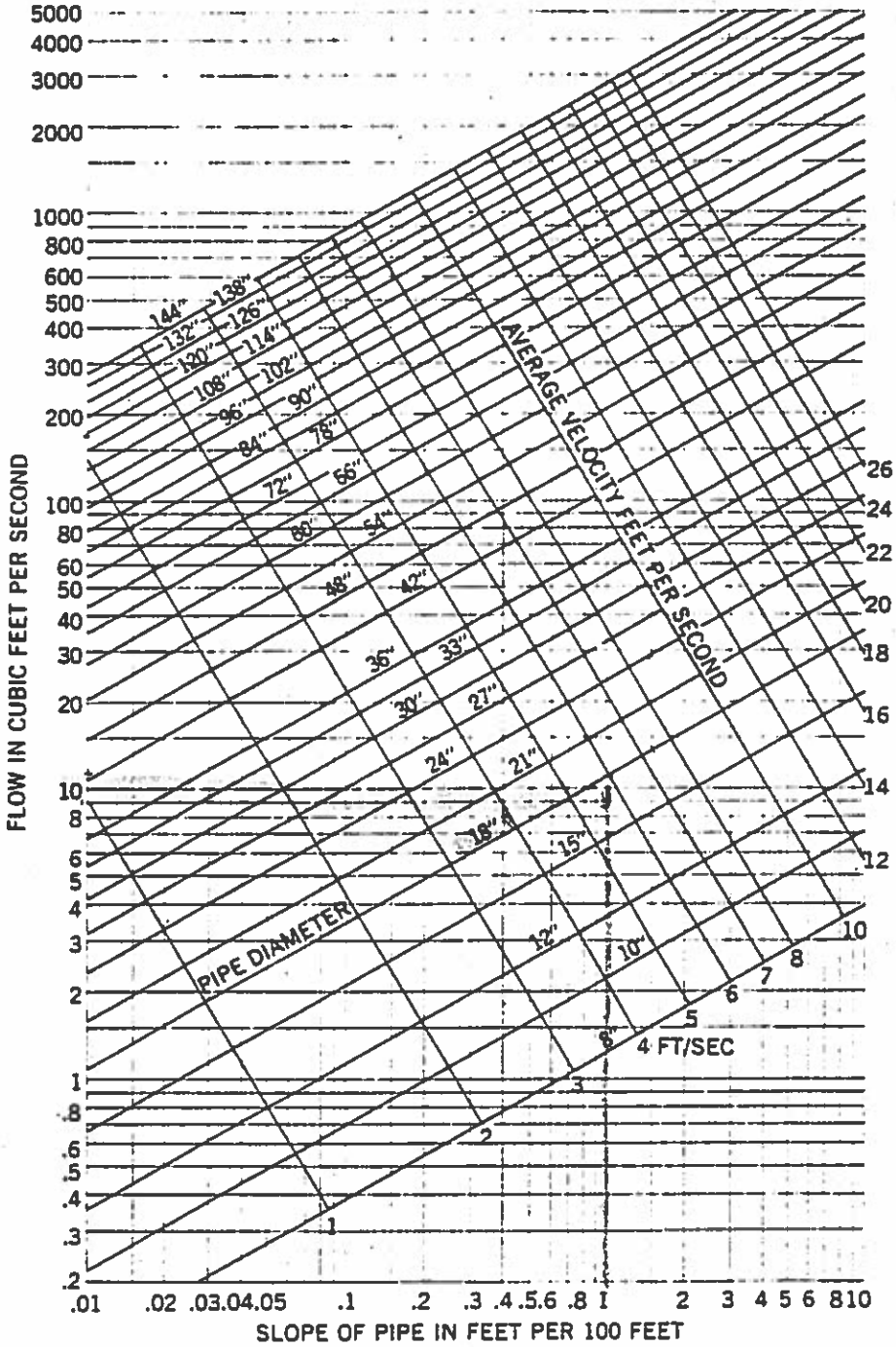
SLOPE OF PIPE IN FT/100 FT. = 1 FT/100 FT = 1%

FLOW IN CFS = 9.2 cfs

USE: 18" RCP

FIGURE 5

FLOW FOR CIRCULAR PIPE FLOWING FULL
BASED ON MANNING'S EQUATION n=0.013



CULVERT #3

COMPUTE Q_{10} FOR 6.7 AC. DRAINAGE AREA

$Q_{10} = CiA$

$A = 6.7$ AC.

6.7 AC. IS WOODLAND.

FROM TABLE 8.03a $C = 0.15$ (MEDIAN FOR RANGE 0.05 - 0.25)

DETERMINE i FOR T_c

OUTLET ELEV. = 298'

ELEV. PT. MOST REMOTE ABOVE OUTLET 380' (380' - 298' = 82')

MAXIMUM LENGTH OF TRAVEL = 500'

T_c = 1.75 MIN. (FIG. 8.03a)

RAINFALL INTENSITY - RALEIGH CHART = 8.0"/HR.
(USING 5 MIN DURATION).

$Q_{10} = CiA = (0.15)(8)(6.7) = 8.04$ cfs.

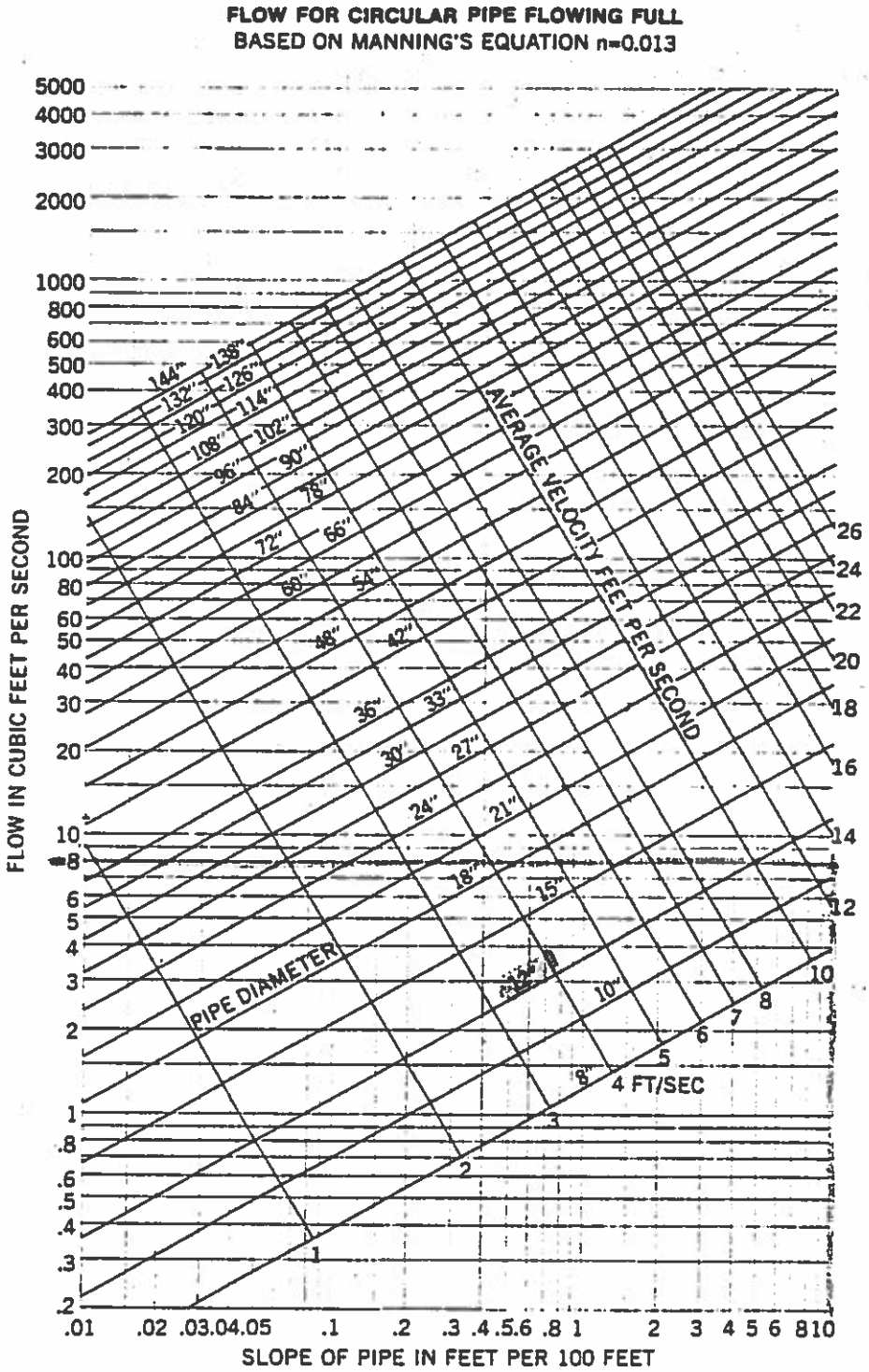
FROM CONCRETE PIPE CHART

SLOPE OF PIPE IN FT/100 FT. = 10FT/100 FT = 10%

FLOW IN cfs = 8.04

USE = 12" RCP.

FIGURE 5


FLOW FOR CIRCULAR PIPE FLOWING FULL
BASED ON MANNING'S EQUATION n=0.013
FLOW IN CUBIC FEET PER SECOND
SLOPE OF PIPE IN FEET PER 100 FEET
AVERAGE VELOCITY FEET PER SECOND
PIPE DIAMETER
4 FT/SEC
5000
4000
3000
2000
1000
800
600
500
400
300
200
100
80
60
50
40
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10
8
6
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CULVERT # 4

COMPUTE Q_{10} FOR 12.4 AC. DRAINAGE AREA

$Q_{10} = ciA$

A = 12.4 Ac WOODLAND

FROM TABLE 8.03a ASSIGN C = 0.15

DETERMINE i FOR Tc.

OUTLET ELEV. = 280'

ELEV. FT. MOST REMOTE ABOVE OUTLET = 386' (386' - 280' = 106')

MAXIMUM LENGTH OF TRAVEL = 1000'

Tc = 4 MIN. (FIG. 8.03a)

RAINFALL INTENSITY - RALEIGH CHART = 8"/HR.
(USING 5 MIN. DURATION).

$Q_{10} = ciA = (0.15)(8.0)(12.4) = 14.9$ cfs USE 15 cfs.

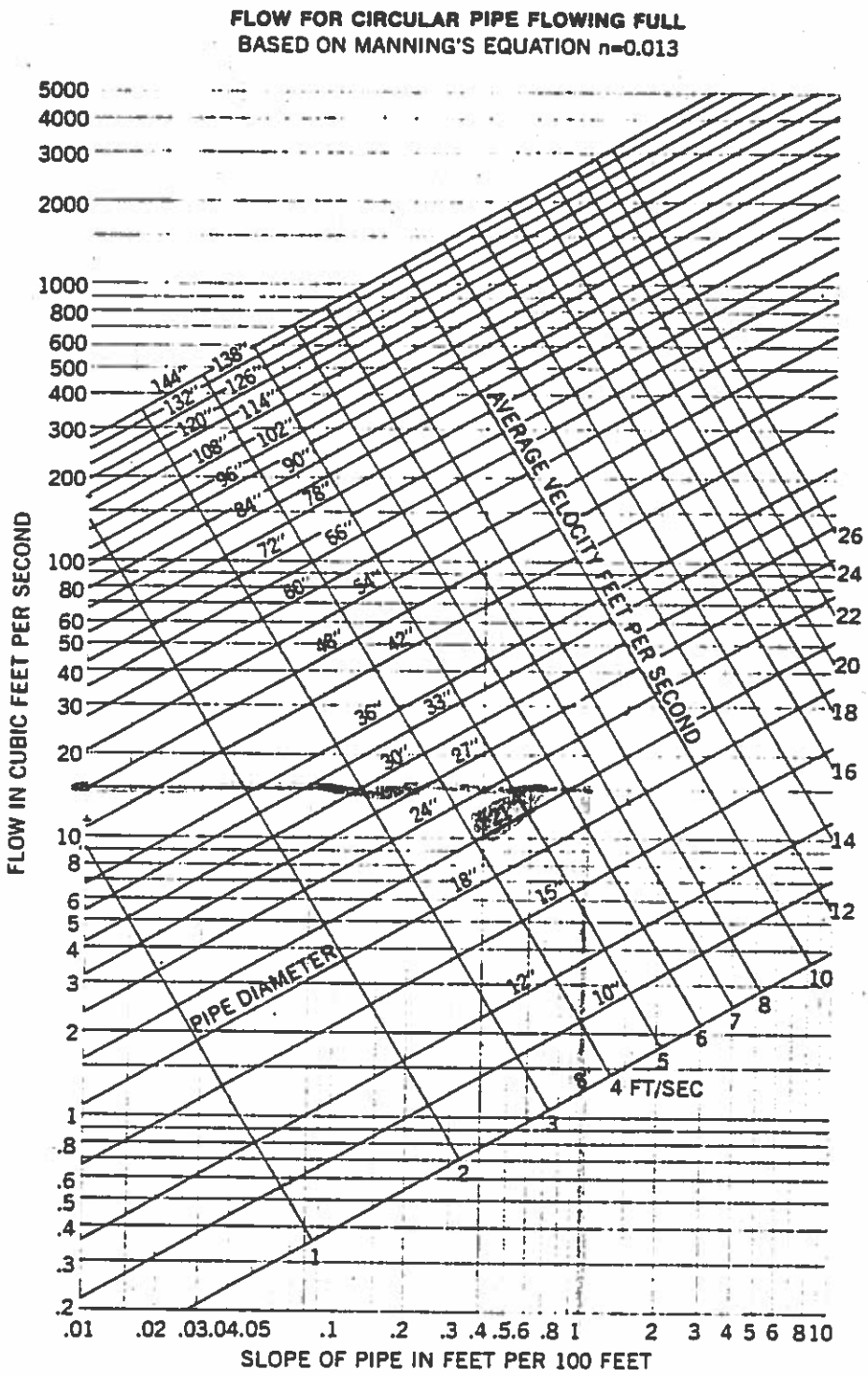
FROM CONCRETE PIPE CHART

SLOPE OF PIPE IN FT./100 FT. = 1 FT./100 FT. = 1%

FLOW IN cfs = 15 cfs.

USE; 21" RCP.

FIGURE 5


FLOW FOR CIRCULAR PIPE FLOWING FULL
BASED ON MANNING'S EQUATION n=0.013
FLOW IN CUBIC FEET PER SECOND
SLOPE OF PIPE IN FEET PER 100 FEET
AVERAGE VELOCITY FEET PER SECOND
PIPE DIAMETER
4 FT/SEC
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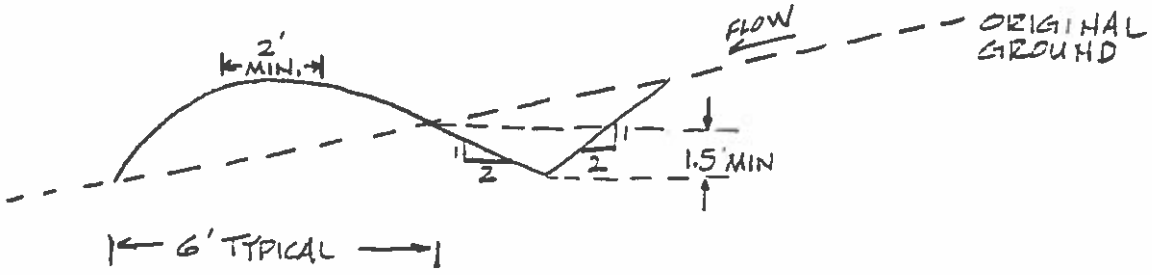
TYPICAL TEMPORARY DIVERSION CONSTRUCTION DETAILS

- LOCATED AT PERIMETER OF DISTURBED AREAS TO DIVERT EXCESS RUNOFF AND SEDIMENT-LADEN WATER TO SEDIMENT TRAPS.

CONSTRUCTION SPECIFICATIONS

- REMOVE ALL TREES, BRUSH, STUMPS, AND OTHER OBJECTIONABLE MATERIAL
- CONSTRUCT DIVERSION CHANNEL AND DIKE USING MOTOR GRADER OR DOZER.
- MACHINE COMPACT DIKE AND VEGETATE IMMEDIATELY AFTER CONSTRUCTION.



DIVISION OF ENVIRONMENTAL MANAGEMENT
December 27, 1990
Groundwater Section

M E M O R A N D U M

TO: John Holley

THROUGH: Arthur Mouberry

FROM: S. Jay Zimmerman

SUBJECT: Wake Stone Corporation Triangle Quarry Mining Permit Review

The following memo is submitted after a review of the subject permit renewal, to advise the Division of Land Resources Land Quality Section of any concerns relative to groundwater impacts resulting from mining activities at the subject site.

After a review of the permit renewal package, I do not feel that mining activities will result in significant impacts to the groundwater. Dewatering activities within the mine pit should not affect water table elevations due to recharge effects associated with the adjacent Crabtree Creek. As a result, the Division of Environmental Management Groundwater Section does not believe monitoring wells are currently needed at this facility.

SJZ:cs

File

State of North Carolina
Department of Environment, Health, and Natural Resources
Division of Land Resources

James G. Martin, Governor
William W. Cobey, Jr., Secretary

Charles H. Gardner
Director

January 2, 1991

MEMORANDUM

TO: Fred Harris
Chief, Division of Boating and Inland Fisheries
Wildlife Resources Commission

FROM: Tracy Davis TD
Mining Specialist
Land Quality Section

RE: Mining Permit Renewal Request
Wake Stone Corporation
Cary Quarry
Mining Permit No. 92-10
Wake County

Please find attached for your review a copy of the mining permit renewal request for the above referenced project. Wake Stone Corporation (WSC) proposes to renew its mining permit for another ten years and expand the current mine excavation in phases.

Please review this information and advise as to the probability of the operation having unduly adverse effect on wildlife or freshwater fisheries (G.S. 74-51 (2)). Please respond by January 18, 1991 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 modification requests, this office will carefully review all proposed erosion and sediment control measures to ensure that they are sufficient to restrain erosion and offsite 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 Mr. David Lee at (919) 266-1100 to set up a convenient date and time.

Your continued cooperation in the review of these type requests is very much appreciated. Please be sure to return all of the attached documents with your review comments as they are my only copies. Thanks!

TED/se

Attachments

cc: Mr. John Holley, P.E.

P.O. Box 27687 • Raleigh, N.C. 27611-7687 • Telephone (919) 733-3833

15 ac PHASE I

42 ac pit

Wahlstrom

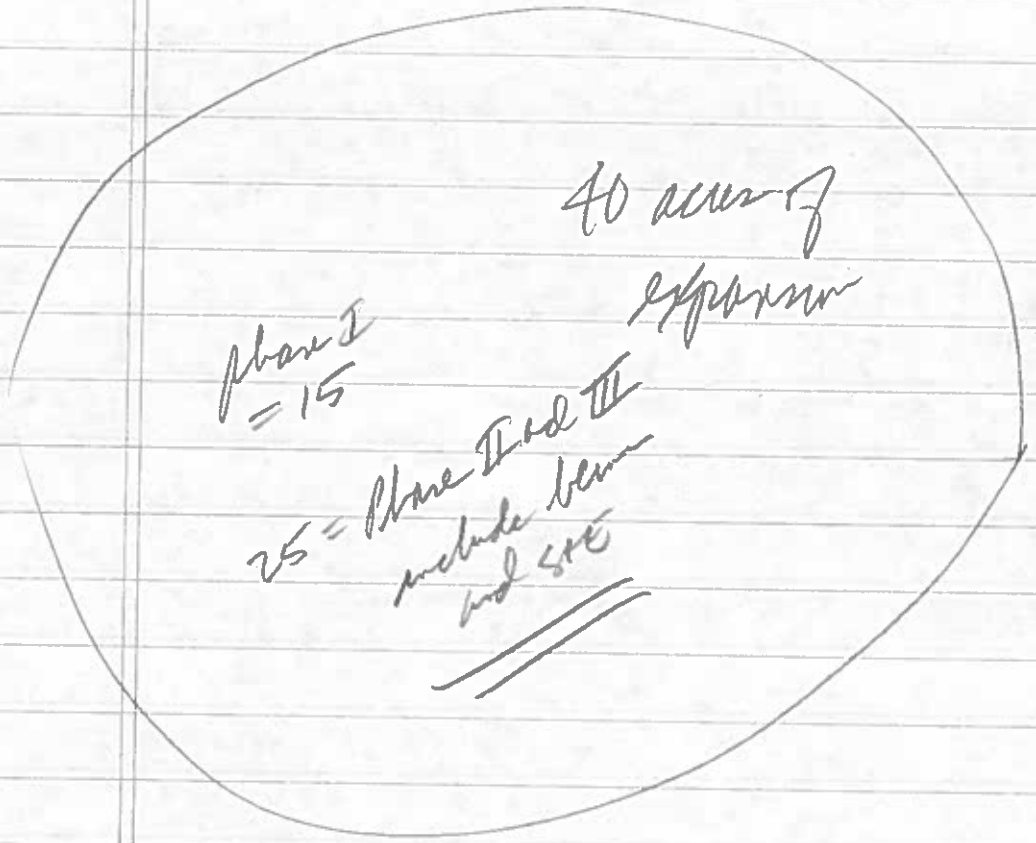
J. Holley 1/16/91
1130 am

may be off
5 acres tailing pond, stock, plant
↓
part of 20 acres?

in Part B

↓
include area in Part A

→ but B would be 5 acres less than now



North Carolina Wildlife Resources Commission

512 N. Salisbury Street, Raleigh, North Carolina 27604-1188, 919-733-3391
Charles R. Fullwood, Executive Director

MEMORANDUM

TO: Tracy Davis, Mining Specialist
Land Quality Section

FROM: Fred Harris, Chief Fred A. Harris
Division of Boating and Inland Fisheries

DATE: January 23, 1991

SUBJECT: Mining Permit Renewal, Wake Stone Corporation, Triangle Quarry, Cary, NC

The Wildlife Resources Commission has completed a review of the subject permit renewal. Biologists on our staff inspected the project area on January 15, 1991, and are familiar with the habitat values of the project area. We are submitting this correspondence in response to your request of January 2, 1991, for comments regarding impacts to fish and wildlife resources in the area. Our comments are provided in accordance with certain provisions of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.), and North Carolina General Statutes (G.S. 113-131 et. seq.).

Clearing of the quarry expansion area will result in the loss of thirty five acres of forested habitat. This forested habitat consists primarily of mixed hardwood species interspersed with pine, all of which is no more than approximately twelve inches in diameter. Much of the hardwood component is mast-bearing. Loss of this habitat will have some effect on wildlife species in the immediate area, particularly deer and squirrels. Adjoining lands on Umstead Park and RDU Airport will provide habitat for the larger vertebrate species displaced by this project.

The progression of land clearing activities and scalping of overburden should be closely monitored to minimize impacts to adjacent Crabtree Creek.

Provided all aspects of the mining, erosion and sedimentation, and NPDES regulations are adhered to, we feel that impacts to fish and wildlife resources in the area will be minimized. Therefore, we have no objections to renewal of this permit.

Thank you for the opportunity to comment on this project.

FAH/lp

cc: Mike Scruggs, District 3 Wildlife Biologist

Speed Letter

From John Holley RRO-EQS Date 1-17-91

To Tracy D. EQS Date 12/21/90

Subject Renewal Request - Waketone Corp - Triangle Quarry, Wake Co. (#92-10) CAP1

Message Please find attached a copy of the above referenced request (with maps, forms and check copy attached) for your office review and comment. Please provide your written comments by January 18, 1990, if possible. I will route my copy to Wildlife for their review and comment.

(* Can you please route this to your local ground water personnel to see if monitoring wells are needed. If so, please have them locate them on a copy of the mine m

Either way, we need a written memo from them regarding this renewal request = ALSO, WATER QUALITY / AIR QUALITY MAY BE INTERESTED IN COMMENTING - THANKS!

Thanks

Signed Tracy D.

Reply COMMENTS ATTACHED

RECEIVED
JAN 24 1991
LAND QUALITY SECTION

Signed

RECIPIENT—RETAIN WHITE COPY, RETURN PINK CO
TURN OVER FOR USE WITH WINDOW ENVELO

WilsonJones
44-803 3-PART PRINTED IN U.S.A.
Carbonless

FILL IN NAME AND ADDRESS HERE
FOR RETURN IN WINDOW ENVELOPE

FOLD

FOLD

DIVISION OF LAND RESOURCES
Raleigh Regional Office
January 18, 1991

M E M O R A N D U M

TO: Tracy Davis, Mining Specialist

FROM: John Holley, Regional Engineer

SUBJECT: Permit Renewal Request
Cary (Triangle) Quarry (92-10)
Wake County

We have completed our review of the subject application and offer the following comments for your consideration:

1. Although no violations have been cited in a NOV under the Mining Act, it should be noted that a Letter of Deficiency was issued on 2-4-87 for inadequate sediment controls and off-site sedimentation.

2. I have discussed the application with DEM representatives. The Groundwater Section finds no problem with the plan as indicated in the attached memo. The Water Quality Section has verified that Permit NC0050601 is still valid and will expire 11-30-92. The Air Quality Section has verified that Permit 4386R4 is still valid and will expire 12-31-94. Both have indicated that no permit modifications appear necessary.

3. "TST-4" is not properly designed. It must accommodate the runoff from the drainage area to sediment basin "C". Therefore, a properly designed rock dam is required as a minimum.

4. Although the TST's and sediment basins are too deep to provide for efficient settling using the 1800 cf/ac criteria, many of the surface areas specified appear reasonable if a 900 cf/ac criteria is used. I believe this to be sufficient for TST-3, TST-4, TST-5, basin "A" & basin "B" in light of the limited use planned for these structures.

5. TST-1, TST-2 and sediment basin "C" are too deep for efficient settling action regardless of the design criteria used. The surface areas at these traps should be increased by holding the maximum sediment zone depth to 3 feet.

6. A spillway has not been designed for sediment basin "B".

7. The construction details for the proposed sediment traps are deficient. The drawings are not fully consistent with the specifications, and it appears that an arched stone filter was intended for basin "C". It is recommended that construction details be added to the drawings consistent with the illustrations provided in our S&E Manual. Also, the enclosed detail should be used for the filter berm at basin "C".

8. The culverts are not designed based on the maximum potential 10 year frequency runoff. The runoff computations must be adjusted to account for the clearing of the pit expansion areas in advance of the excavation. Further, dissipators must be designed for the culverts as necessary to prevent scour erosion.

9. The design of the perimeter access road is not complete. A typical cross-section is needed as well as ditch design.

10. The expansion acreage is 40 acres. This is based on the 15 acres proposed in the initial expansion and the boundaries identified for Phase II and Phase III pit expansions.

11. It should be noted that perimeter sediment controls and berm construction appear to extend into the buffers proposed on page 5 of the application under 4.a.

12. Under 6.b. on page 6 of the application, the maximum slope proposed for excavations in unconsolidated overburden material is set at 1:1. The current permit requires that such slopes be no steeper than 2:1.

13. Specifications must be added to the revegetation plan for anchoring all mulch materials.

If there are any questions, please advise.

JLH/ga

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

15790

Jan 28, 19 91

66-763/531
003

PAY TO THE ORDER OF N.C. Dept of EHNR $ 500 00

Five Hundred & NO/100 DOLLARS

Wachovia
Wachovia Bank & Trust Company, N.A.
Raleigh, NC 27611-7886

WAKE STONE CORPORATION

FOR Triangle Permit (Modification)

[redacted]

APPLICATION FOR

NORTH CAROLINA MINING PERMIT

State of North Carolina
Department of Natural Resources
and Community Development
Division of Land Resources
Land Quality Section

P.O. Box 27687
Raleigh, North Carolina 27611
(919) 733-3833

rev. 3/88

RECEIVED
JAN 24 1991
LAND QUALITY SECTION

NORTH CAROLINA DEPARTMENT OF NATURAL RESOURCES AND COMMUNITY DEVELOPMENT

LAND QUALITY SECTION

APPLICATION FOR A MINING PERMIT

RENEWAL
(PLEASE PRINT OR TYPE)

1. Name of Mine Triangle Quarry (Cary) County Wake

2. Name of Applicant Wake Stone Corporation

3. Permanent address for receipt of official mail.

PO Box 190

Knightdale, NC 27545 *Telephone 266-1100

4. Mine Office Address 222 Star Lane

Cary, NC 27513 Telephone 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 John R. Bratton Date 12-17-90

Print Name John R. Bratton

Title President

*The Land Quality Section should be notified of change in 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

A. GENERAL CHARACTERISTICS OF MINE.

1. Total acreage at site covered by this permit application:
   Acres owned 223± Acres leased -- Property owner if leased _____

2. Name of all materials mined: Stone

3. Mining method: Hydraulic Dredge _____ Underground _____ Shovel & Truck X Dragline & Truck X Self-loading Scraper _____
   Other (explain) _____

4. a. Expected maximum depth of mine (feet) +56 Ft. Reference elevation: MSL
   b. Expected average depth of mine (feet) +56 Ft. MSL

5. Has any area(s) at this site been mined in the past? Yes X No ___ If no, proceed to Question 6.

42 ac. pit
20 ac. plant, road, and stockpiles

   a. Acreage of previously affected land(s) at present site that has not been reclaimed: Pit & plant area acres (identify all areas on your mine map).
   b. When and by whom was this activity conducted? On going operation by Wake Stone Corporation. This application is for 10 year renewal.
   c. Acreage of previously affected land at present site that has been reclaimed:
   25 ac. berms & slopes acres (identify all areas on your mine map).
   d. When and by whom was this activity conducted? Wake Stone-throughout first 10 years of operation.
   e. Do you wish to exclude any areas noted in 5a or c from this permit application? Yes _____ No X If yes, how much? _____ acres (identify all areas on your mine map).

6. Present (premining) use of the land (estimate acreage for each):
   Cropland _____ ac Pasture _____ ac Forestry _____ ac Fish/Wildlife _____ ac
   Recreation _____ ac Other _____ ac
   Approximately 75 ac. of undisturbed woodland remain on site currently.

7. Proposed land use after mining and reclamation has been completed (estimate acreage for each):
   Cropland _____ ac Pasture _____ ac Forestry _____ ac Fish/Wildlife 150-175 ac
   Recreation 50-75 ac Other _____ ac

B. DETERMINATION OF AFFECTED ACREAGE AND BOND

1. Number of years for which permit is requested (10 years maximum). 10

2. Total affected acreage to be disturbed during initial year of operation:

a. Area used for tailing ponds	No change from current 1.0 ac. in use.	acres
b. Area used for stockpiles	" " " " 4.0 ac. " "	acres
c. Area used for waste piles	-	acres
d. Area used for processing plants and onsite haul roads	20	acres
e. Area of mine excavation(s) (42 ac. existing + 15 ac. expansion)	56	acres
f. TOTAL a-e	81	acres

3. Estimate the maximum amount of land to be disturbed and unreclaimed at any one time during the life of the permit. 65-125* acres

* This is difficult to estimate as it can't be predicted how much pit expansion will be necessary in the next 10 years.

APPLICATION FOR A MINING PERMIT

4. Check acreage to be bonded*: Total affected acreage figure from B2f OR B3 (page 2) whichever is larger, equals acreage to be bonded. (See 15 NCAC 5B.0003 for bond amounts.)

____	0 - 4.99 acres	____	10 - 24.99 acres
____	5 - 9.99 acres	X	25 + acres

5. a. Will you file a blanket bond or other security covering all of your mining operations in North Carolina? Yes X No___ Already on file.

   b. Have you already filed a blanket bond or other security? Yes X No___

6. List any mining permits previously issued to the applicant. #92-6, #92-10, #53-10, & #64-11

C. PROTECTION OF NATURAL RESOURCES

1. a. Will the operation involve washing the material mined, recycling process water, or other waste water handling? Yes X No_____ If yes, briefly describe all such processes including any chemicals to be used.

   Typical quarry wash system consisting of rinsing screen, 4 settling ponds, a reservoir, and pumping and piping equipment.

   b. Will the operation involve dewatering the mine or discharging fresh or waste water from the mine or plant. Yes X No_____ If yes, briefly describe the nature of the discharge and locate all proposed discharge points on your mine map.

   Accumulated rain water and ground water is discharged when not needed as make-up water.

   c. If you answered yes to either 1a or 1b, provide evidence that you have applied for or obtained a water quality permit from the Division of Environmental Management, Water Quality Section.

   NPDES Permit No: NC0050601

*In lieu of the surety bond required by this section, the operator may file with the Department a cash deposit, negotiable securities, a mortgage of real property acceptable to the Department, or an assignment of a savings account in a North Carolina bank on an assignment form prescribed by the Department. **The amount of land disturbed and unreclaimed at any one time must not exceed the bonded amount.**

APPLICATION FOR A MINING PERMIT

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

Air Quality Permit No: 4386R4

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

Fugitive dust from stockpiles and haul roads will be controlled by wetting with water truck.

Calcium chloride solutions may be used on roads as necessary.

3. Describe in detail the chronological sequence of land disturbing activities and reference the sequence to the mine map(s). Attach additional sheets as needed.

See narrative incorporated in E&SC plan.

APPLICATION FOR A MINING PERMIT

4. a. How wide a buffer will be maintained between any mining activity and any adjoining property or highway right-of-way? Show all buffers on mine map(s).

West side along Crabtree Creek - 100'
North side along Crabtree Creek and State Park - 250'
East side along State Park - 100'

b. 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.

No such structures in proximity to existing or proposed excavations.

c. Describe what kind of barricade will be used to prevent inadvertent public entry along any high wall area and when it will be implemented.

Boulder barrier emplaced once highwalls are no longer being worked.

5. Describe specific erosion and sediment control measures to be taken during mining to prevent offsite sedimentation (include specific plans for erosion control for mine excavation(s), waste piles, access/mine roads and process areas), and give a detailed sequence of installation. Locate and label all erosion and sediment control measures on the mine map. Engineering designs and calculations shall be required when needed to justify the adequacy of any proposed measures.

   See detailed E & SC plan.

6 a. Describe methods to prevent landslide or slope instability adjacent to adjoining properties during mining.

   Overburden slopes stabilized at angle of repose able to support vegetation.

b. In excavation(s) of unconsolidated (non-rock) materials, specify the angle of all slopes including specifications for benching and sloping.

   Graded overburden slopes to be stabilized at grade able to be maintained with vegetative cover. In no case steeper than 1 horizontal to 1 vertical (1:1).

c. In hardrock evacations, specify proposed bench widths and heights in feet.

   Excavations in rock will be by 40 ft. bench heights. Bench width will vary according to ongoing mining plans.

7. Are acid producing minerals or soils present? Yes___ No__X If yes, list all such minerals, their relative abundance and indicate their location(s) on the mine map. How will acid water pollution from the excavation, stockpiles and waste areas be controlled?

8. 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 and provide cross-sections through all proposed berms.

   Berms along I-40 and park boundaryin place, stabilized, and vegetated with grass and evergreen trees.

   As listed in the chronological sequence of land disturbing activities, the northern buffer berm will be constructed in the early stage of the expansion, following construction of the perimeter road and associated sediment control structures. Overburden removed from the pit expansion area will be used for construction of the berm. The berm will be stabilized and revegetated with grasses and evergreen trees as timely as possible. Cross section through northern buffer berm is provided on site plan.

9. Will explosives be used? Yes_X_ 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. Locate the nearest offsite structure(s) to the proposed excavation(s) on the mine map.

   Current advanced blasting technology using ammonium nitrate based explosives and millisecond delays provide optimum control for minimization of air blast and ground vibration, and total elimination of fly rock. A seismograph is employed to monitor blasts.

10. a. What is the pre-mining depth (in feet) to the seasonal high and low ground water tables? High 8 ft. Low 40 ft. What is the source(s) of this information?

Test drilling.

b. Will any part of the proposed mine excavation(s) extend below the water table? Yes X No___. If yes, do you intend to dewater the excavation(s)? Yes X No___. If yes, what impact, if any, will mine dewatering have on neighboring wells? Locate all existing wells on the mine map that lie within 500 feet of the proposed permit area. Provide data to support any conclusions or statements made.

No known wells other than those on Wake Stone property are known to exist within 500 ft. of property line. Mine dewatering in crystalline rock formations does not normally adversely impact neighboring wells.

11. Will fuel tanks, solvents, or other chemical reagents be stored on-site? Yes X No___. If yes, describe these materials and how they will be stored and show the location(s) of all storage facilities on the mine map.

Fuels and lubricants stored in above ground tanks within containment structure consisting of concrete floor and concrete block walls.

APPLICATION FOR A MINING PERMIT

D. RECLAMATION PLAN

1. Describe your intended plan for the reclamation and subsequent use of all affected lands and indicate the general methods to be used in reclaiming this land. This information must be illustrated on a reclamation map.

   Once depleted of reserves the pit will be allowed to fill to create a lake. Plant components will be disassembled and removed from the site. Stockpile will be removed. Settling ponds will be backfilled, graded, and re-vegetated. Erosion control structures will be backfilled, graded and revegetated. Plant and stockpile areas will be graded and re-vegetated.

   Re-vegetation will be with grasses, wildlife food species, and trees.

2. a. 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. Will the body(s) of water be stocked with fish? Yes__X__ No___. If yes, specify species.

   Bass, brem, crappie, and catfish, or other species as approved by NC Wildlife Resources Commission.

   b. Describe provisions for prevention of noxious, odious or foul water collecting or remaining in mined areas. Provide details on any permanent water outlets.

   Temperature/density conditions will generate currents to keep lake water "moving". An outlet at the low point in the pit perimeter will create an outfall thereby causing additional movement of the water.

APPLICATION FOR A MINING PERMIT
RECLAMATION PLAN

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. The location of the barricade must be shown on the reclamation map.

   Highwalls in excess of 40 ft. above the ultimate lake level will be fenced or otherwise barricaded.

4. a. 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.

   These types of reclamation activities are conducted concurrent with mining. Slopes are graded to a stable configuration and revegetated.

   b. Are any processing waste, overburden or other such mine wastes to be disposed of off-site? Yes ___X___ No _____. If yes, describe in detail what these wastes are and how they will be disposed. Attach a separate site map(s) showing the location(s) of the disposal area(s). Include all specifications for erosion and sediment control.

   Overburden removed during stripping operations will be used offsite by grading contractors.

APPLICATION FOR A MINING PERMIT
RECLAMATION PLAN

5. a. Describe reclamation of processing facilities, stockpile areas, and onsite roadways.

Plant equipment to be disassembled and removed from site, plant areas, stockpile areas, and unnecessary on-site roadways to be graded, provided with topsoil if needed, and revegetated.

b. Will any onsite roadways be left as part of the reclamation? Yes X No___. If yes, identify these on the reclamation map and provide details on permanent ditch line stabilization.

Entrance road and perimeter road.

Ditch lines to be stabilized with vegetation or rip rap.

6. State the method of reclamation of settling ponds and/or sediment control basins.

Backfilled, graded to stable grades, and revegetated.

7. State 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 N.C. Department of Natural Resources and Community Development, Land Quality Section and either the N.C. Department of Human Resources or local governing body.

   Disposed of off-site in appropriate landfills or recycling centers.

8. Indicate the method of restoration or establishment of any permanent drainage channels to a condition minimizing erosion, siltation and other pollution. Give design details including typical cross-sections of any permanent channels to be constructed as part of the reclamation plan. Show the location(s) of all permanent channels on the reclamation map.

   As with those currently existing, any future established channels will be of sound design with proper gradients and linings.

APPLICATION FOR A MINING PERMIT
RECLAMATION PLAN

9. Describe your plan for revegetation or other surface treatment of the affected areas. This plan must include recommendations for time of seeding and the amount and type of seed, fertilizer, lime and mulch per acre and general seeding instructions for permanent revegetation and, if necessary, temporary revegetation. Revegetation utilizing pine seedlings only is not acceptable. **NOTE: Revegetation Plan must be approved and signed by one of the following:**

(a) Authorized representatives of the local Soil and Water Conservation District having jurisdiction over lands in question;
(b) Authorized representatives of the Office of Forest Resources, Department of Natural Resources and Community Development;
(c) County Agricultural Extension chairmen or Research and Extension personnel headquartered at North Carolina State University in the School of Agriculture and Life Sciences;
(d) North Carolina licensed landscape architects;
(e) Private consulting foresters referred by the Office of Forest Resources, Department of Natural Resources and Community Development;
(f) Others as may be approved by the Department.

LIME - RATE OF APPLICATION:
FERTILIZER - ANALYSIS AND RATE OF APPLICATION:
SEED - TYPES(S) AND RATE OF APPLICATION INCLUDING SEEDING SCHEDULE:

See page 13A.

MULCH - TYPE AND RATE OF APPLICATION:

OTHER VEGETATIVE COVERS:

Revegetation and/or reforestation plan approved by:

Signature Susan B. Gardner Date 12/12/90

Title DISTRICT CONSERVATIONIST

Agency USDA-SCS

APPLICATION FOR A MINING PERMIT (RENEWAL)
REVEGETATION PLAN

Item #9 from page 13 of application booklet.

Site Preparation
Land surfaces will be graded and/or shaped as necessary to create lines and grades applicable to the subsequent use of the land. Slopes in unconsolidated material will be graded to stable gradients not to exceed one horizontal to one vertical. Loose rocks, woody material, and other obstructions that would interfere with the establishment of vegetation will be removed and either buried or properly disposed of off-site. Surface runoff will be controlled by use of diversions and terraces to allow discharge through protected outlets.

Seedbed Preparation
Lime and fertilizer will be mixed with the soil to a depth of 3 to 4 inches on slopes where conventional equipment can be used. On slopes steeper than 2:1, soils will be scarified along the contour for seed and nutrient retention.
Lime and fertilizer will be applied according to soil tests for the areas being revegetated, generally at a rate of 1,000 lbs. of 10-20-20 and 2000 lbs. of lime per acre.
On steep slopes not accessible to seeding equipment, seed, nutrients, and mulch will be applied by hand.

Revegetation Species
Typical seed mixtures to be utilized include: fescue-rye, fescue-rye-lespedeza, and fescue-lespedeza, where the lespedeza used may include Korean or Kobe, or sericea. All rye species to be utilized shall be ryegrass rather than ryegrass.
In fall or spring plantings, seeding mixtures will 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 will be utilized at a rate of 20 to 40lbs per acre in combination with fescue when planting excessively droughty soils or steep slopes.
When using lespedeza species in fall plantings, non-scarified seed will be utilized. Scarified seed will be utilized in spring plantings.
Newly seeded areas will 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 pine and red cedar seedlings will be planted at selected sites to provide visual screens and revegetation. Evergreen seedling plantings are typically done on a staggered 4' by 4' pattern.

Maintenance
Plant replacement or other maintenance required to establish and maintain vegetative cover will be undertaken as necessary.

10. Provide a schedule of reclamation that indicates the sequence of reclamation and approximate time frame. If reclamation is to be accomplished concurrently with mining, then show on the site map segments that are to be mined and reclaimed during each year of the permit. Add drawings showing typical sections or cross-sections and layout of proposed reclamation.

    Reclamation is to proceed concurrent with mining activities, grading, stabilization, and revegetation will be completed as timely as possible.

E. NOTIFICATION OF ADJOINING LANDOWNERS

1. The "NOTICE" form or a facsimile thereof attached to this application must be sent certified or registered mail to all adjoining (contiguous) landowners indicated on mine map unless another means of notice is approved <u>in advance</u> by the Director, Division of Land Resources.

   The completed "Affidavit of Notification" attached to this application must be submitted before the application is considered complete.

NOTICE

Pursuant to provisions G.S. 74-50 of The Mining Act of 1971, notice is hereby given that _____ (Company Name) has applied on _____ (Date) to the Land Quality Section, Division of Land Resources, North Carolina Department of Natural Resources and Community Development, P.O. Box 27687, Raleigh, North Carolina 27611 for a surface mining permit to commence mining of _____ (Mineral, Ore) on _____ (Number) acres located _____ (Miles) _____ (Direction) of _____ (Nearest Town) near road _____ (Road Number/Name) in _____ (Name of County).

In accordance with G.S. 74-50, the mine operator is required to make a reasonable effort to notify all owners of record of land contiguous to the proposed site, and to notify the chief administrative officer of the county or municipality in which the site is located. The property owner may file written comment(s) to the Department at the above address within ten (10) days following receipt of this notice or the filing of the application for a permit, whichever is later. Should the Department determine that a significant public interest exists relative to G.S. 74-51, a public hearing will be held in accordance with the Department of Natural Resources and Community Development, Mining, Mineral Resources Regulation Title 15 Subchapter 5B, .0011.

A copy of the permit application materials are on file and available for public review during normal business hours at the above listed address. For further information call (919) 733-4574.

_____
(Date Mailed to Addressee)

_____
(Address of Applicant)

_____

_____

APPLICATION FOR A MINING PERMIT

AFFIDAVIT OF NOTIFICATION

I, _____, an applicant, or an agent, or employee of an applicant, for a Mining Permit from the N.C.Department of Natural Resources and Community Development, being first duly sworn, do hereby attest that the following are known owners, both private and public, of the land adjoining the proposed mining site and that notice of the pending application has been caused to be mailed, by certified or registered mail, to said owners at their address shown below, such notice being given on a form provided by the Department:

(Name)	(Address)
_____	_____
_____	_____
_____	_____

(Attach additional list if necessary)

I do also attest that the following individual is the chief administrative officer of the county or municipality in which the proposed mining site is located and that notice of the pending application has been caused to be mailed, by certified or registered mail, to said office at the following address:

(Name)	(Address)
_____	_____

The above attestation was made by me while under oath to provide proof satisfactory to the Department that a reasonable effort has been made to notify the owners of record of the adjoining land and the chief administrative officer of the county or municipality in compliance with N.C.G.S. 74-50 and 15 N.C.A.C. 5B .0004(d). I understand that it is the responsibility of the applicant to retain the receipts of mailing showing that the above notices were caused to be mailed and to provide them to the Department upon request.

_____ _____

Date Signature of Applicant

If person executing Affidavit is an agent or employee of an applicant, provide the following information: (Name of applicant)_____;title of person executing Affidavit)_____.

I, _____ a Notary Public of the County of_____, State of North Carolina, do hereby certify that _____ personally appeared before me this day and under oath acknowledged that the above Affidavit was made by him.

Witness my hand and notarial seal, this _____ of day of 19_____.

_____

Notary

My Commission expires: _____

APPLICATION FOR A MINING PERMIT

F. MAPS

1. Two copies of the county highway maps and two copies of all mine maps shall be submitted with each permit application.

   County highway maps may be obtained from:

   Location Department
   State Highway Commission
   Raleigh, North Carolina 27602

   Clearly mark the location of your mining operation on the county highway maps.

2. Mine maps should be accurate drawings, aerial photographs or enlarged topographic maps of the entire mine area and of a scale sufficient (see minimum requirements listed below) to clearly illustrate the following.

   a. 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.
   b. Initial and ultimate limits of clearing and grading.
   c. Outline of all pits/excavations.
   d. Outline of stockpile areas.
   e. Outline of temporary and/or permanent overburden disposal areas.
   f. Location of processing plants (processing plants may be described as to location and distance from mine if sufficiently far removed)
   g. Location and name of streams and lakes.
   h. Outline of settling and/or processing wastewater ponds.
   i. Location of planned and existing access roads and on-site haul roads.
   j. Location of planned and existing on-site buildings.
   k. Location of all proposed sediment and erosion control measures.
   l. 100 year floodplain limits.
   m. Names of owners of record, both public and private, of all adjoining land.
   n. Map legend:
      1. Name of applicant
      2. Name of mine
      3. North arrow
      4. County
      5. Scale
      6. Date prepared
      7. Name and title of person preparing map

   Map scales must, at a minimum, meet the following guidelines:

SITE SIZE (From Page 2, A1)	MAP SCALE
0-99 Acres	1 inch=50 feet
100-499 Acres	1 inch=100 feet
500+ Acres	1 inch=200 feet

NOTE: THIS APPLICATION WILL NOT BE CONSIDERED COMPLETE WITHOUT ITEMS 2a-n BEING ADEQUATELY ADDRESSED.

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 this Act.

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.

Signature* John R Bratton

Print Name: John R. Bratton

Title: President

Mine : Triangle Quarry

Company: Wake Stone Corporation

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

Return two copies of the completed application and all maps to the appropriate Land Quality Section Regional Office serving your area. (See attached list of Regional Offices).

Inquiries regarding the status of an application should be directed to the address listed on the front page of this application form.

File

State of North Carolina
Department of Environment, Health, and Natural Resources
Division of Land Resources

James G. Martin, Governor
William W. Cobey, Jr., Secretary

Charles H. Gardner
Director

January 29, 1991

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

RE: Renewal/Modification of Cary Quarry
Mining Permit No. 92-10
Wake County

Dear Mr. Lee:

This office has completed its initial review of your request to renew and modify the above referenced mining permit. The items in need of further clarification are as follows:

(1) "TST-4" has not been properly designed. It must be redesigned to accommodate the runoff from the drainage area leading to sediment basin "C." Therefore, a properly designed rock dam must be provided as a minimum.

(2) Although the TSTs and "Permanent" Sediment Basins are too deep to provide for efficient settling using the 1800 cubic feet per acre design criteria, many of the surface areas specified in your calculations appear reasonable if a 900 cubic feet per acre design criteria is used and said structures are cleaned out when they become 1/2 full of sediment. Therefore, the dimensions for TST-3, TST-4, TST-5, Sediment Basin "A" and Sediment Basin "B" are acceptable in light of the limited use planned for these structures.

However, TST-1, TST-2 and Sediment Basin "C" are too deep for efficient settling action regardless of the design criteria used above. Therefore, the surface areas for these structures must be increased by holding the maximum sediment zone depth to 3 feet.

(3) Spillway dimensions and design calculations have not been provided for Sediment Basin "B."

(4) The construction details for the Temporary Sediment Traps and "Permanent" Sediment Basins are not fully consistent with the design specifications and it appears that an arched stone filter was intended for Sediment Basin "C." It is strongly recommended that the construction details be upgraded to denote the items specified on the details provided in the Erosion and Sediment Control Planning and Design Manual.

(5) The culverts were not designed based upon the maximum potential 10 year frequency runoff. The runoff computations must be adjusted to account for the clearing of the pit expansion areas in advance of the excavation. Furthermore, energy dissapators must be designed and provided at the outlets of all culverts, as necessary, to prevent scour erosion.

(6) The design of the perimeter access road as well as the temporary/permanent ditches was not complete. A typical cross-section must be provided for the perimeter access road. In addition, design calculations, stabilization (grass, matting, rip-rap, etc.) and construction details must be provided for said ditches.

(7) Pursuant to my letter of January 18, 1991, an additional $500.00 fee is required to cover the 40 acres of pit expansion (including the northern berm and erosion and sediment control measures) before your request can be completely processed.

(8) Under 6 (b) on page 6 of the application, the maximum slope proposed for excavations in unconsolidated (overburden) materials is 1 horizontal to 1 vertical. This proposed slope is unacceptable unless it is supported by sufficient soil/slope stability data. Otherwise, a minimum slope of 2 horizontal to 1 vertical or flatter must be provided.

(9) Anchoring specifications must be added to the Revegetation Plan for all mulch materials.

In order to complete the processing of your request, please forward two (2) copies of the requested information to my attention at the following address:

Land Quality Section
P. O. Box 27687
Raleigh, North Carolina 27611

Please advise if you should have any questions on the above.

Sincerely,

Tracy E. Davis, E.I.T.
Mining Specialist
Land Quality Section

TED/se

cc: Mr. John Holley, P.E.

Wake Stone Corporation

Quarry Phone Numbers:
919/266-9266—Knightdale
919/677-0050—Triangle
919/775-7349—Moncure
919/985-4411—Nash County

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.

Business Office Address:
P.O. Box 190
Knightdale, N.C. 27545
919/266-1100

January 28, 1991

Beth Studenberg - Assistant Mining Specialist
Division of Land Resources
NC Dept. EHNR
P.O. Box 27687
Raleigh, North Carolina 27611

Dear Ms. Studenberg:

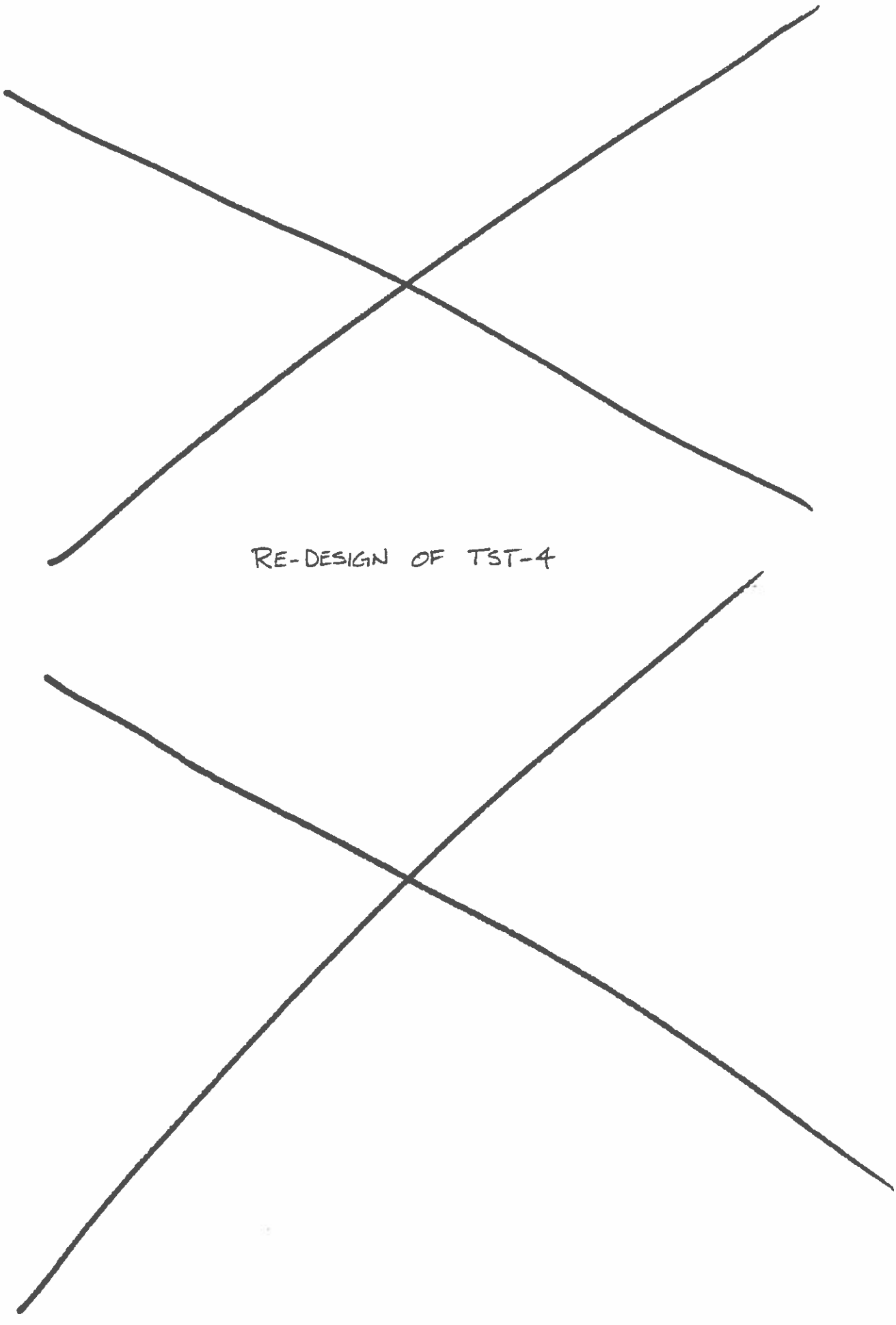
Enclosed is our check in the amount of $500.00 for the forty acres of pit expansion outlined in our recently submitted Triangle Quarry Mining Permit renewal request. In retrospect, it seems we (Wake Stone Corp. and the mining industry) may have been too quick to accept the new fee schedule as it apparantly penalizes an operation for requesting a permit renewal and modification at the same time.

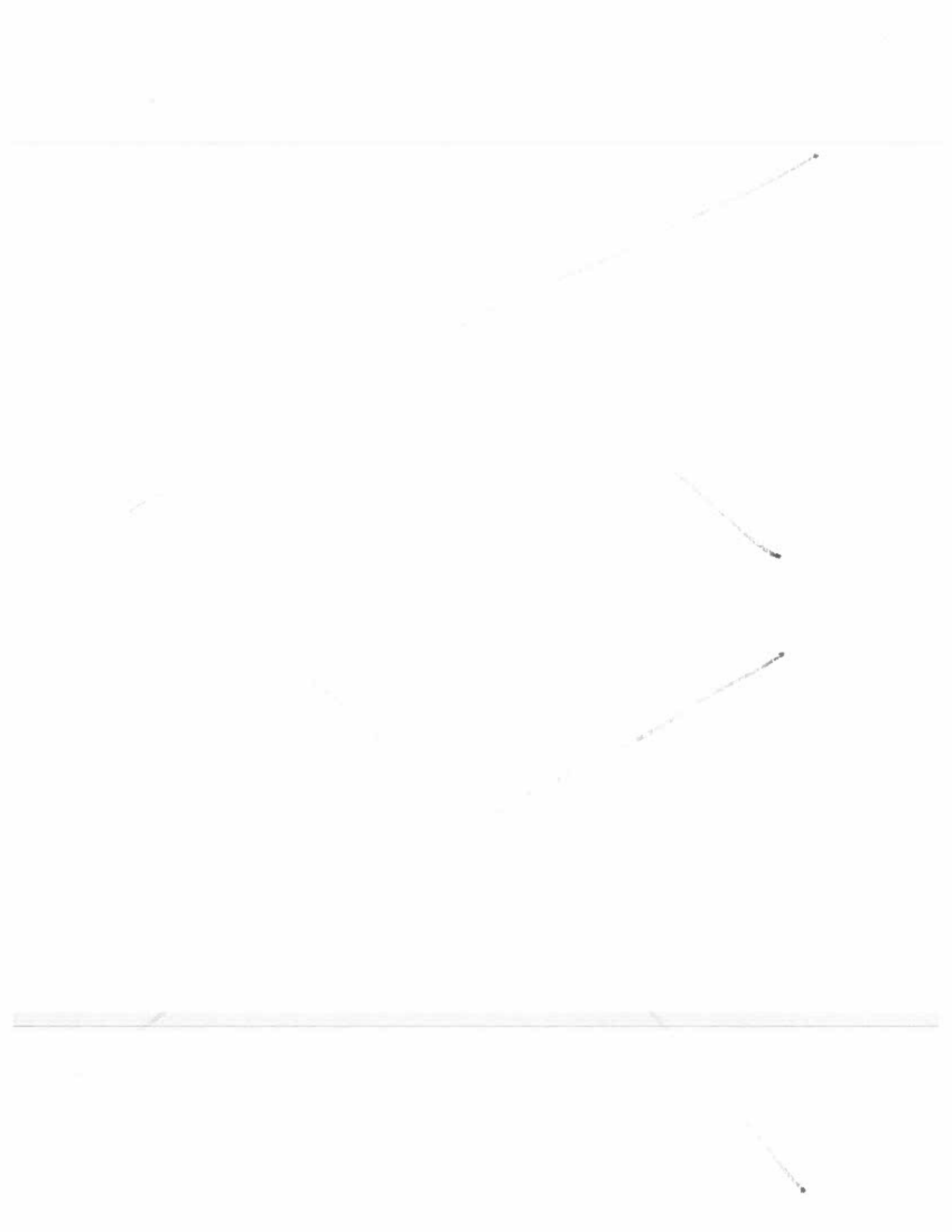
We feel the $500.00 renewal fee is adequate to cover the review of the renewal application even though it contains forty acres of expansion area and associated erosion and sedimentation control structures. It would seem to be a rare instance to have a mining permit renewal that does not include expansions or other impacts to additional acreage. As Land Quality and the mining industry become adjusted to the new permit fee schedule perhaps we will see a need to make modifications to prevent this "double whammy".

Sincerely,
Wake Stone Corporation

David F. Lee

Enclosure


RE-DESIGN OF TST-4



RE-DESIGN OF TST-4

DESIGN STRUCTURE TO ACCOMMODATE RUNOFF FROM DRAINAGE AREA LEADING TO SEDIMENT BASIN C. DESIGN STRUCTURE AS A PROPERLY DESIGNED ROCK DAM.

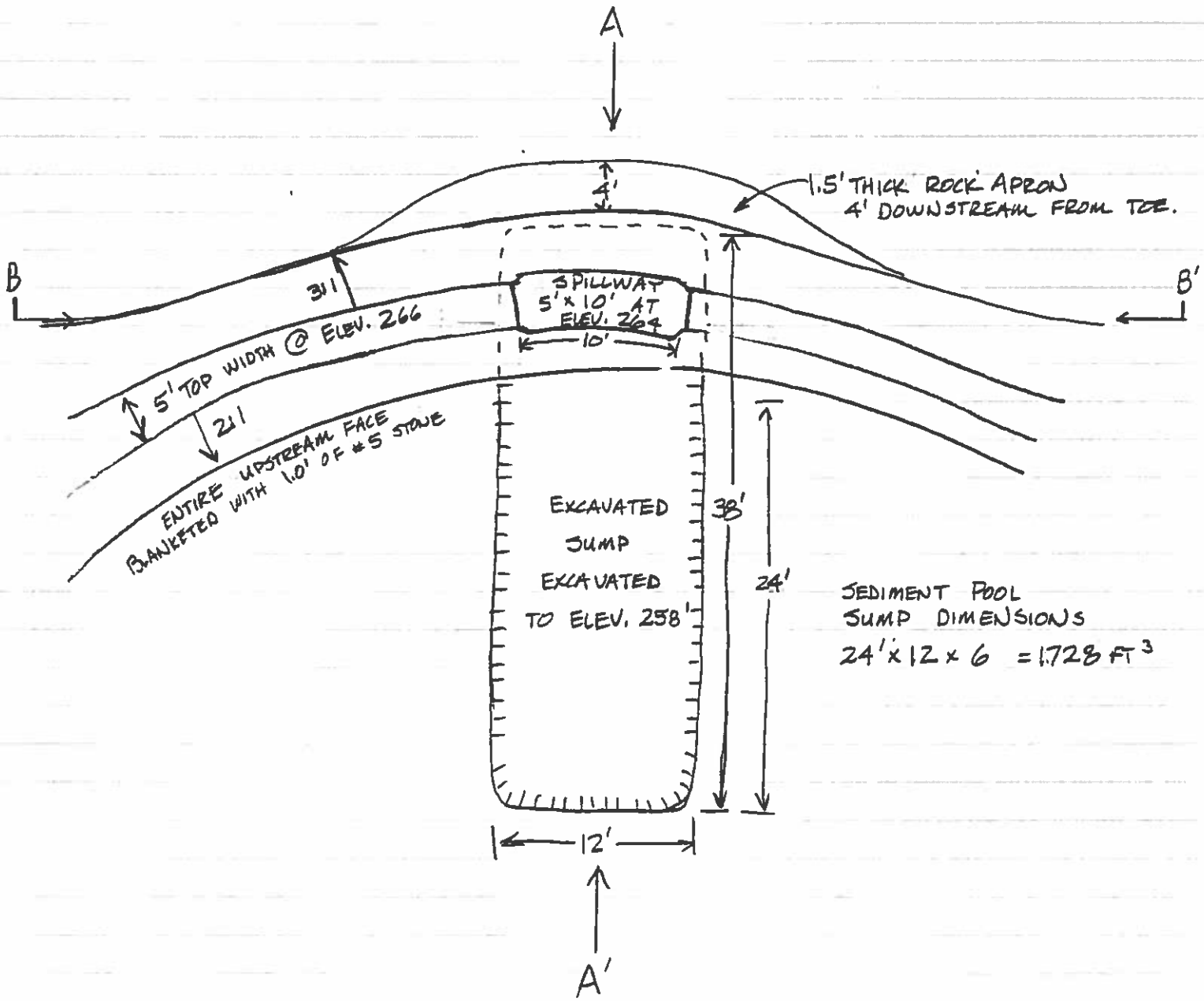
1- DETERMINE BASIN VOLUME BASED ON DRAINAGE AREA.

1800 FT^3/AC DISTURBED x 0.9 AC = 1620 FT^3 REQUIRED VOLUME.

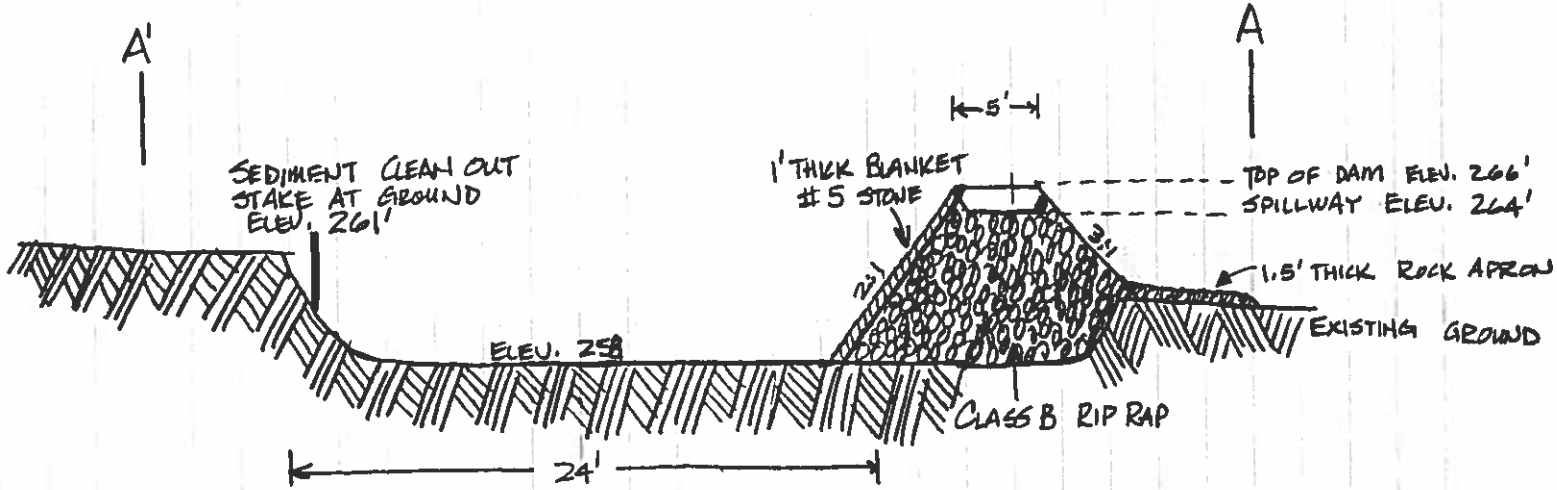
2- DETERMINE BASIN DIMENSIONS
DUE TO CONFINING AREA AVAILABLE FOR BASIN AND ROCK DAM CONSTRUCTION, BASIN WILL BE DEEPER THAN IS NORMALLY ACCEPTABLE.

EXCAVATED "SUMP" DIMENSIONS : WIDTH - 12 FT.
LENGTH- 38 FT. (* SEE DWGS.)
DEPTH - 6 FT. (BELOW SPILLWAY CREST).

3- CONSTRUCT ROCK DAM TO ELEVATION 266' AT ABUTMENTS
TOP WIDTH - 5'
SIDE SLOPES - UPSTREAM 2:1
DOWNSTREAM 3:1
CENTERED SPILLWAY AT ELEVATION 264' AND OF DIMENSIONS : WEIR WIDTH - 5' (SAME AS TOP OF DAM WIDTH)
WEIR LENGTH - 10'
EXTEND ROCK APRON 1.5' THICK 4' DOWNSTREAM FROM TOE OF DAM.
PLACE 1 FOOT THICK BLANKET OF #5 STONE ALONG ENTIRE UPSTREAM SURFACE OF DAM.
SET CLEAN-OUT STAKE AT GROUND ELEV. 261'.
SEE CONSTRUCTION DESIGN DWGS. ON FOLLOWING PAGES.

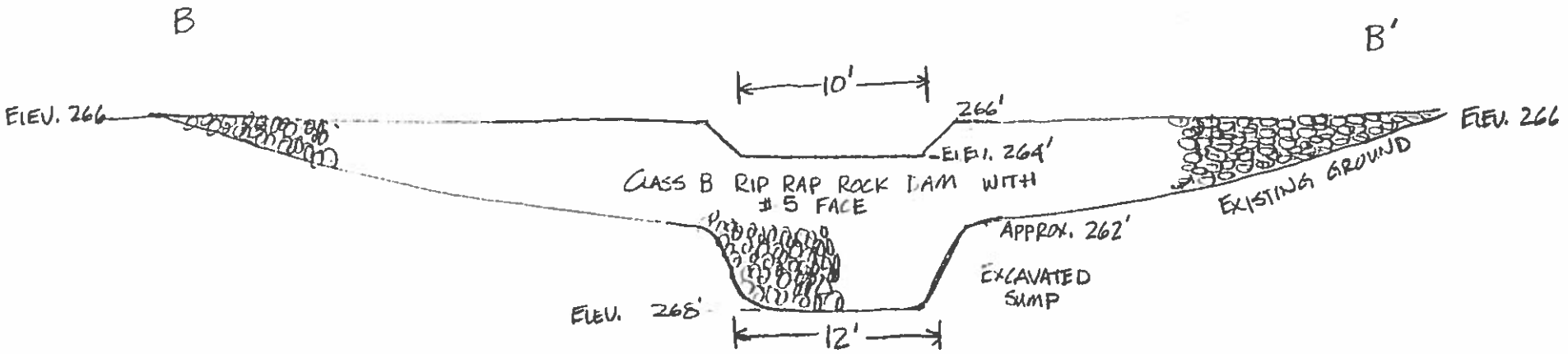

A
4'
1.5' THICK ROCK APRON
4' DOWNSTREAM FROM TOE.
B
B'
3:1
SPILLWAY
5' x 10' AT
ELEV. 266
10'
5' TOP WIDTH @ ELEV. 266
2:1
ENTIRE UPSTREAM FACE
BLANKETED WITH 1.0' OF #5 STONE
EXCAVATED
SUMP
EXCAVATED
TO ELEV. 258'
38'
24'
SEDIMENT POOL
SUMP DIMENSIONS
24' x 12 x 6 = 1,728 FT³
12'
A'

PLAN VIEW

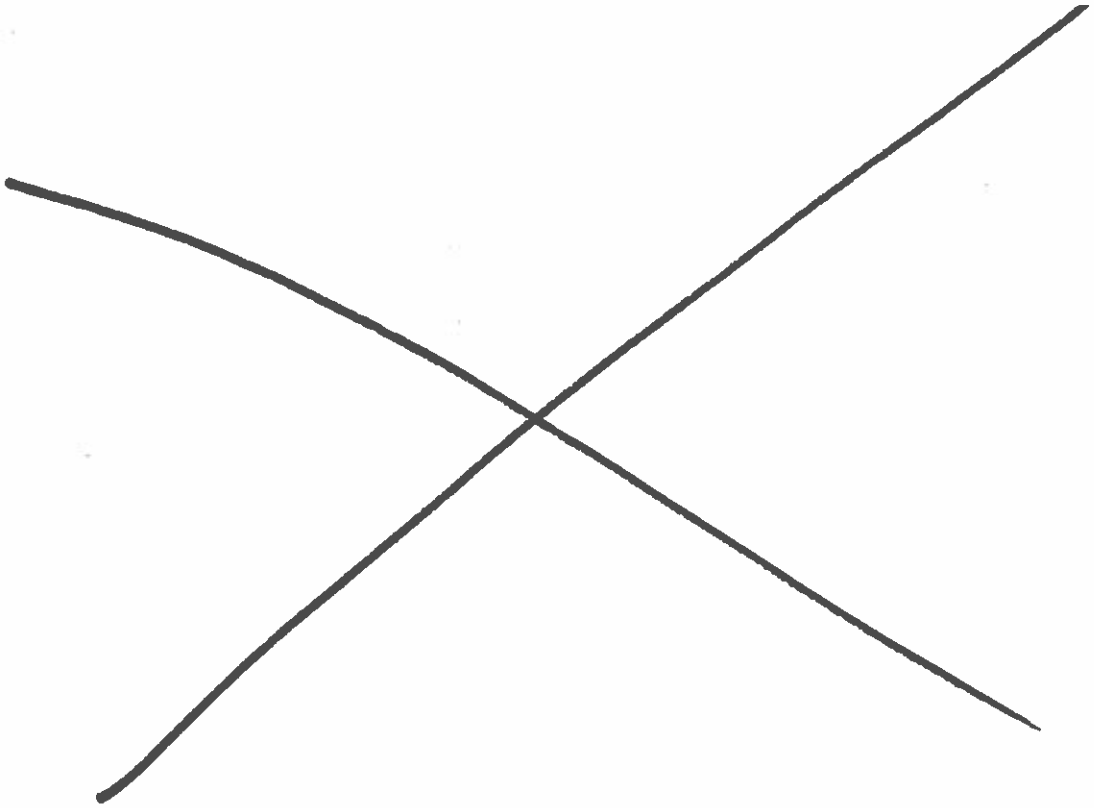


LONGITUDINAL SECTION
THROUGH TST-4

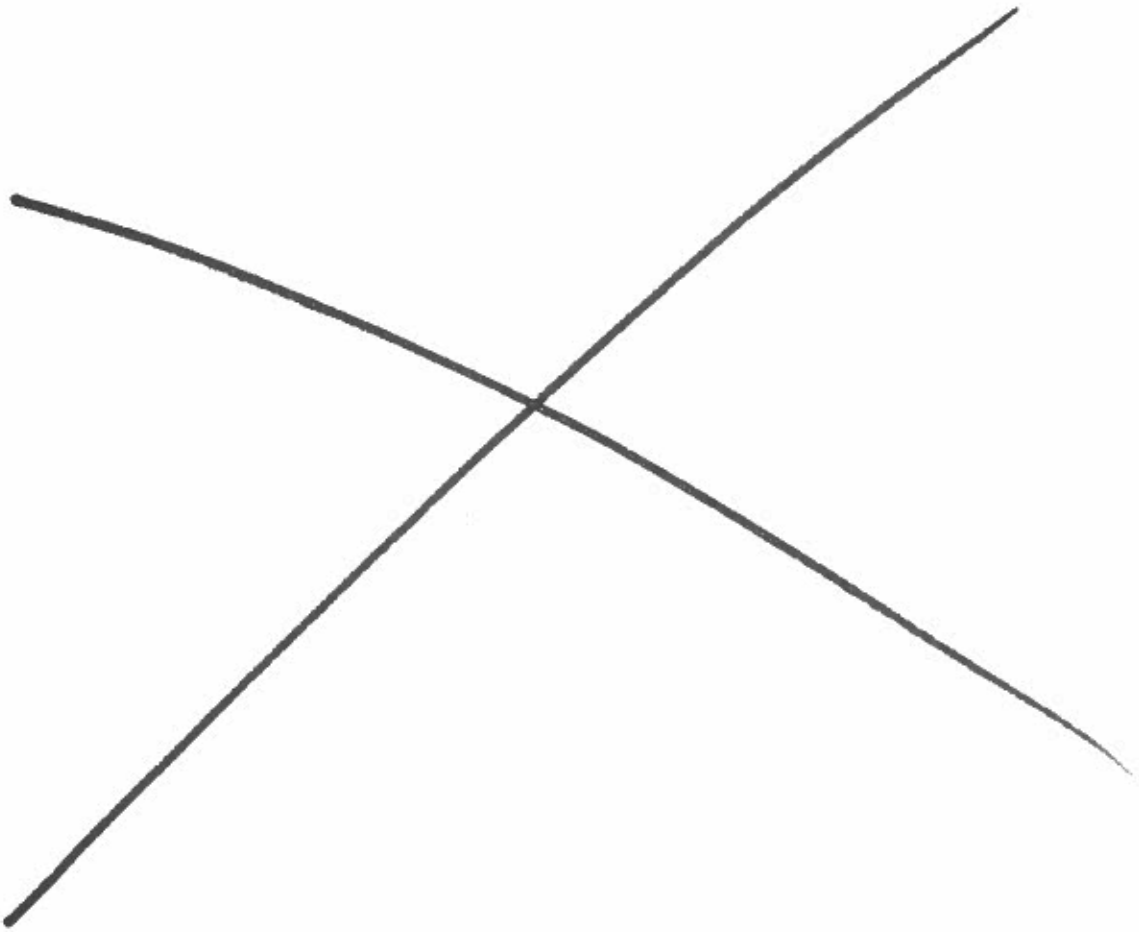
TST-4
3/4



SPILLWAY SECTION DETAILS



RE-DESIGN OF TST-1, TST-2,
AND BASIN C



RE-DESIGN OF TST-1 & TST-2

DESIGN STRUCTURES TO KEEP SEDIMENT ZONE DEPTH TO 3 FEET USING 2:1 LENGTH TO WIDTH RATIO.

1- DETERMINE REQUIRED BASIN VOLUME BASED ON 1800 FT^3/AC. DISTURBED.

1800 FT^3/AC x 2.8 AC = 5040 FT^3 FOR BOTH TST-1 & TST-2,

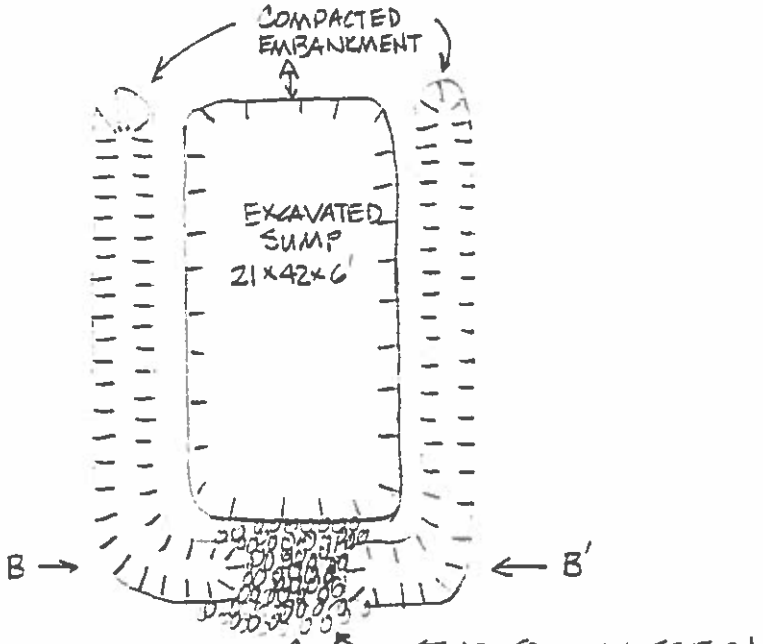
2- DETERMINE BASIN DIMENSIONS

- ASSUME TOTAL POOL DEPTH OF 6 FEET WITH SEDIMENT CLEAN-OUT WHEN ACCUMULATION REACHES 3 FEET OF DEPTH.

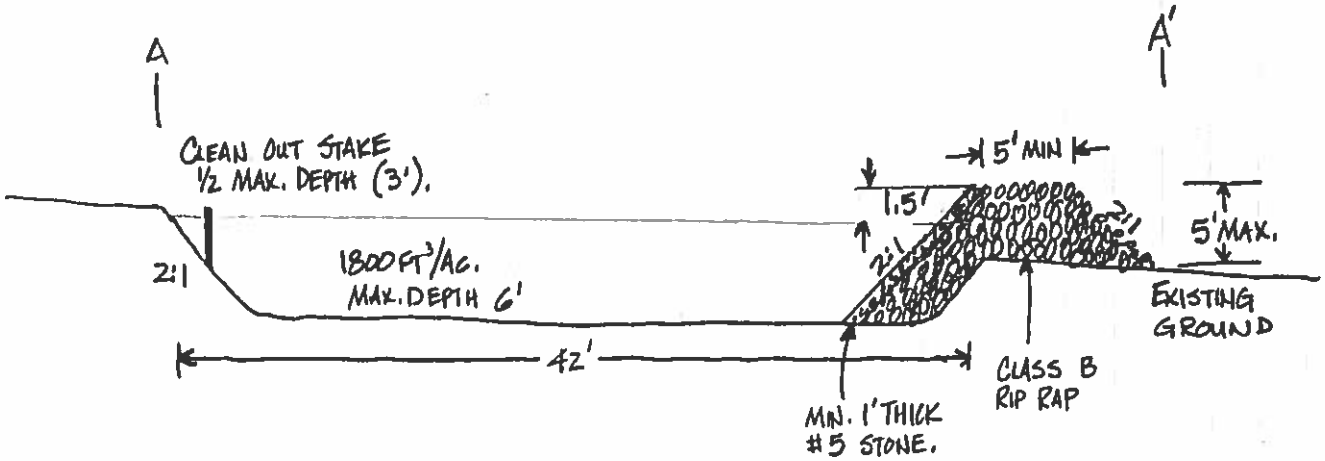
LENGTH = 42'
WIDTH = 21'
DEPTH = 6'
42x21x6 = 5292 FT^3.

DESIGN / CONSTRUCTION DETAILS

EXISTING SITE CONDITIONS DICTATE COMBINATION EXCAVATED SUMP AND COMPACTED EARTHFILL EMBANKMENT WITH STONE SPILLWAY SECTION.

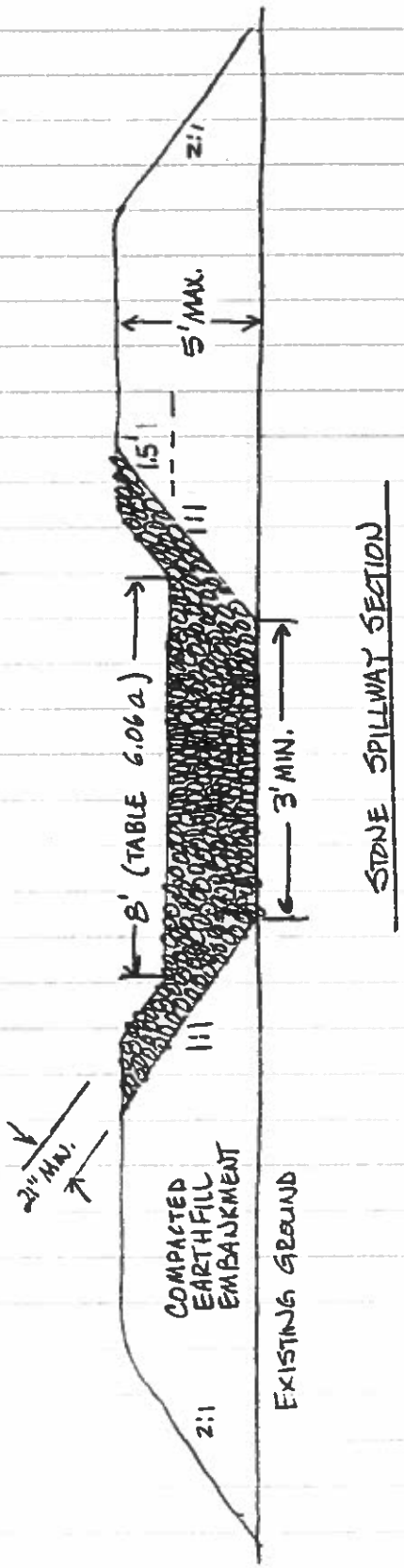


PLAN VIEW



LONGITUDINAL SECTION

TST-1 & 2
2/3



STONE SPILLWAY SECTION

RE-DESIGN OF BASIN C

RE-DESIGN BASIN C TO INCREASE SETTLING EFFICIENCY. KEEP SEDIMENT ZONE DEPTH TO 3 FEET.

1- DETERMINE REQUIRED BASIN VOLUME.

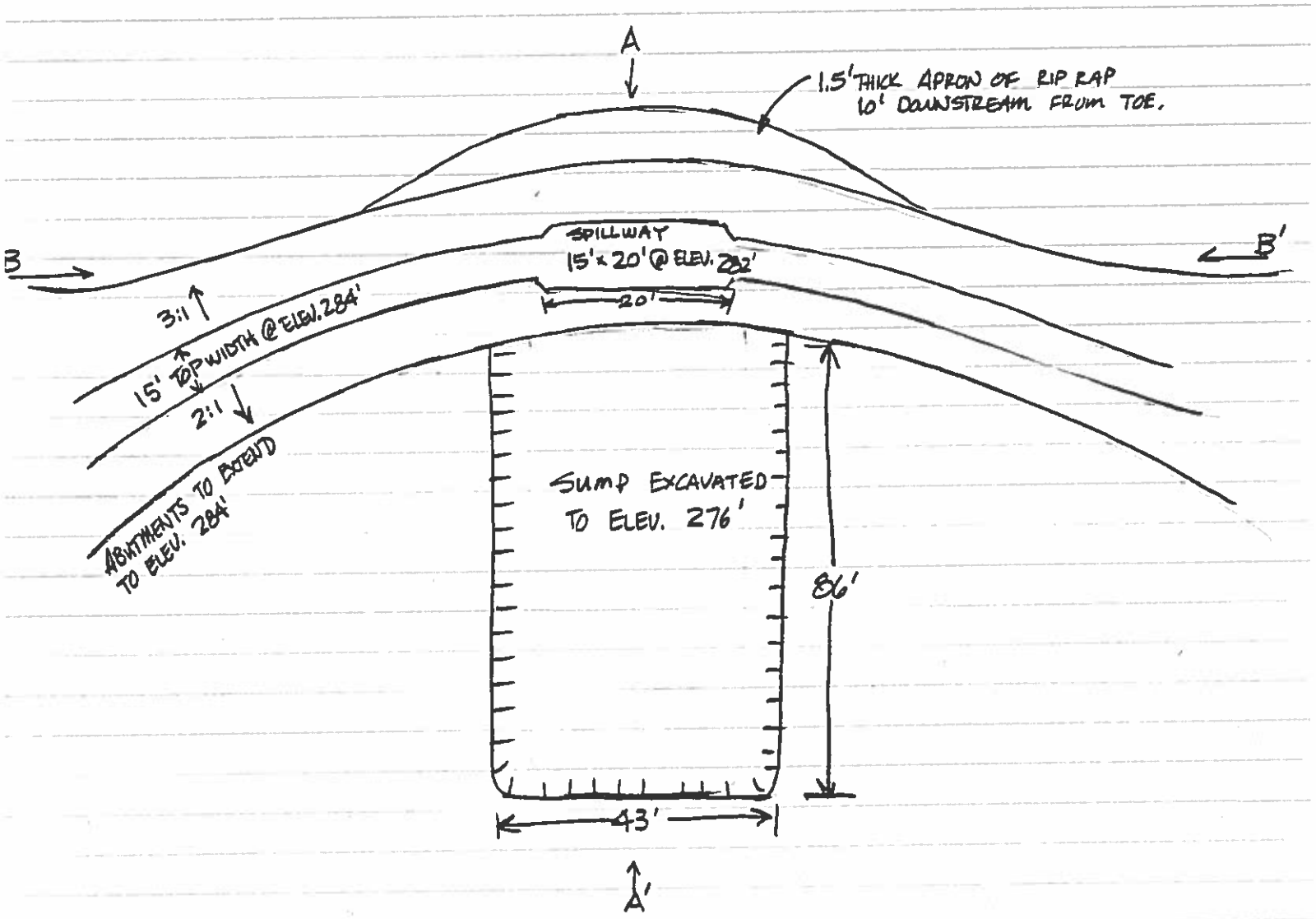
$1800\ FT^3/AC \times 12.4\ AC$ DRAINAGE AREA $= 22{,}320\ FT^3$.

2- DETERMINE BASIN DIMENSIONS CONSIDERING 2:1 LENGTH TO WIDTH RATIO AND MAXIMUM DEPTH OF 6' (SED. ZONE = 3').

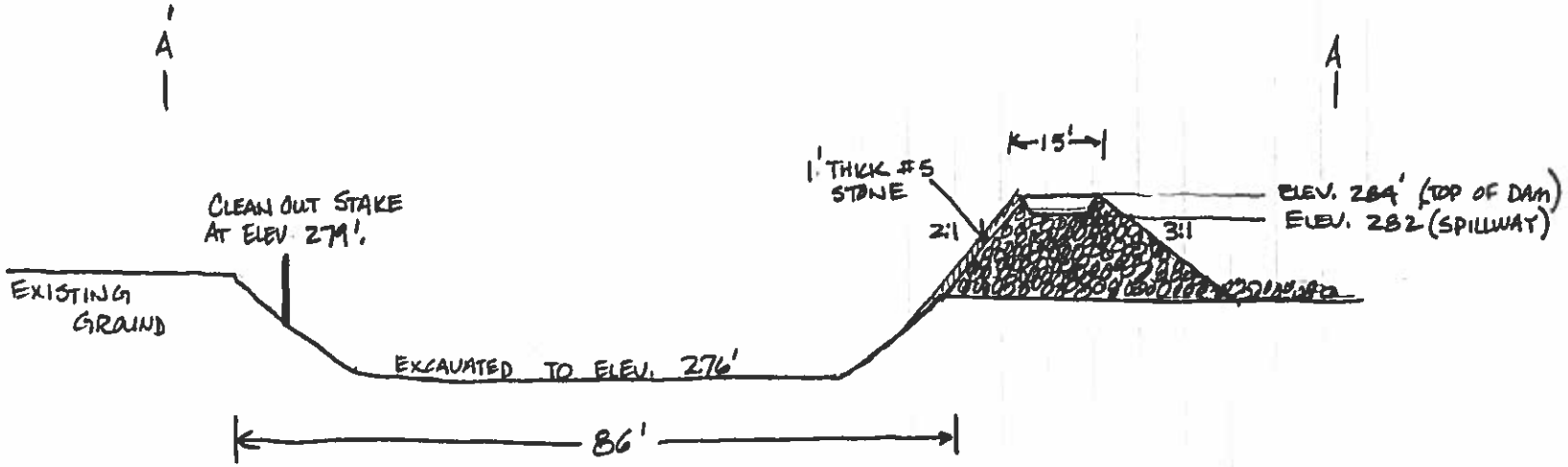
LENGTH - 86'
WIDTH - 43'
DEPTH - 6'

- CONSTRUCT ROCK DAM ACROSS EXISTING DRAINAGE TO ELEV. 284' AS LOCATED ON PLAN. TOP WIDTH (UPSTREAM TO DOWNSTREAM) TO BE MINIMUM OF 15'.
- SPILLWAY CENTERED ALONG DAM AT ELEVATION 282.0' WITH WEIR LENGTH OF 20' (15x20').
- UPSTREAM SLOPE 2:1, DOWNSTREAM SLOPE 3:1.
- 1' THICK BLANKET OF #5 STONE ON UPSTREAM FACE.
- EXCAVATE SUMP 43' x 86' x 6' (TO ELEV. 276.0').
  - 2:1 SIDE SLOPES IN EXCAVATION.
  - PROPERLY DISPOSE OF EXCAVATED SPOIL.
- 1.5' THICK BLANKET OF RIP RAP TO EXTEND 10' DOWNSTREAM FROM DOWNSTREAM TOE.
- SET CLEAN-OUT STAKE AT GROUND ELEVATION 279.0'.

SEE CONSTRUCTION / DESIGN DWGS. ON FOLLOWING PAGES.

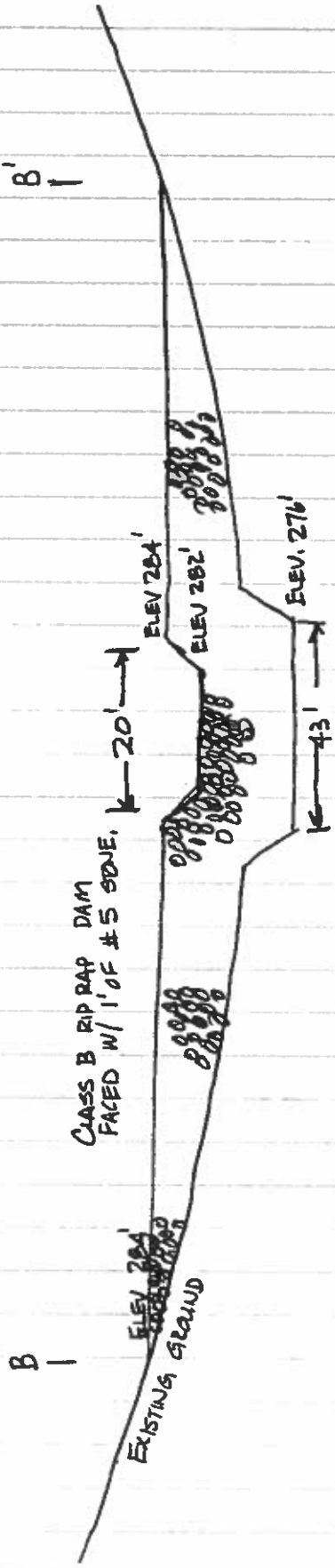

A
1.5' THICK APRON OF RIP RAP
10' DOWNSTREAM FROM TOE.
B
B'
SPILLWAY
15' x 20' @ ELEV. 282'
20'
3:1
15' TOP WIDTH @ ELEV. 284'
2:1
ABUTMENTS TO EXTEND
TO ELEV. 284'
SUMP EXCAVATED
TO ELEV. 276'
86'
43'
A'

PLAN VIEW

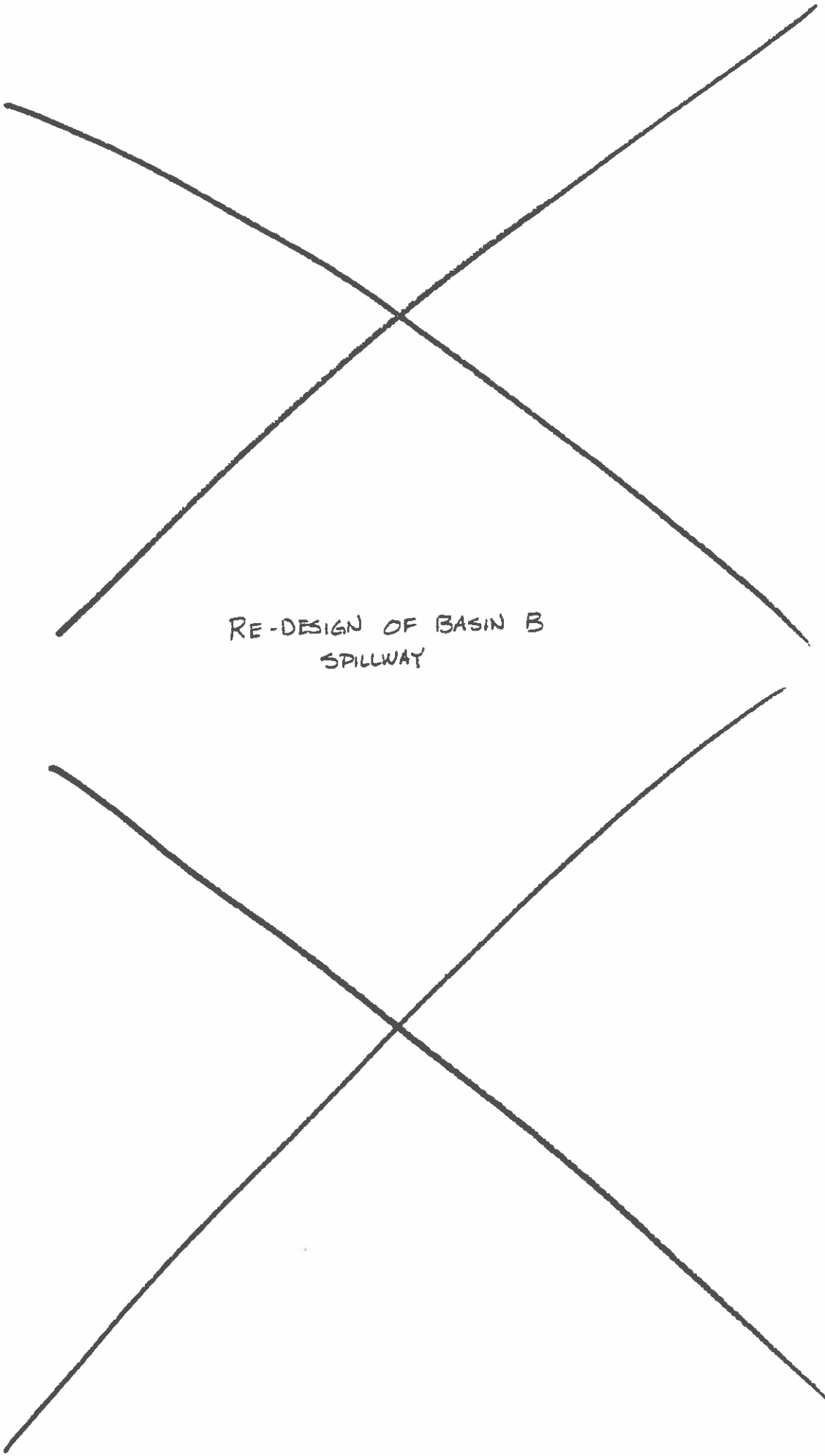


LONGITUDINAL SECTION THROUGH
BASIN C

BASIN C
3/4



SPILLWAY SECTION


RE-DESIGN OF BASIN B
SPILLWAY

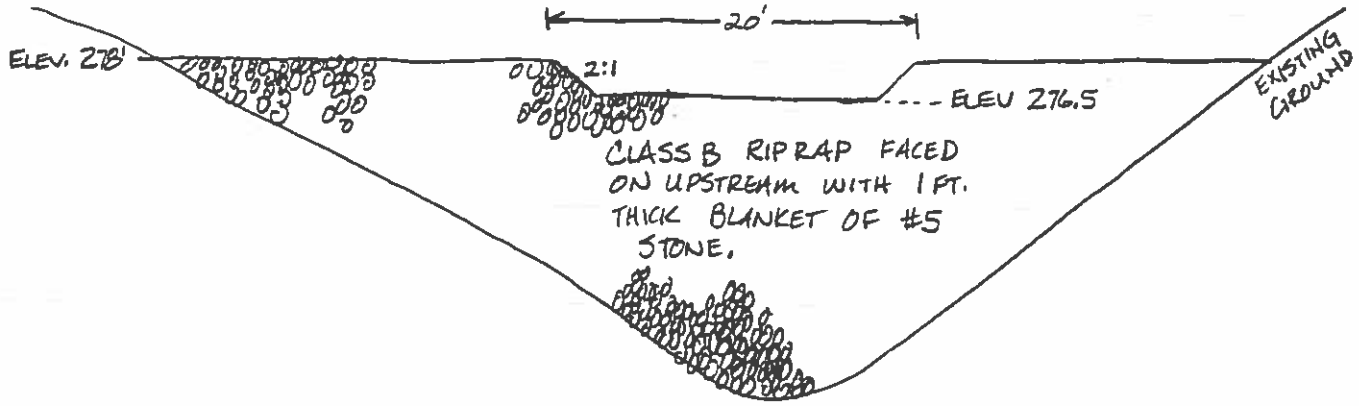
RE-DESIGN OF BASIN B PROVIDING SPILLWAY DIMENSIONS

1- DETERMINE REQUIRED BASIN VOLUME:
1800 FT^3/AC × 6.7 AC = 12,060 FT^3.

2- DETERMINE BASIN DIMENSIONS.
BY EXAMINATION OF EXISTING CONTOURS ON SITE PLAN:
ELEVATION 278' PROVIDES 17,000 FT^3 OF STORAGE VOLUME
AT A TOTAL BASIN DEPTH OF 8 FT.

3- CONSTRUCTION DETAILS FOR ROCK DAM.
- TOP OF DAM ELEVATION 278' (ABUTMENTS TO EXTEND TO 278')
- SPILLWAY ELEVATION 276.5'
- TOP WIDTH OF DAM : 12 FT.
- SPILLWAY DIMENSIONS : WEIR WIDTH 12 FT.
  WEIR LENGTH 20 FT.
- 3:1 DOWNSTREAM AND 2:1 UPSTREAM SIDESLOPES.
- 1 FT. THICK BLANKET OF # 5 STONE ON UPSTREAM FACE OF DAM,
- ACCUMULATED SEDIMENT TO BE REMOVED WHEN AT ELEV. 274'.

SPILLWAY DETAILS



RE-DESIGN OF CULVERTS AND ENERGY DISSIPATERS FOR CULVERTS

RE-DESIGN OF CULVERTS

CULVERT #1

COMPUTE Q_{10} FOR 2.8 AC DRAINAGE AREA

$Q_{10} = CiA$

ASSUME ENTIRE 2.8 AC. AREA CLEARED / BARE GROUND.

FROM TABLE 8.03a USE MEDIAN RUNOFF COEFFICIENT VALUE FOR ROUGH BARE SOIL.

RANGE 0.20 - 0.50. USE 0.35.

DETERMINE i - AVE. INTENSITY FOR TIME OF CONCENTRATION T_c.

- OUTLET ELEVATION. 282' (CULVERT INVERT IN)

ELEV. POINT MOST REMOTE ABOVE OUTLET - 350' (350-282 = 68')

MAXIMUM LENGTH OF TRAVEL - 350'.

T_c = 1.4 MINUTES (FIG. 8.03a)

RAINFALL INTENSITY - RALEIGH CHART = 8"/HR. (5 MIN. DURATION)

$Q_{10} = CiA = (0.35)(8)(2.8) = 7.8$ cfs. use 8 cfs.

FROM FIG.5 pg. 192 CONCRETE PIPE DESIGN MANUAL

SLOPE OF PIPE IN FT/100FT = 1%

FLOW IN CFS = 8

USE : 18" RCP.

FIGURE 5

FLOW FOR CIRCULAR PIPE FLOWING FULL
BASED ON MANNING'S EQUATION n=0.013

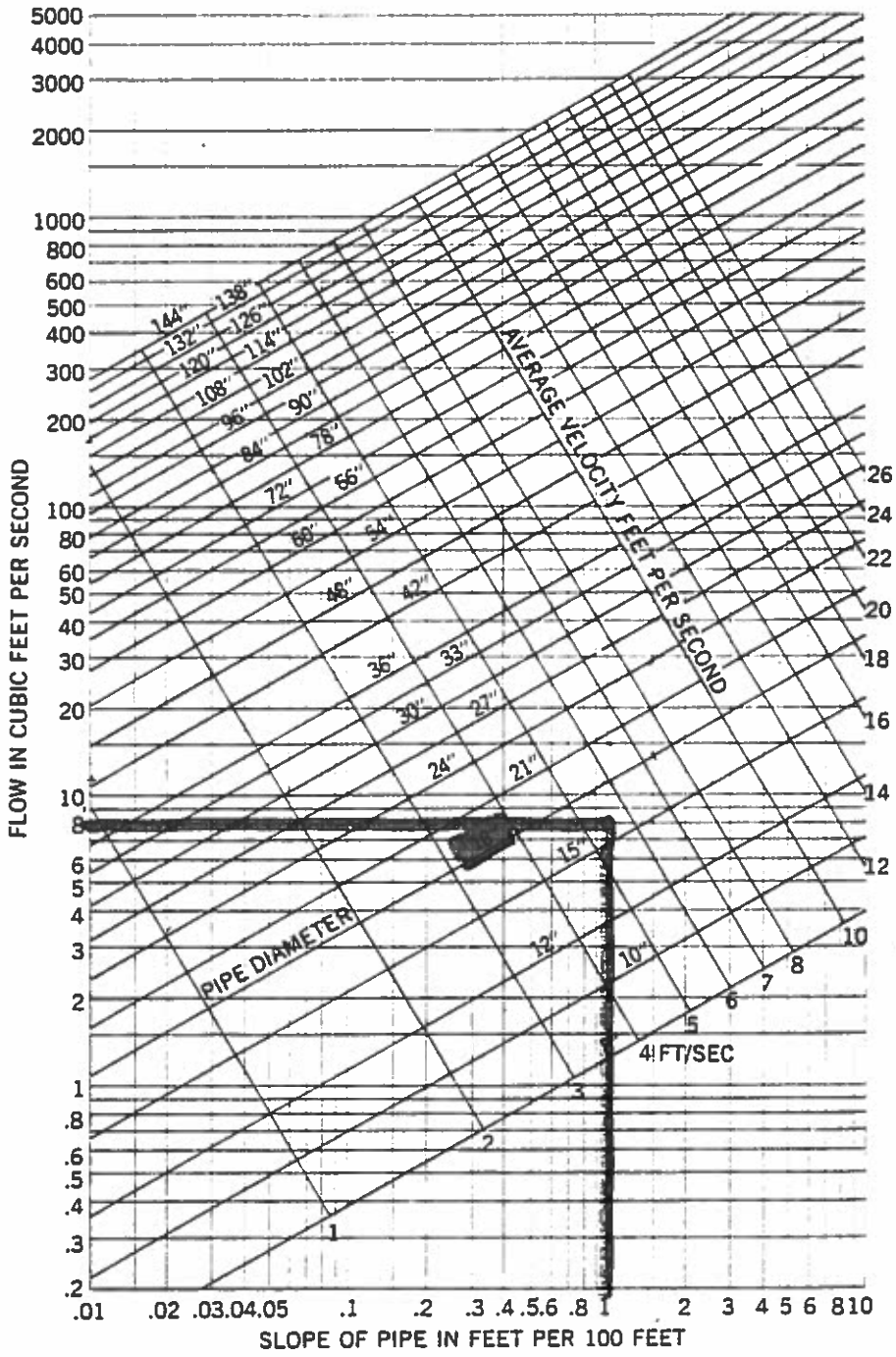
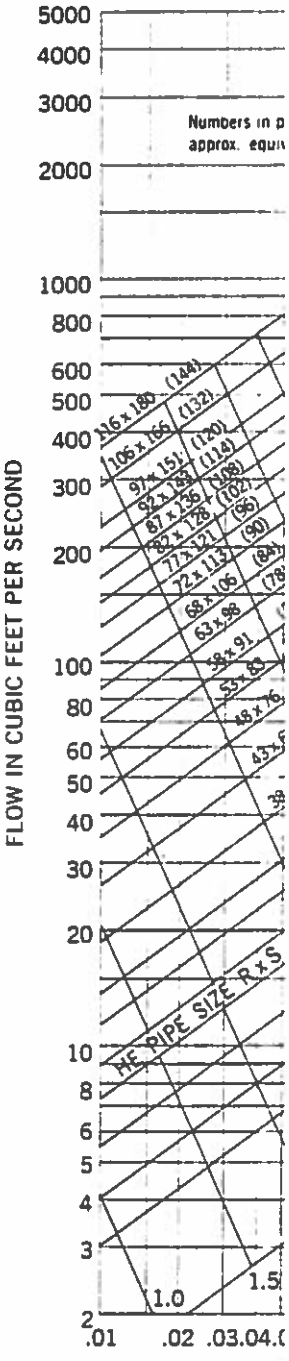


FIGURE 6

FLOW FOR H
BAS



CULVERT # 2

COMPUTE Q_{10} FOR 7.6 Ac DRAINAGE AREA

$Q_{10} = ciA$

$A = 7.6$ Ac

ASSUME BARE GROUND CONDITIONS

FROM TABLE 8.03a ASSIGN MEDIAN RUNOFF COEFFICIENT VALUE.

RANGE 0.20 - 0.50, USE: 0.35.

DETERMINE i - AVE. INTENSITY FOR T_c.

OUTLET ELEVATION = 264'

ELEV. POINT MOST REMOTE ABOVE OUTLET = 380' (380 - 264' = 116'

MAXIMUM LENGTH OF TRAVEL - 1100'

T_c = 4 MIN (FIG. 8.03a)

RAINFALL INTENSITY - RALEIGH CHART - 8.0"/Hr. (5 MIN. DURATION)

$Q_{10} = ciA = (0.35)(8)(7.6) = 21.2$ cfs.

FROM CONCRETE PIPE DESIGN CHART,

SLOPE OF CULVERT = 1.5%

FLOW IN CFS. = 21 cfs.

USE: 24" RCP

FIGURE 5

FLOW FOR CIRCULAR PIPE FLOWING FULL
BASED ON MANNING'S EQUATION n=0.013

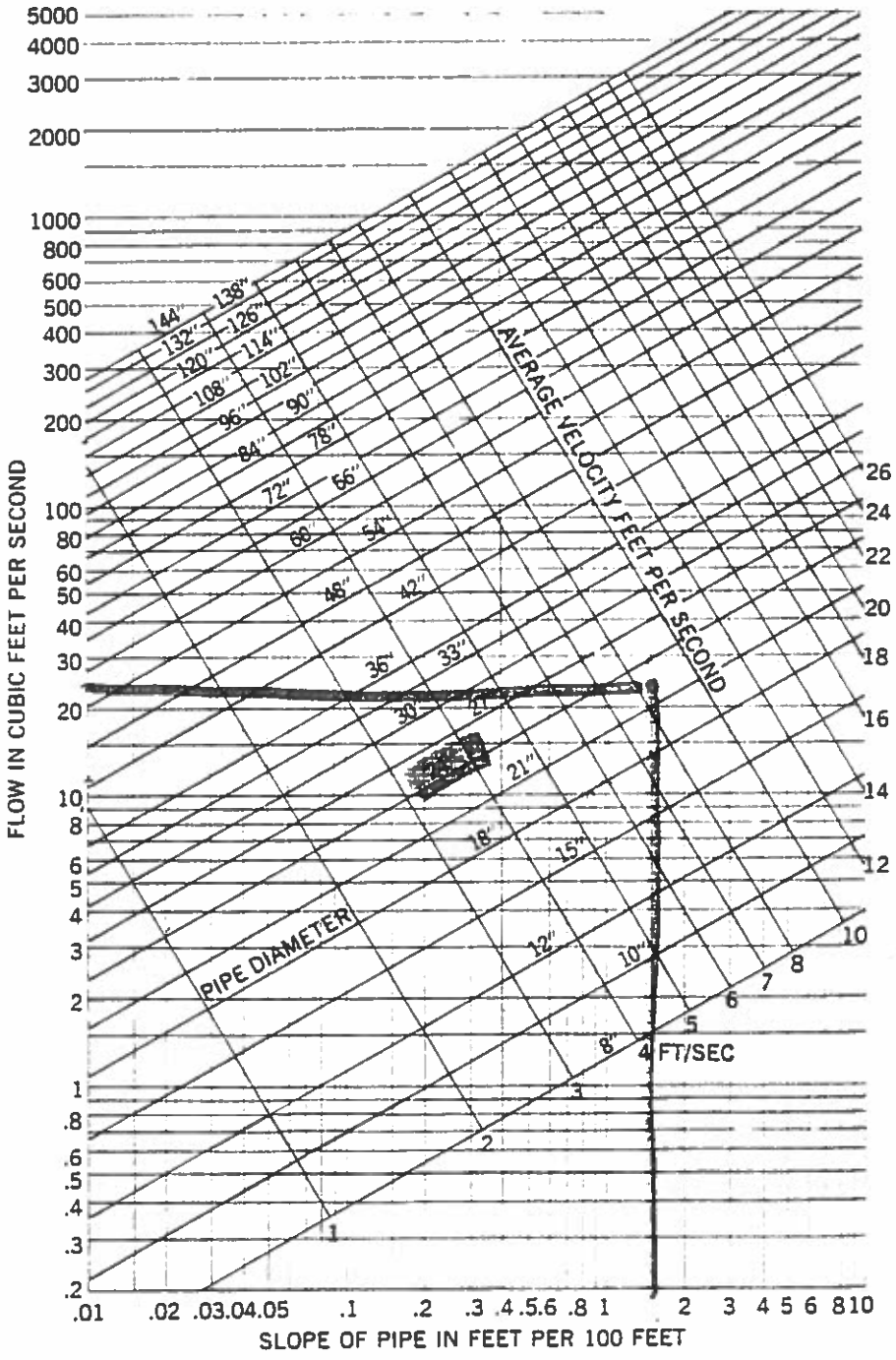
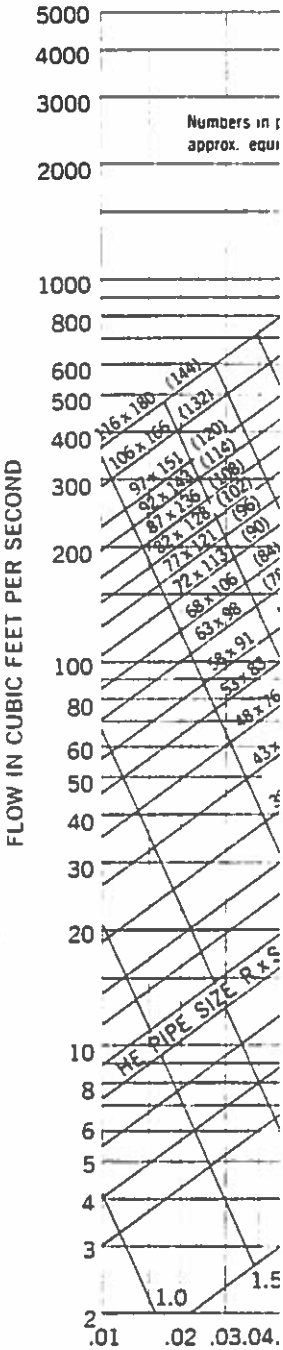


FIGURE 6

FLOW FOR
BAS



Culvert # 3

Compute Q_{10} for 6.7 Ac Drainage Area

$Q_{10} = ciA$

$A = 6.7$ Ac.

Assume Bare Ground Conditions.

From Table 8.03a Assign Median Runoff Coefficient Value.

Range 0.20 - 0.50, use : 0.35.

Determine i for T_c

Outlet Elev. = 298'.

Elev. Point Most Remote Above Outlet 380' (380'-298' = 82')

Maximum Length of Travel = 500'

T_c = 1.75 Min. (Fig. 8.03a)

Rainfall Intensity - Raleigh Chart = 8.0"/Hr. (5 Min Duration)

$Q_{10} = ciA = (0.35)(8)(6.7) = 18.8$ cfs use 20 cfs.

From Concrete Pipe Design Chart.

Slope of Pipe in Ft/100 Ft. = 5%

Flow in CFS = 20

Use : 18" RCP.

FIGURE 5

FLOW FOR CIRCULAR PIPE FLOWING FULL
BASED ON MANNING'S EQUATION n=0.013

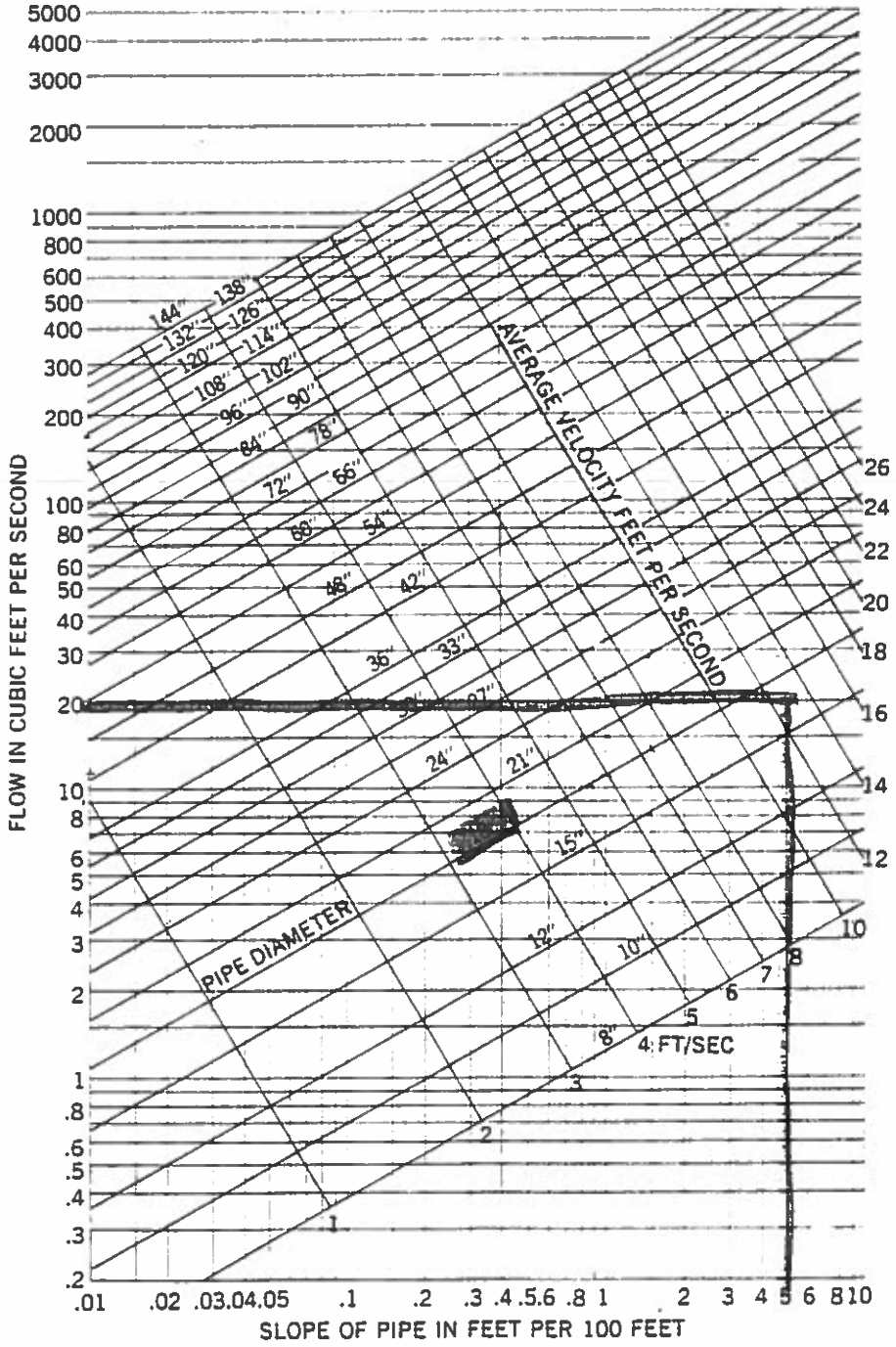
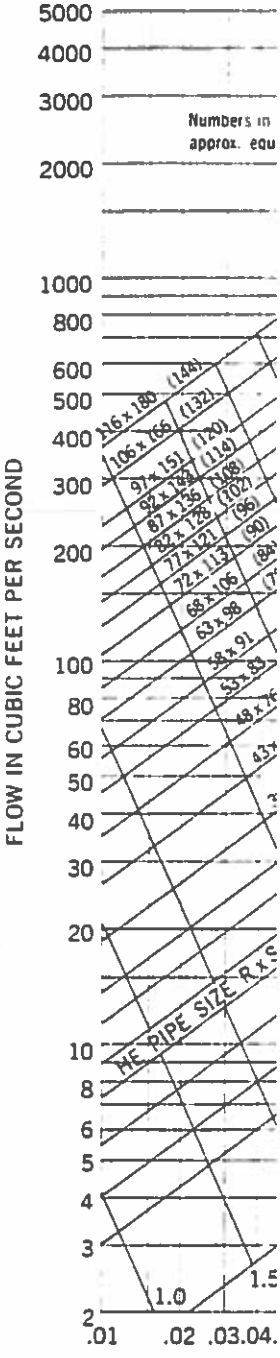


FIGURE 6

FLOW FOR
BA



CULVERT # 4

COMPUTE Q_{10} FOR 12.4 AC. DRAINAGE AREA

$Q_{10} = CiA$

$A = 12.4$ Ac.

ASSUME AT A MAXIMUM 6.6 AC WOODED 5.8 Ac BARE GROUND.

FROM TABLE 8.03a $C =$ 0.15 FOR FORESTED AREA (PIT EXP. AREA 3)

0.35 FOR BARE GROUND (PIT EXP. AREA 2)

COMPUTE WEIGHTED AVE.

$$\frac{(0.15 \times 6.6) + (0.35 \times 5.8)}{12.4} = 0.24$$

DETERMINE i FOR Tc

CUTLET ELEV = 280'

ELEV. PT. MOST REMOTE ABOVE OUTLET : 386' (386 - 280 = 106')

MAXIMUM LENGTH OF TRAVEL = 1000'.

Tc = 4 MIN. (FIG. 8.03a)

RAINFALL INTENSITY - RALEIGH CHART = 8"/HR (5 MIN. DURATION)

$Q_{10} = CiA = (0.24)(8)(12.4) = 23.8$ cfs. USE 24 CFS.

FROM CONCRETE PIPE CHART

SLOPE OF PIPE IN FT/100 FT. = 1 = 1%

FLOW IN CFS = 24.

USE : 24" RCP.

FIGURE 5

FLOW FOR CIRCULAR PIPE FLOWING FULL
BASED ON MANNING'S EQUATION n=0.013

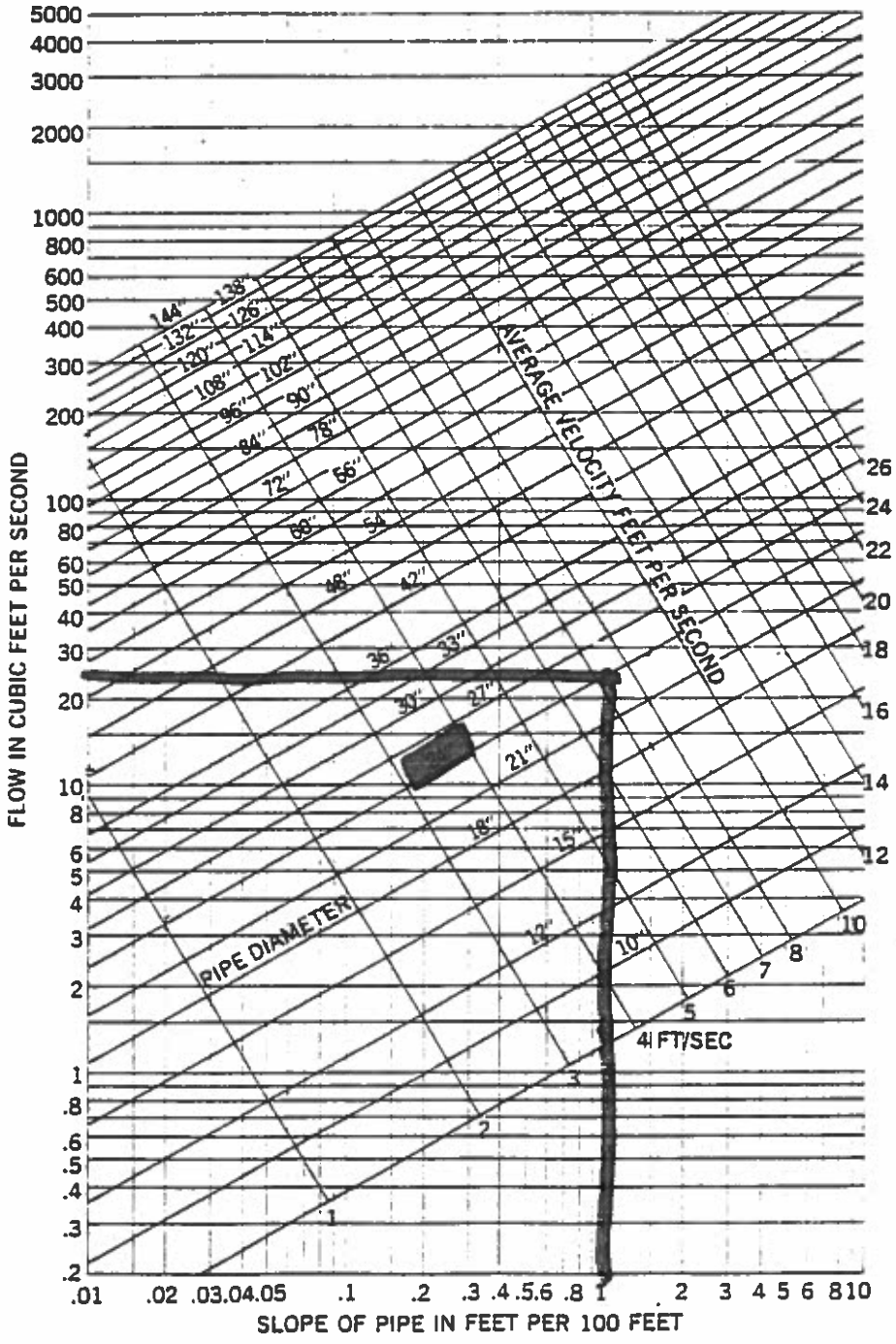
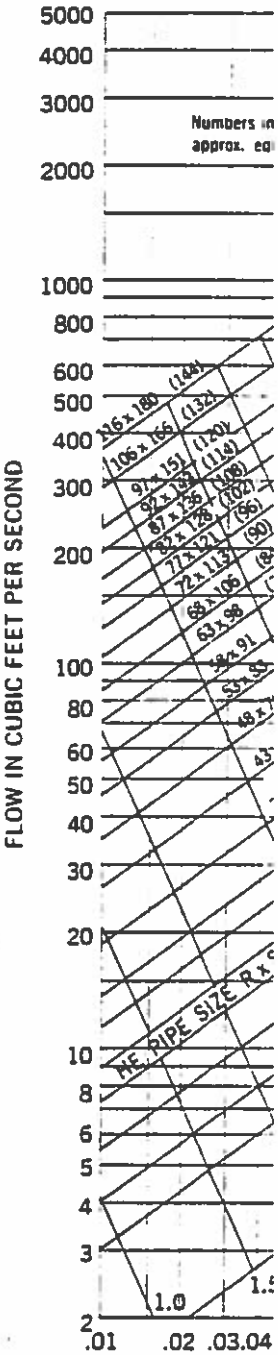


FIGURE 6

FLOW FOR
BA



DESIGN OF ENERGY DISSIPATERS FOR CULVERT OUTLETS

- SINCE CULVERTS WERE SIZED AS "FLOWING FULL", ASSUME MAXIMUM TAILWATER CONDITIONS FOR EACH OUTLET STABILIZATION STRUCTURE.
- OUTLET STABILIZATION STRUCTURES (RIP RAP) APRONS TO EXTEND FROM CULVERT OUTLET TO SEDIMENT BASIN LOCATED BELOW OR MIN DESIGN LENGTH.

CULVERT 1

$Q = 8$ cfs., $D_o = 18"$
d_{50} riprap size = 10" (NCDOT CLASS B)
min. Apron length = 10'
APRON THICKNESS = $1.5 \times 1.5 d_{50}$ = 22.5"

CULVERT 2

$Q = 21$ cfs., $D_o = 24"$.
d_{50} riprap size = 10" (NC DOT CLASS B)
Min APRON LENGTH = 10'
APRON THICKNESS = 22.5"

CULVERT 3

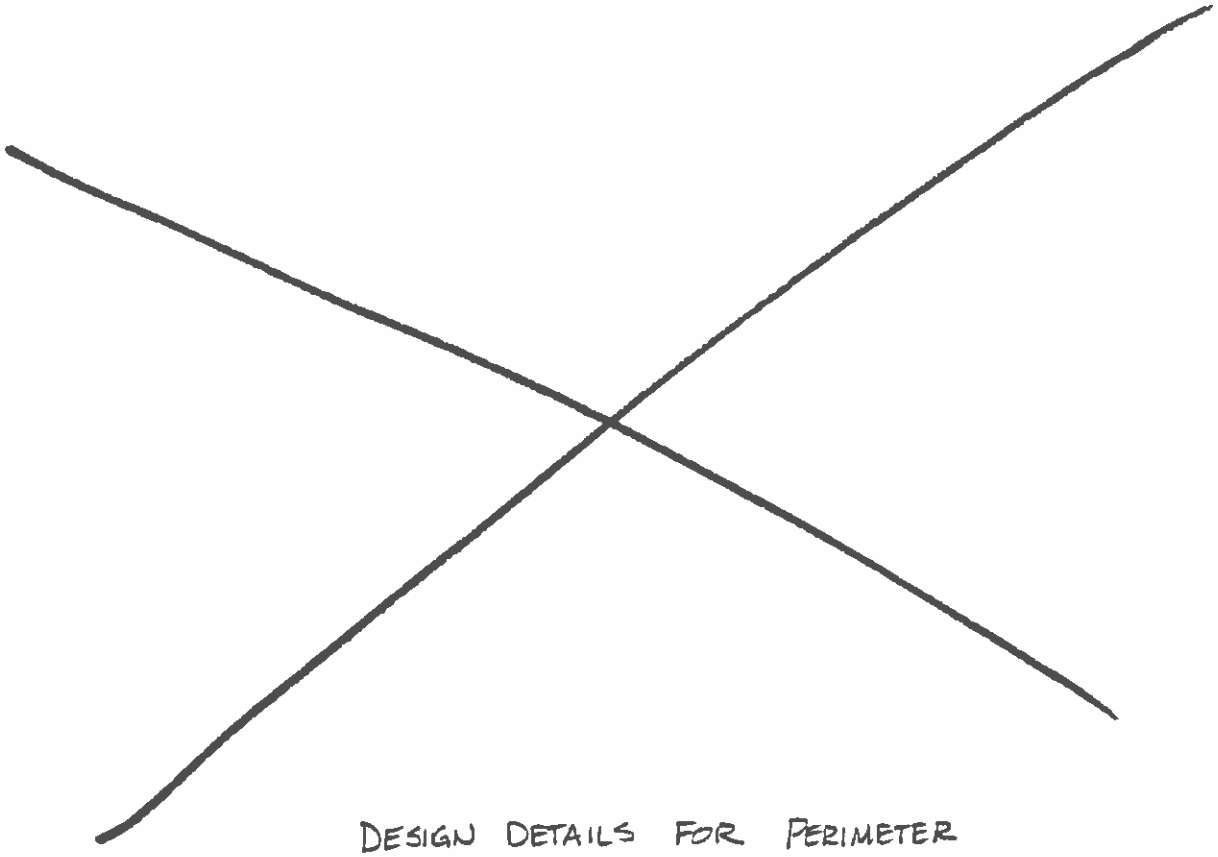
$Q = 20$ cfs, $D_o = 18"$.
d_{50} riprap size = 10" (NC DOT CLASS B)
MIN. APRON LENGTH = 35'
APRON THICKNESS = 22.5"

CULVERT 4

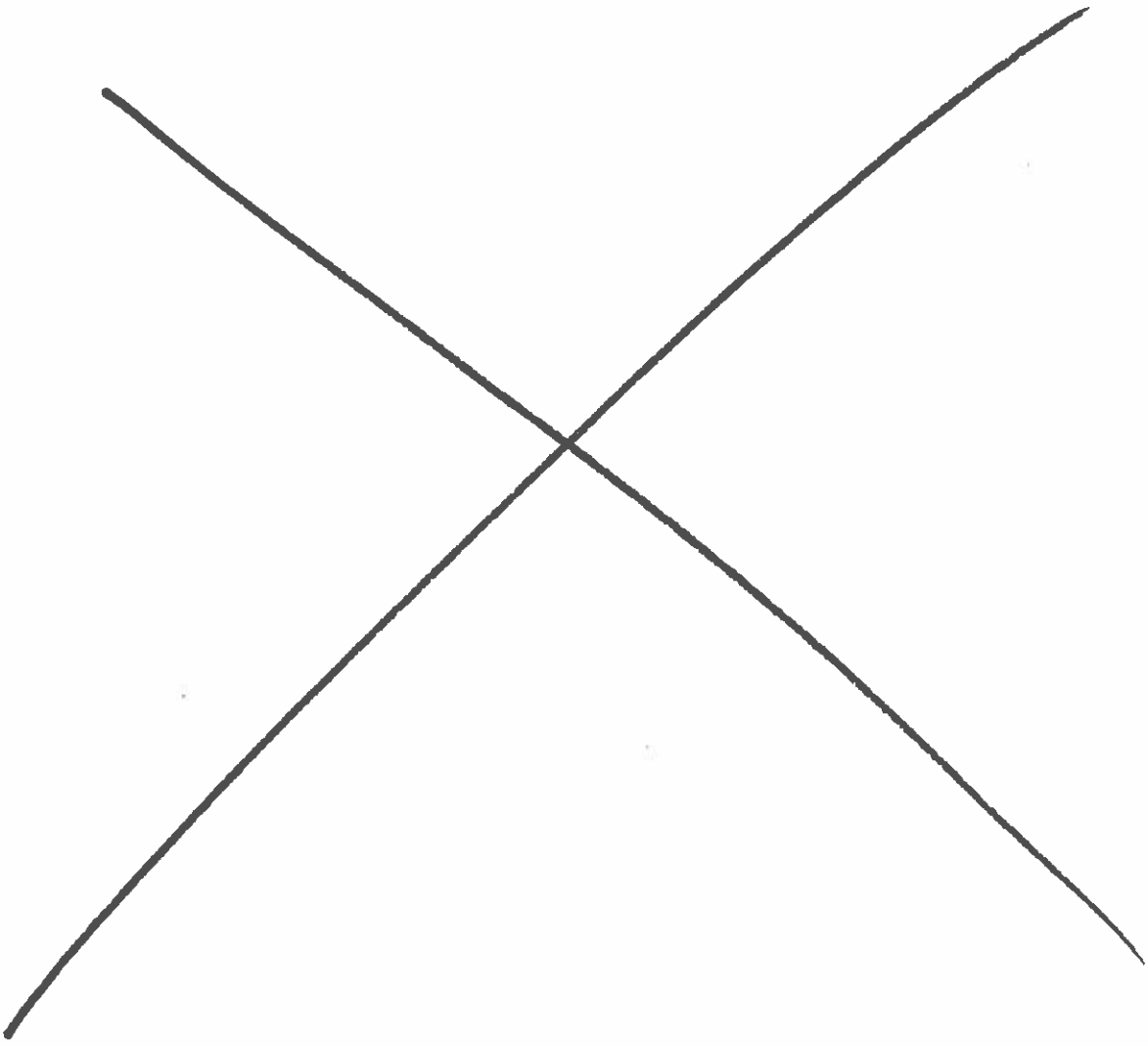
$Q = 24$, $D_o = 24"$.
d_{50} rip rap size = 10" (NC DOT CLASS B)
MIN. APRON LENGTH = 10'
APRON THICKNESS = 22.5"

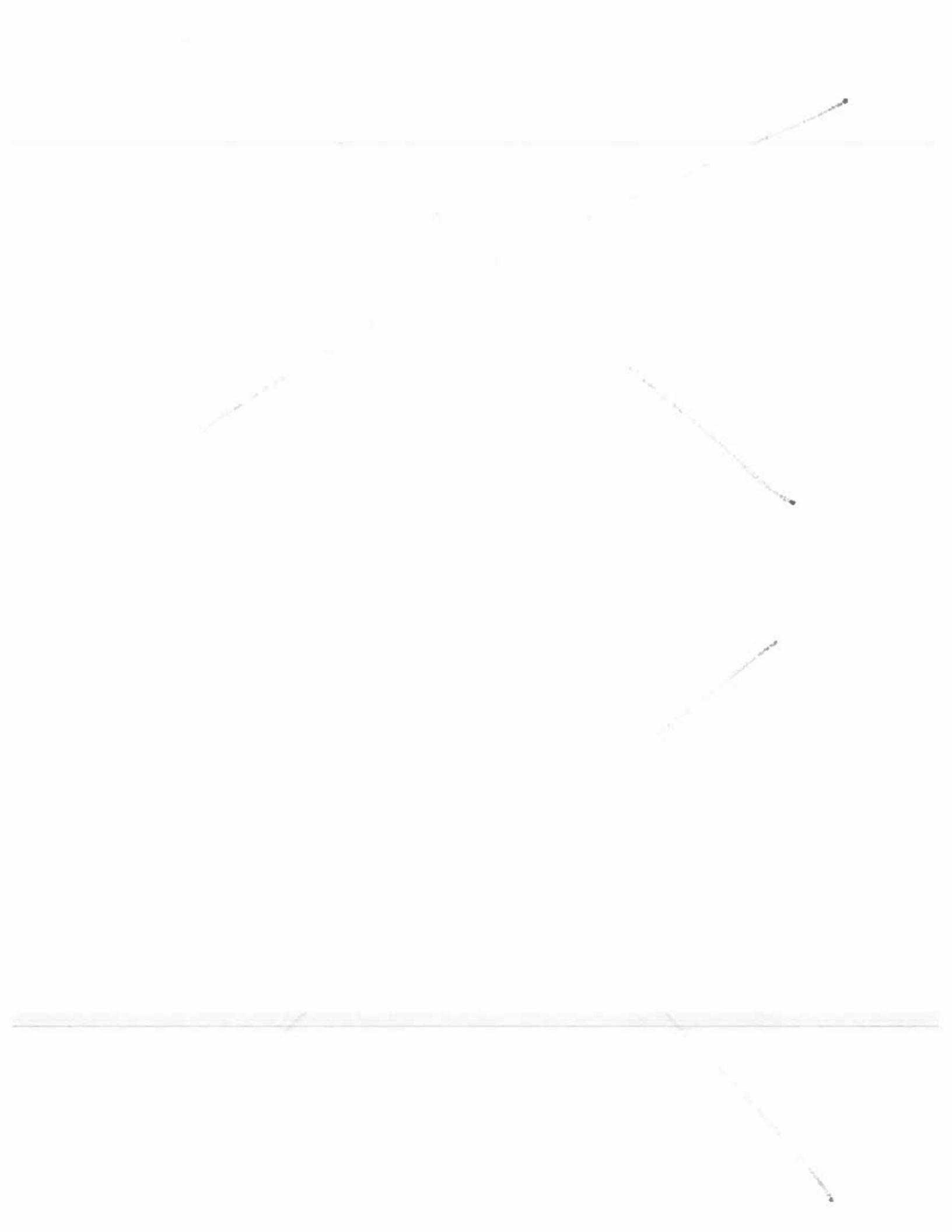
- OUTLET STABILIZATION FOR CULVERTS 1, 2, 3, & 4 TO CONSIST OF 2 FT. THICKNESS OF CLASS B RIP RAP PLACED AS CHANNEL LINING AND EXTENDING FROM CULVERT OUTLET DOWNSTREAM TO THE RESPECTIVE SEDIMENT BASIN, OR AT LEAST FOR THE MINIMUM DESIGN LENGTH.
- EXISTING CHANNEL SIDE SLOPES TO BE COVERED TO ELEVATION 6" ABOVE CULVERT OUTLET (MAX. TAILWATER DEPTH).

CULVERT 1 - LINING TO EXTEND 24" (MIN.) UP SIDE SLOPES.
CULVERT 2 - LINING TO EXTEND 30" (MIN.) UP SIDE SLOPES.
CULVERT 3 - LINING TO EXTEND 24" (MIN.) UP SIDE SLOPES.
CULVERT 4 - LINING TO EXTEND 30" (MIN.) UP SIDE SLOPES.



DESIGN DETAILS FOR PERIMETER
ROAD DITCHES





- TEMPORARY DIVERSION DITCHES AS INDICATED ON PLAN WILL BECOME PERMANENT SIDE DITCHES FOR PERIMETER ROAD AS EXPANSION PROJECT REACHES MATURITY.

- DESIGN STABILE DITCHES BASED ON GRASS-LINED OR RIP RAP-LINED TRIANGULAR "V" CONFIGURATIONS.

(SEE REVISED SITE PLAN FOR DITCH ENUMERATION.)

TEMPORARY DIVERSION TD-1A

STEP 1 COMPUTE Q_{10}

$Q_{10} = CiA$; $A = 0.9$ Ac. , $C = 0.35$ (MEDIAN FOR ROUGH BARE PACKED SOIL - TABLE 3.03a

DETERMINE i FOR T_C.

OUTLET ELEV. - 270'

ELEV. PT. MOST REMOTE ABOVE OUTLET - 325' (325' - 270' = 55')

MAX. LENGTH OF TRAVEL - 530'

T_C = 2.5 MIN. (FIG. 8.03a)

RAINFALL INTENSITY = 8"/HR (RALEIGH CHART - 5 MIN. DURATION)

$Q = CiA = (0.35)(8.0)(0.9) = 2.5$ cfs.

STEP 2 DETERMINE SLOPE, CHANNEL GEOMETRY, & LINING

SLOPE - FROM EXISTING TOPO - 6%

GEOMETRY - TRIANGULAR "V".

LINING - FESCUE (V_p = 4.0 FT/SEC - TABLE 8.05a)

STEP 3 ESTIMATE CHANNEL SIZE

$Q_{10} / V_p = 2.5 \text{ cfs} / 4 \text{ ft/sec} = 0.62 \text{ ft}^2$.

TRY CHANNEL 1' DEEP, 4' WIDE, 2:1 SIDE SLOPES.

HYDRAULIC RADIUS $R = \frac{Z_d}{2\sqrt{Z^2+1}} \frac{(2)(1)}{2\sqrt{(2)^2+1}} = \frac{1}{\sqrt{5}} = 0.45$

ASSUME CLASS C RETARDANCE

$V_p R = (4.0 \text{ FT/SEC})(0.45) = 1.8$

MANNING n = 0.06 (FIG. 8.05c)

$$V = \frac{1.49}{n} R^{2/3} S^{1/2}$$

$$= \frac{1.49}{0.06}(0.45)^{2/3}(0.06)^{1/2}$$

$$= (24.8)(0.59)(0.24)$$

$= 3.5$ FT/SEC. $\quad V < V_p \quad \therefore$ OKAY.

CHECK ACTUAL CHANNEL CAPACITY AGAINST Q_{10} REQUIREMENT

$Q = AV$

$A = Zd^2$ WHERE Z = SIDESLOPE ($\frac{2}{1}$) & d = DEPTH (1')

$A = 2(1)^2 = 2\,FT^2$

$Q = (2)(3.5) = 7.0$ cfs

$Q > Q_{10} \quad \therefore$ OKAY

TD-1B

STEP 1 $Q_{10} = ciA$; $A = 1.3$ $c = 0.35$

DETERMINE i FOR T_c.
OUTLET ELEV. = 270'
ELEV. PT. MOST REMOTE ABOVE OUTLET - 350' (350 - 270 = 80')
MAXIMUM LENGTH OF TRAVEL = 750'
T_c = 3 MIN. (FIG. 8.03a)
RAINFALL INTENSITY = 8.0"/HR - 5 MIN DURATION

$Q = ciA = (0.35)(8.0)(1.3) = 3.6$ cfs.

STEP 2 SLOPE, GEOMETRY, & LINING
SLOPE = 5% FROM TOPO
GEOMETRY = TRIANGULAR "V"
LINING = FESCUE. (V_p = 4.0 FT/SEC - TABLE 8.05a)

STEP 3 ESTIMATE CHANNEL SIZE

$Q_0 / V_p = 3.6 / 4$ FT/SEC $= 0.91$ FT^2.

TRY CHANNEL 1' DEEP, 4' WIDE, 2:1 SIDE SLOPES.

$$R = \frac{zd}{2\sqrt{z^2+1}} = 0.45$$

ASSUME CLASS C RETARDANCE

$V_p R = (4.0 \text{ FT/SEC})(0.45) = 1.8$
$n = 0.06$ (FIG. 8.05c)

$$V = \frac{1.49}{n} R^{2/3} S^{1/2} = \frac{1.49}{0.06}(0.45)^{2/3}(0.05)^{1/2} = 3.26 \text{ FT/SEC}$$

$V < V_p$ ∴ OKAY!

$Q = AV = (zd^2)(V) = (2)(3.26) = 6.52$ cfs

$Q > Q_{10}$ ∴ OKAY!

TD-2A

STEP 1 $Q_{10} = ciA$; $A = 0.9$, $c = 0.35$

DETERMINE i FOR Tc.

OUTLET ELEV = 274'

ELEV. PT. MOST REMOTE ABOVE OUTLET = 350 (350-274 = 76')

MAX. LENGTH OF TRAVEL = 600'

Tc = 2.5 MIN. (FIG 8.03a)

RAINFALL INTENSITY 8.0"/HR (RALEIGH CHART)

$Q_{10} = ciA = (0.35)(8)(0.9) = 2.5$ cfs.

Q_{10} FOR CHANNEL TD-2A SAME AS FOR TD-1A

STEP 2 SLOPE - FROM TOPO = 5%

GEOMETRY - TRIANGULAR "V"

LINING - FESCUE. (V_p = 4.0 FT/SEC. - TABLE 8.05a)

STEP 3 ESTIMATE CHANNEL SIZE.

$Q_{10}/V_p = 2.5/4.0 = 0.62$ FT^2

TRY CHANNEL 1' DEEP, 4' WIDE, 2:1 SIDE SLOPES.

$$R = \frac{Zd}{2\sqrt{Z^2+1}} = 0.45$$

CLASS C RETARDANCE.

$V_pR = (4.0 \text{ FT/SEC})(0.45) = 1.8$

$n = 0.06$ (FIG. 8.05c)

$$V = \frac{1.49}{n} R^{2/3} S^{1/2} = 3.26 \text{ FT/SEC.}$$ $V < V_p$ ∴ OKAY.

$Q = AV = (Zd^2)(V) = (2)(3.26) = 6.52$ CFS $Q > Q_{10}$ ∴ OKAY.

TD-2B

STEP 1 $Q_{10} = ciA$; $A = 0.59$, $c = 0.35$

DETERMINE i

OUTLET ELEV. = 274'

ELEV. PT. MOST REMOTE ABOVE OUTLET = 350 (350-274 = 76')

MAX. LENGTH OF TRAVEL = 570'

T_C = 2.2 MIN (FIG. 8.03a)

i = 8"/HR RALEIGH CHART.

$Q_{10} = ciA = (0.35)(8)(0.59) = 1.65$ cfs.

STEP 2 SLOPE = 11% (FROM TOPO)

GEOMETRY - TRIANGULAR "V"

LINING - RIP RAP (DUE TO GRADIENT) V_p FESCUE = 2.5 FT/SEC.

FESCUE WOULD PROBABLY PROVIDE A SUITABLE LINING GIVEN THE VERY MINOR FLOW ; A RIP RAP LINING WILL BE INSTALLED DUE TO THE SEVERITY OF THE GRADIENT.

STEP 3 ESTIMATE CHANNEL SIZE

$Q_{10}/V_p = 1.65/2.5 = 0.66$ FT^2

TRY CHANNEL 1.5' DEEP , 6' WIDE , 2:1 SIDE SLOPES (FINISHED DIMENSIONS)

$$R = \frac{zd}{2\sqrt{z^2+1}} = 0.67$$

USING FESCUE & CLASS C RETARDANCE

$V_p R = (2.5 \text{ FT/SEC})(0.67) = 1.67$

n .·. = 0.062 (FROM FIG 8.05c - FOR FESCUE)

(n FOR d_{50} RIPRAP 1' THICK Approx. = 0.068 (TABLE 8.05f))

FOR R/R $V = \frac{1.49}{0.068} R^{2/3} S^{1/2} = \frac{1.49}{0.068} (0.67)^{2/3} (0.11)^{1/2} = 5.56$ FT/SEC.

FOR FESCUE $V = \frac{1.49}{0.062} R^{2/3} S^{1/2} = 6.1.0$ FT/SEC $V > V_p$ NOT ACCEPTABLE

- SUGGEST FINISHED CHANNEL DIMENSION 1.5' DEEP , 6' WIDE , 2:1 SIDESLOPES
- EXCAVATE / SUBGRADE 2.5' DEEP , 10' WIDE WITH 2:1 SIDE SLOPES.
- LINE CHANNEL WITH 1' THICK BLANKET OF CLASS B (d_{50}=9") RIP RAP.

(CONTINUED)

TD-3A

STEP 1 $Q_{10} = CiA$; $A = 1.5$ Ac., $C = 0.35$

DETERMINE i FOR T_C

OUTLET ELEV. = 265'

ELEV. PT. MOST REMOTE ABOVE OUTLET = 350' (350-265' = 85')

MAX. LENGTH OF TRAVEL = 800'

$T_C = 3.4$ MIN (FIG. 8.03a)

$i = 8$"/HR. RALEIGH CHART.

$Q_{10} = CiA = (0.35)(8)(1.5) = 4.2$ CFS.

STEP 2 SLOPE = 5% FROM SITE PLAN.

GEOMETRY = TRIANGULAR "V"

LINING - FESCUE

STEP 3 ESTIMATE CHANNEL SIZE

$Q_0 / V_p = 4.2 / 4.0 = 1.05$ FT^2

TRY CHANNEL 1.75' DEEP, 7' WIDE, 2:1 SIDE SLOPES.

$$R = \frac{Zd}{2\sqrt{Z^2+1}} = \frac{(2)(1.75)}{2\sqrt{(2)^2+1}} = \frac{(2)(1.75)}{2\sqrt{5}} = \frac{3.5}{4.47} = 0.78$$

CLASS C RETARDANCE

$V_p R = (4.0)(0.78) = 3.13$

$n = 0.045$ (FIG 8.05c)

$$V = \frac{1.49}{n} R^{2/3} S^{1/2} = \frac{1.49}{0.045}(0.78)^{2/3}(0.05)^{1/2} = 6.27 \text{ FT/SEC.}$$

$V > V_p$ NO GOOD!

CHECK Q AGAINST Q_{10} ANY WAY!

$Q = AV = (Zd^2)(V) = (6.12)(6.3) = 38.4$ cfs. GOOD! $Q > Q_{10}$

TRY TRAPEZOIDAL SHAPE

$b = 8'$, $d = 1'$, $e = 3$

$$R = \frac{bd + zd^2}{b + 2d\sqrt{z^2+1}} = \frac{(8)(1) + (3)(1)^2}{8 + 2(1)\sqrt{(3)^2+1}} = \frac{9+3}{14.3} = \frac{12}{14.3} = 0.84$$

$$V_p R = (4.0)(0.84) = 3.35$$

$n = 0.045$ (FIG. 8.05c)

$$V = \frac{1.49}{n} R^{2/3} S^{1/2} = \frac{1.49}{0.045}(0.84)^{2/3}(0.05)^{1/2} = 6.59 \text{ FT/SEC.}$$

IN AN EFFORT TO MINIMIZE AREA REQUIRED FOR DITCH, DESIGN RIP RAP LINING.

MINIMIZE DITCH DIMENSIONS.

$b = 4$, $d = 1$, $e = 3$, $T = 10'$

GIVEN: $Q = 4.2$ CFS

$S = 0.05$ FT/FT

$b = 4$ FT.

$z = 3$

FIND FLOW DEPTH AND MEAN RIP RAP SIZE.

(1) TRY $d_{50} = 9"$, depth = 1.0 FT.

TABLE 8.05f, $n = 0.068$

TABLE 8.05g, $T_d = 3.80$ lb/ft^2

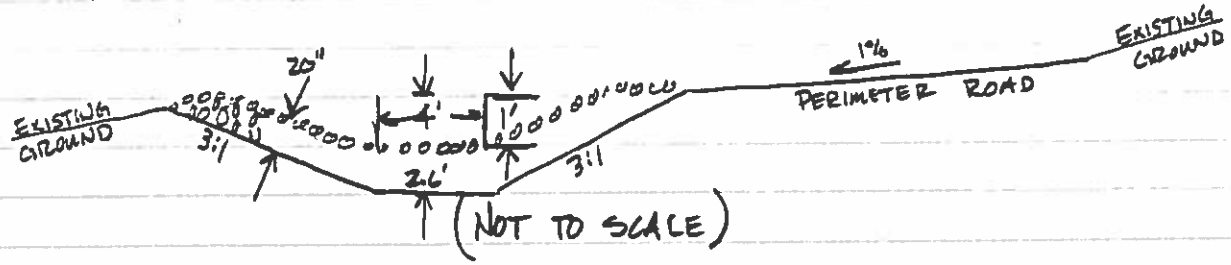
(2) FIG. 8.05d $Q_n = (4.2 \text{ CFS.})(0.068) = 0.28$; $d/b = 0.081$ $d = 0.32$ FT.

(3) $T = \gamma d s$

$= (62.4 \text{ lb/ft}^3)(0.32)(0.05) = 1.01$ lb/ft^2 $\quad T < T_d \therefore$ OKAY

$d_{max} = 1.5\, d_{50} = (1.5)(.75) = 1.12' = 13"$

THICKNESS RIP RAP BELOW FINISHED GRADE $= 1.5 \times d_{max} = 1.5(13") = 20"$.



TD-3B

STEP 1 $Q_{10} = CiA$; $A = 0.52$, $C = 0.35$

DETERMINE i FOR T_c

ASSUME 8"/HR

$Q_{10} = CiA = (0.35)(8)(0.52) = 1.45$ CFS

STEP 2 SLOPE = 10% (0.10 FT/FT) FROM TOPO.

GEOMETRY = TRT TRIANGULAR "V", TRAPEZOIDAL IF NECESSARY

LINING = RIP RAP.

STEP 3 ESTIMATE CHANNEL SIZE

Q_{10}/V_p : $1.45/2.5 = 0.58$ FT^2

V_p FROM TABLE 8.05a FOR FESCUE, $S > 10\%$.

USE SAME PROCEDURE FOR TD-3A

ATTEMPT TO USE DIMENSIONS: $b = 2$, $d = 1$, $e = 3$, $T = 8'$

GIVEN: $Q = 1.45$ CFS

$S = 0.10$ FT/FT

$b = 2$ FT

$Z = 3$ FT

(1) TRT $d_{50} = 9"$, depth = 1.0 FT.
TABLE 8.05f, $n = 0.068$
TABLE 8.05g, $T_d = 3.80$ lb/FT^2

(2) FIG. 8.05d $Qn = (1.45)(0.068) = 0.099 = 0.1$; $d/b = 0.022$ $d = 0.08$

(3) $T = \gamma ds = (62.4)(0.08)(0.1) = 0.55$ lb/ft^2 $T < T_d$ ∴ okay

TRAPEZOIDAL DITCH OF ABOVE DIMENSIONS IS GROSSLY OVERSIZED.
COMMON SENSE APPROACH!

CONSTRUCT "V" DITCH WITH 2:1 SIDESLOPES TO SUBGRADE SUFFICIENT TO USE 1 FT THICK BLANKET OF CLASS B RIP RAP AND HAVE FINISHED GRADE DIMENSIONS OF $d = 1'$, $Z = 2$, $T = 4'$

SUBGRADE DIMENSIONS: $d = 2'$, $Z = 2$, $T = 8'$

TD-4A

STEP 1 $Q_{10} = ciA$; $A = 0.10$, $c = 0.35$, $i = 8$

$Q_{10} = (0.35)(8)(0.10) = 0.28$ cfs.

STEP 2 SLOPE - 16% (0.16 FT/FT)

GEOMETRY - TRIANGULAR "V"

LINING - FESCUE

STEP 3 ESTIMATE CHANNEL SIZE

$Q_{10}/V_p = 0.28/2.5 = 0.11$ FT^2

TRY CHANNEL WITH $d = 2.0'$, $T = 8'$, $z = 2$

$$R = \frac{zd}{2\sqrt{z^2+1}} = \frac{(2)(2)}{2\sqrt{(2^2)+1}} = \frac{4}{2\sqrt{5}} = 0.89 = 0.9$$

$V_p R = (2.5 \text{ FT/SEC.})(0.9) = 2.23$

$n = 0.055$

$$V = \frac{1.49}{n} R^{2/3} S^{1/2} = \frac{1.49}{0.055}(0.9)^{2/3}(0.16)^{1/2} = 10.10$$

$V > V_p$ - NO GOOD! USE RIP RAP LINING

USE DESIGN PROCEDURE FOR STEEP GRADIENT.

STEP 1 ASSUME $B = 2$, $Z = 2$, $Q = 0.28$CFS

FIND FLOW DEPTH : $d = \frac{A_3}{A_2} d_n = (1.250)(0.25) = 0.31'$ (FIG 8.05j/Table 8.

FIND RIP RAP SIZE : $d_{50} = \frac{d}{d_n} d_{50c} = \frac{0.31'}{0.25} 0.50 = 0.6'$

USE $d_{50} = 9"$ (CLASS B) RIP RAP

LINE CHANNEL WITH 1 FT THICK BLANKET TO ABOVE FINISHED DIMENSIONS.

SUBGRAE : $B = 2'$, $Z = 2$, $T = 10'$

TD-4B

STEP 1 $Q_{10} = CiA$; $A = 0.5$, $C = 0.35$, $i = 8$

$Q_{10} = (0.35)(8)(0.5) = 1.4$ CFS.

STEP 2 SLOPE - 20%
GEOMETRY - TRAPEZOIDAL
LINING - RIP RAP.

UTILIZE CHANNEL WITH $Z = 2$
∴ FIND FLOW DEPTH & RIP RAP SIZE

$b = 2.0$, $Z = 2.0$, $Q = 1.4$ CFS, $T = 10'$

FOR FLOW DEPTH; $d = \frac{A_3}{A_Z} d_n = (1.250)(0.50) = 0.625'$

FOR RIP RAP SIZE; $d_{50} = \frac{d}{d_n} d_{50c} = \frac{0.625}{0.50}(0.5) = 0.625$

USE SAME CHANNEL DIMENSIONS AS TD-4A.

SUBGRADE TO : $B = 2$FT. , $Z = 2$ $T = 10$, $d = 2$FT
INSTALL RIP RAP ($d_{50} = 9$"-CLASS B) TO 1 FT. THICK.
FINISHED DIMENSION $b = 2$FT, $Z = 2$, $T = 6'$ $d = 1$FT.

TD-5

STEP 1 COMPUTE Q_{10}

$Q_{10} = CiA$; $C = 0.35$, $i = 8$, $A = 1.6$ Ac.

$Q_{10} = (0.35)(8)(1.6) = 4.5$ CFS.

STEP 2 SLOPE - 7% (FROM TOPO)

GEOMETRY - TRAPIZOIDAL

LINING - RIP RAP

GIVEN: $Q = 4.5$ CFS

$S = 0.07$ FT/FT

$b = 2$ FT

$Z = 2:1$

TRY $d_{50} = 9"$ (CLASS B) , depth = 0.5 FT.

FROM TABLE 8.05f ; $n = 0.068$

FROM TABLE 8.05g ; $T_d = 3.80$ lb/ft^2.

FROM FIG. 8.05 d. $Q_n = (4.5)(0.068) = 0.31$ $\frac{d}{b} = 0.25$, $d = 0.5$ FT

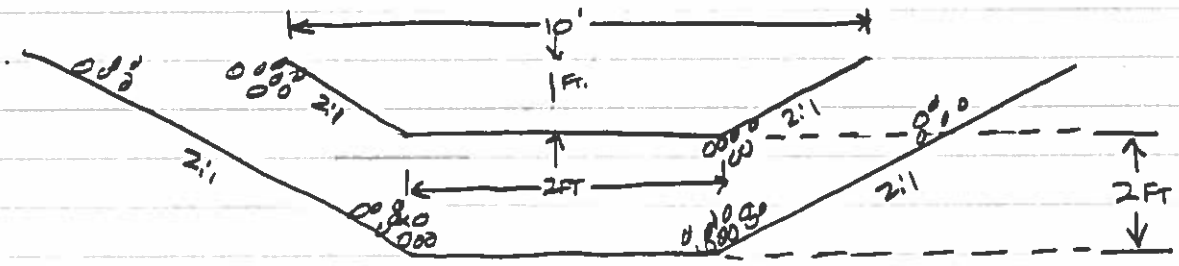
CALCULATED DEPTH W/IN ACCEPTED RANGE.

$T = \gamma d s = (62.4 \text{ lb/ft}^2)(0.5 \text{ FT})(0.07) = 2.18$

$T < T_d$ ∴ okay.

$d_{max} = 1.5\, d_{50} = 13.5"$

THICKNESS BELOW FINISHED GRADE $= 1.5 \times d_{max} = 20"$



SUBGRADE $b = 2'$, $Z = 2$, $T = 14'$

TD-6

STEP 1 COMPUTE Q_{10}

$Q_{10} = CiA$; $C = 0.35$, $i = 8$, $A = 1.2$

$Q_{10} = (0.35)(8)(1.2) = 3.36$ CFS

STEP 2 SLOPE - 1%

GEOMETRY - TRIANGULAR "V"

LINING - FESCUE $V_p = 4.5$ FT/SEC.

STEP 3 ESTIMATE SIZE $Q_{10} / V_p = 0.74$ FT^2

TRY CHANNEL 1' DEEP, 4' WIDE, 2:1 SIDE SLOPES,

$d = 1$, $z = 2$

$$R = \frac{zd}{2\sqrt{z^2+1}} = \frac{(2)(1)}{2\sqrt{(2^2)+1}} = \frac{2}{2\sqrt{5}} \quad \frac{1}{\sqrt{5}} = 0.45$$

CLASS C RETARDANCE

$V_p R = (4.5)(0.45) = 1.8$

$n = 0.06$ (FIG. 8.05c)

$$V = \frac{1.49}{n} R^{2/3} S^{1/2} = \frac{1.49}{0.06} (0.45)^{2/3} (0.01)^{1/2} = 1.45$$

$V < V_p$ ∴ okay!

CHECK Q.

$Q = AV = (zd^2)(V) = (2)(1.45) = 2.90$

$Q < Q_{10}$ - CHANNEL TOO SMALL.

USE $d = 1.5$, $z = 2$, $T = 6$

$Q = AV = (zd^2)(V) = (2)(1.5)^2 (1.45) = 6.75$

$Q > Q_{10}$ ∴ Okay.

CHANNEL OF DIMENSIONS $d = 1.5$, $z = 2$, $T = 6$

TD-6A

- COMPUTE Q_{10}
- DESIGN TO ACCEPT Q_{10} FOR TD-6 AND AREA CLEARED FOR BERM CONSTRUCTION $(0.5 Ac) \rightarrow Q_{10} = ciA = (0.35)(8)(0.5) = 1.5$ CFS

Q_{10} TOTAL $= 3.4 + 1.5 = 4.9$ USE 5.0 CFS

DESIGN RIP RAP CHANNEL FOR $Q_{10} = 5.0$ CFS, $S = 0.10$ FT/FT.

TRAPEZOIDAL SHAPE

$Q = 5.0$ CFS
$S = 0.10$ FT/FT
$b = 2.0$ FT.
$Z = 2$

FIND FLOW AND d_{50} RIP RAP SIZE

FIG 8.05j
$d_{50} = 0.3$ FT
$d = 0.4$ FT

USE $d_{50} = 9"$ (CLASS B) $d_{max} = 13"$
DEPTH IN CHANNEL = 0.25'
RIP RAP THICKNESS = $1.5\, d_{max} = 20"$

FINISHED GRADE: $b = 2$FT, $Z = 2$, $d = 1$FT., $T = 6'$
SUBGRADE: $d = 3'$, $b = 2'$, $Z = 2$, $T = 14'$

TD-6B

- COMPUTE Q_{10}
- AREA DISTURBED FOR BERM CONSTRUCTION – 0.6 Ac.

$Q_{10} = CiA = (0.35)(8)(0.6) = 1.55$ CFS.

SLOPE = 0.17 FT/FT.

FIND FLOW DEPTH AND d_{50} RIP RAP SIZE.

GIVEN: $Q = 1.6$ CFS
$S = 0.17$ FT/FT
$b = 2.0$ FT
$Z = 2$

FIG. 8.05 j
$d_{50} = < 0.5$ FT.
$d = < 0.5$ FT.

USE $d_{50} = 9"$ (CLASS B) $d_{max} = 13"$
DEPTH IN CHANNEL = < 0.5'.
RIP RAP THICKNESS = $1.5\, d_{max} = 20"$ (USE 2')

FINISHED GRADE: $b = 2$ FT., $Z = 2$, $d = 1$ FT., $T = 6'$
SUBGRADE: $d = 3'$, $b = 2'$, $Z = 2$, $T = 14'$,

TD-7A

STEP 1 COMPUTE Q_{10}.

$Q_{10} = ciA$; $c = 0.35$, $L = 8$, $A = 0.5 A_c$ $Q_{10} = 1.4$ CFS.

STEP 2 SLOPE = 0.01 FT/FT.

GEOMETRY: TRIANGULA "V"

LINING = FESCUE ($V_p = 4.5$ FT/SEC) TABLE 8.05a

STEP 3 ESTIMATE SIZE

$Q_{10}/V_p = 1.4 \text{ cfs} / 4.5 \text{ ft/sec} = 0.31$

TRY CHANNEL 1' DEEP, 4' WIDE, 2:1 SLOPES.

$$R = \frac{zd}{2\sqrt{z^2+1}} = 0.45$$

CLASS C RETARDANCE

$V_p R = (4.5)(.45) = 2.0$

$n = 0.055$. (FIG. 8.05c)

$$V = \frac{1.49}{n} R^{2/3} S^{1/2} = \frac{1.49}{0.055} (0.45)^{2/3} (0.01)^{1/2} = 1.6 \text{ FT/SEC.}$$

$V < V_p$ ∴ OKAY.

CHECK Q

$Q = AV = (zd^2)V = (2(1)^2)1.6 = 3.2$ $Q > Q_{10}$ ∴ OKAY.

TD-7B

STEP 1 COMPUTE Q_{10}

$Q_{10} = CiA$; $C = 0.35$, $i = 8$, $A = 1.3$

$Q_{10} = (0.35)(8)(1.3) = 3.6$ CFS.

STEP 2 SLOPE = 0.03 FT/FT.

GEOMETRY = TRIANGULAR "V"

LINING = FESCUE. ($V_p = 4.5$ FT/SEC.) TABLE 8.05a

STEP 3 ESTIMATE SIZE

$Q_{10}/V_p = 3.6/4.5 = 0.80$

TRY CHANNEL: 1.5' DEEP, 6' WIDE, 2:1 SLOPES.

$$R = \frac{zd}{2\sqrt{z^2+1}} = \frac{(2)(1.5)}{2\sqrt{(2)^2+1}} = \frac{3}{2\sqrt{5}} = 0.67$$

CLASS C RETARDANCE

$V_p R = (4.5)(0.67) = 3.02$

$n = 0.046$ (FIG. 8.05c)

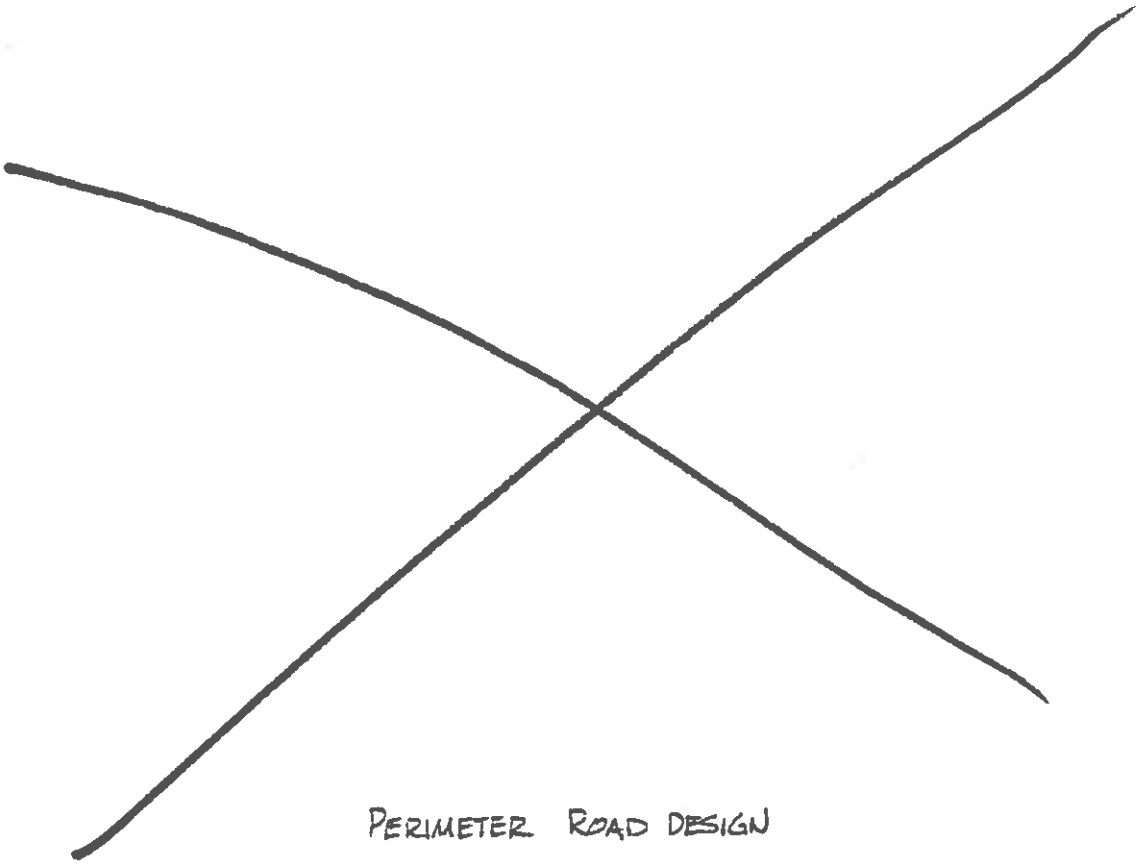
$$V = \frac{1.49}{n} R^{2/3} S^{1/2} = \frac{1.49}{0.046}(0.67)^{2/3}(0.03)^{1/2} = 4.2 \text{ FT/SEC.}$$

$V < V_p$ ∴ OKAY

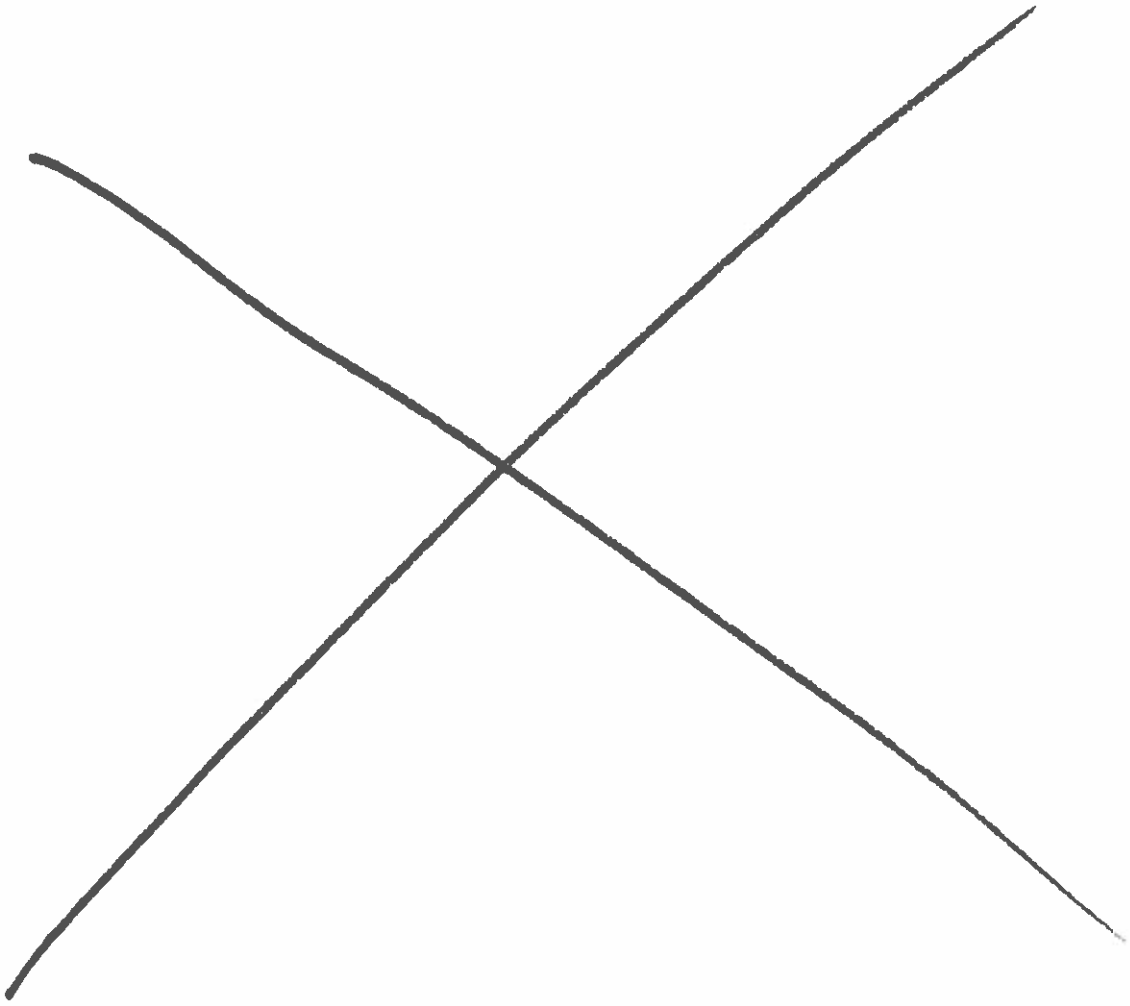
CHECK ACTUAL Q.

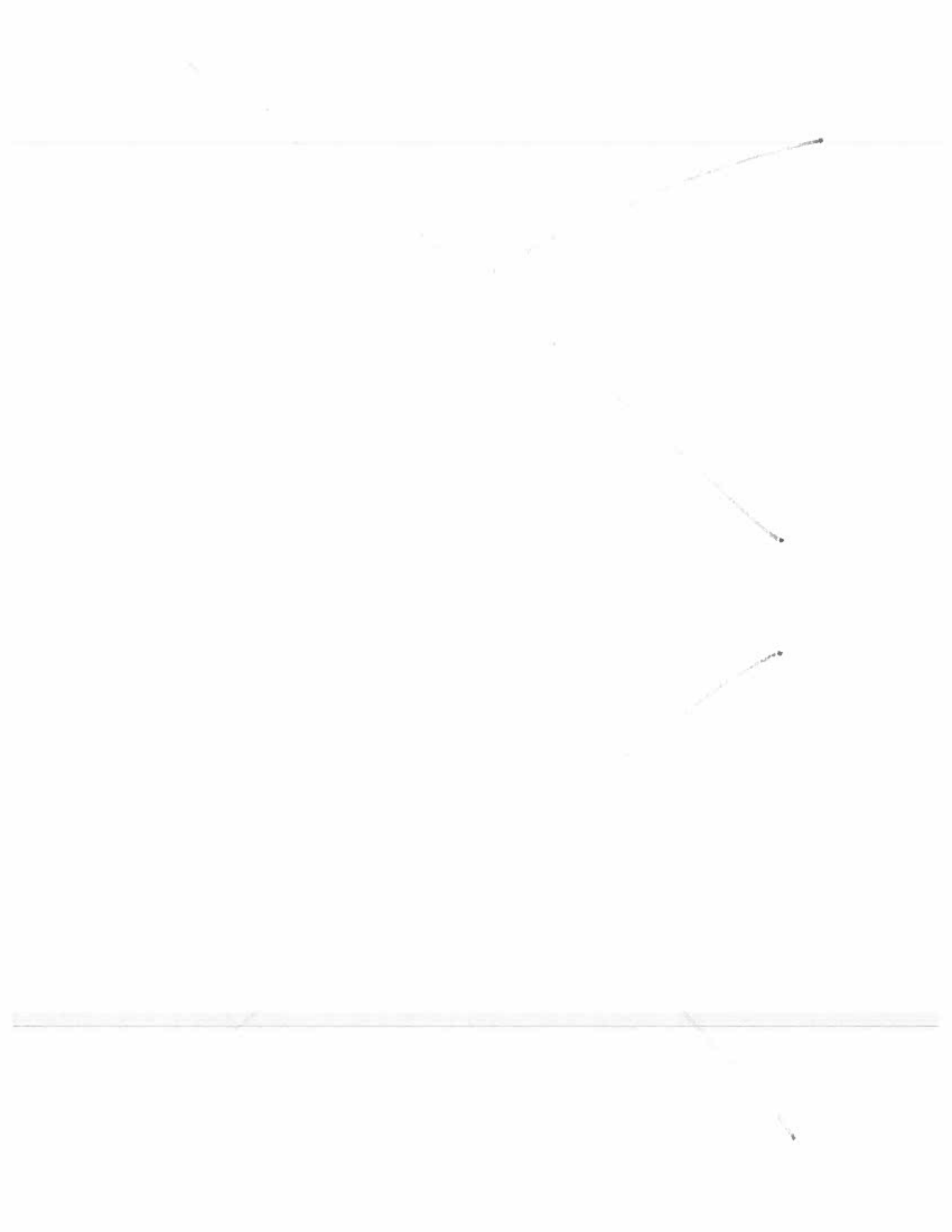
$Q = AV = (zd^2)V = (2)(1.5)^2(4.2) = 18.9$ CFS

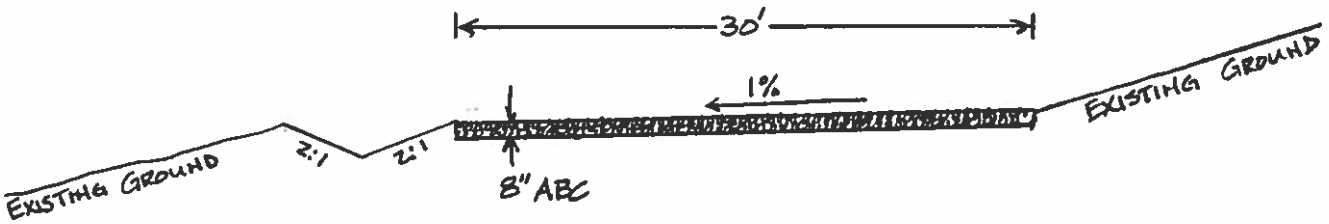
$Q > Q_{10}$ ∴ OKAY.



PERIMETER ROAD DESIGN







WAKE STONE CORP.
TRIANGLE QUARRY
PERIMETER ROAD DESIGN
TYPICAL SECTION
(NOT TO SCALE)

SPEED LETTER®

TO JOHN HOLLEY
RRO/LQS

DATE

FROM BETH STUDENBERG
CO/LQS

DATE 1/31/91

SUBJECT WAKE STONE CARY QUARRY RENEWAL AND MODIFICATION

– FOLD NO. 9 or 10

MESSAGE

ATTACHED IS YOUR COPY OF THE COVER LETTER AND FEE FOR THE MODIFICATION.

THANKS!

– FOLD FOR NO. 9

– FOLD FOR NO. 10

SIGNED Beth

REPLY

SIGNED

SENDER: DETACH AND RETAIN YELLOW COPY, SEND WHITE AND PINK COPIES

SPEED LETTER®

TO John Haller
MO-LGS

DATE

FROM
LGS

DATE 2/18/91

SUBJECT Supplemental Info. Water Use - Clay County (4-92-10), Water Co.

- FOLD NO. 9 or 10

MESSAGE

Please find attached a copy of the above referenced info. for your review and comment. Please respond by March 8, 1991, if possible.

Thanks

SIGNED

REPLY

SIGNED

- FOLD FOR NO. 9
- FOLD FOR NO. 10

SENDER: DETACH AND RETAIN YELLOW COPY, SEND WHITE AND PINK COPIES

Wake Stone Corporation

Quarry Phone Numbers:
919/266-9266—Knightdale
919/677-0050—Triangle
919/775-7349—Moncure
919/985-4411—Nash County

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.

Business Office Address:
P.O. Box 190
Knightdale, N.C. 27545
919/266-1100

February 14, 1991

Mr. Tracy E. Davis, E.I.T.
Mining Specialist
Land Quality Section
P. O. Box 27687
Raleigh, North Carolina 27611

RE: Renewal/Modification of Triangle
Quarry Mining Permit No. 92-10
Wake County

Dear Mr. Davis:

Enclosed are two copies of the supplimental information requested in your letter of January 29, 1991. As you will see, we have addressed each of the items listed in your letter. Specifically, we have re-designed temporary sediment traps 1, 2, and 4 and basin C, provided spillway design data for basin B, re-designed the culverts and provided energy dissipaters, provided design details and calculations for the perimeter road ditches, and provided a typical cross section of the perimeter road. A revised Site Plan is also included for your review.

Item # 7 of your letter of January 29th was addressed in my letter of January 28th. The only other items for which you have requested supplimental information or clarification are: the overburden cut slope gradient and anchoring of mulch materials. We believe stable cut slopes steeper than 2:1 are practical in the dense red clay subsoil of the quarry area but do not have any soils engineering data to support that, only our operating experience in the area. Mulch materials will be anchored by crimping, either by tracked equipment or farm disc.

Sincerely,
Wake Stone Corporation

David F. Lee

Enclosures

DEPARTMENT OF ENVIRONMENT, HEALTH AND NATURAL RESOURCES

DIVISION OF LAND RESOURCES

LAND QUALITY SECTION

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

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 1, 2001

In accordance with the application for this mining permit, which is hereby approved by the Department of Environment, Health 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

A. April 1, 1991: This permit has been modified to include the 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 by the revised Site Plan and supplemental information dated February 14, 1991.

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

Expiration Date

This permit shall be effective from the date of its issuance until April 1, 2001.

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

   Any wastewater processing or mine dewatering shall be in accordance with the requirements and rules promulgated by the N.C. Environmental Management Commission.

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.

   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. Sprays shall be used throughout the plant at transfer points to control dust.

   F. Drill hole 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 wetlands shall be in accordance with the requirements and regulations promulgated by the U.S. Army Corps of Engineers.

B. Sufficient buffer shall be maintained between any affected land and any adjoining waterway to prevent sedimentation of that waterway from erosion of the affected land and to preserve the integrity of the natural watercourse.

C. The dotted line labelled as buffer along the northern boundary and along the eastern boundary is the permanent buffer as designated by the Mining Commission. (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 the 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 (2) 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 edge 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 U.S. Corps of Engineers requirements 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 February 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."

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 these undisturbed buffers of natural vegetation are:

A. The construction of berms as approved by the Department for visual and noise screening.

B. The installation of drainage and sedimentation controls as approved by the Department to protect Crabtree Creek.

C. The construction of a water supply dam as shown on drawings submitted in a permit modification request dated September 30, 1986 approved by the Department.

4. Erosion and Sediment Control

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

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 insure the stability of the embankments.

C. The 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 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 5 feet, the minimum elevation of the top of the road fill shall be set at elevation 292, (3) temporary diversions TD-1A, TD-1B, TD-2A 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 1/2:1 slope or flatter.

D. 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. Such areas include, but are not limited to, expansion outside of the initial pit area, creek crossings, or expansion of overburden disposal areas.

5. Groundwater Protection

Observation wells shall be installed, maintained and monitored as deemed appropriate by the Department.

6. Noise Abatement

All reasonable precautions shall be taken to minimize the impact of operational noise upon Umstead Park. Such measures shall include but not be limited to:

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 outset 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 measures, 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 whisperized 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 only on Monday through Friday and shall not be operated on the following recognized holidays: New Year's 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 P.M. on Saturdays, but hauling shall not be done at any other time on weekends or on holidays without prior approval by the Department.

7. Processing Plant Location

A. The processing and stockpiling facilities shall be located as indicated on the Wake Stone Corporation site plan dated March 10, 1981.

B. The plant shall be located to place the processing and stockpiling facilities at the lowest possible elevation to reduce visibility and noise impact on the 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 offsite 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 pit opening shall be graded to a minimum 1 1/2 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 the 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 provide to the Department a copy of the findings of any seismic studies conducted at this facility. The operator shall make every reasonable effort to incorporate the report's recommendations into the production blasting program.

The following blasting conditions shall be observed by the operator to prevent hazard to persons and adjacent property from thrown rock or vibrations:

A. In all blasting operations, except as hereinafter otherwise provided, the maximum peak particle velocity of any component of ground motion shall not exceed 1 inch per second at the immediate location of any building outside of the permitted area regularly occupied by human beings such as dwelling house, church, school, public building, or commercial or institutional building outside of the permitted area. The operator shall monitor each blast with a seismograph.

B. Airblast overpressure shall not exceed 128 decibels linear (dBL) as measured at the immediate location of any regularly occupied building such as any dwelling house, church, school, public building, or commercial or institutional building.

C. The operator shall take all reasonable precautions to insure that flyrock is not thrown beyond areas where the access is temporarily or permanently guarded by the operator. Should flyrock occur beyond the guarded area or the levels in Items A and B above are exceeded, the operator shall report the incident to the Department immediately and further use of explosive at the site shall be immediately 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 satisfactory report detailing the investigation shall be provided to the Department within 10 days of the incident. Said 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 site. Failure to take corrective measures to prevent flyrock and repeated instances of flyrock shall be considered a violation of this permit.

D. 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; and blast location. Records shall be maintained at the permittee's mine office and copies shall be provided to the Department upon request.

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

F. 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 around the perimeter of any highwall to prevent inadvertent public access. In addition, a minimum ten (10) foot wide horizontal safety bench shall be provided at the junction between the top of rock and the toe of the overburden cut slope.

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.

B. Berms shall be located and constructed as shown on the revised Site Plan and supplemental information dated February 14, 1991. Construction of berms shall be completed within one (1) year of the start of quarrying activities. In addition to grasses, loblolly and/or Virginia pines 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 the 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 plans 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 the 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 2 horizontal to 1 vertical grade 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 plan as 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 the park.

13. 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. Approval to implement such changes must be obtained from the Department prior to on-site implementation of the revisions.

14. Refuse Disposal

A. No on-site disposal of refuse or other solid waste that are 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 Solid Waste Management and the Land Quality Section, Department of Environment, Health 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 Solid Waste Management. No petroleum products, acids, solvents or their storage containers or any other material that maybe considered hazardous shall be disposed of within the permitted area.

15. 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.

16. Bonding

The security which was posted pursuant to N.C.G.S. 74-54 in the form of a $25,000.00 blanket bond is sufficient to cover the operation as indicated on 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.

17. 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

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, 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 highwall, 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. All 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.

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

E. No contaminants shall be permanently disposed of at the mine site. On-site disposal of waste shall be in accordance with Operating Condition 12A and B.

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.

3. Revegetation Plan:

All disturbed areas in unconsolidated material shall be permanently revegetated utilizing 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 obstruction 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 Conditions 12A and B above. Surface runoff will 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 results or at a rate of 2,000 lbs./ac. of lime and 1,000 lbs./ac. of 10-20-20 fertilizer.

Seedbed Preparation: Lime and fertilizer shall be mixed with the soil to a depth of 3 to 4 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-lespeceza, where the lespedeza used may include Korean or Kobe, or sericea. All rye species to be utilized shall be ryegrain rather than ryegrass. In fall or spring plantings, seeding mixtures will 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 will 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 will be utilized. Scarified seed will be utilized in spring plantings. Newly seeded areas will 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 pine and red cedar seedlings will be planted at selected sites to provide visual screens and revegetation. Evergreen seedling plantings are typically done on a staggered 4' by 4' pattern.

Maintenance: Plant replacement 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.

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 recordation of each such encumbrance.

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

A. Wake Stone Corporation not being pronibited by the U.S. Government, State of North Carolina, Wake County, any municipality having jurisdiction, or by any court from removing Wake Stone Corporation's property all quarryable stone which is outside the buffer zone referred to in condition 3, page 3. The requirements by the State that Wake Stone Corporation comply with laws and rules and regulations generally applicable to stone quarries 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, ad 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 the exercise of its options 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 obligation 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 belonging to or under the control of Wake Stone Corporation during the period of its quarrying operations and which lies between the 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 an election within said six month period or shall elect not to accept a conveyance of the quarry site, the option shall 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 will 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, 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 condition of the land to be transferred will be in accordance with the criteria identified in the "Principles Governing the Establishment Extension and Development of State Parks, State Recreation Areas and State Natural Areas."

This permit, issued May 13, 1981, modified April 15, 1986, and renewed and contemporaneously modified April 1, 1991, is hereby modified this 5th day of February, 1992 pursuant to G.S. 74-52.

By: Charles H. Gardner

Charles H. Gardner, Director
Division of Land Resources
By Authority of the Secretary
Of the Department of Environment, Health and Natural Resources

Wake Stone Corporation

Quarry Phone Numbers:
919/266-9266—Knightdale
919/677-0050—Triangle
919/775-7349—Moncure
919/985-4411—Nash County

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.

Business Office Address:
P.O. Box 190
Knightdale, N.C. 27545
919/266-1100

April 19, 1991

Mr. Tracy E. Davis, E.I.T.,
Mining Specialist
Land Quality Section - Dept. EHNR
PO Box 27687
Raleigh, North Carolina 27611

SUBJECT: Renewal and Modifications to Mining Permit No. 92-10 Triangle Quarry

Dear Tracy:

As we discussed by phone on Tuesday April 16th, we would like to address a concern we have over the language used in the recently renewed Triangle Quarry Mining Permit. Specifically, we wish to address Paragraph D. on Page 4 of 15 of the Permit. The paragraph currently reads:

> "An undisturbed buffer of existing natural vegetation shall be maintained between the mining disturbance and both Crabtree Creek and the Umstead Park property as indicated by the "10 year buffer" shown on the site plan dated March 10, 1981 with the exception of the installation of the two (2) vegetated earthen berms as specified by the revised Site Plan dated February 14, 1991."

Our concern is with the use of the phrase "10 year buffer" in this paragraph. The "10 year buffer" as established by the Mining Commission and made a condition of the original mining permit issued on May 13, 1981 will cease to exist upon expiration of the original permit. Our future expansion plans as indicated in the modification request accompanying the renewal application are for the development of the remainder of the property located between the "10 year buffer" and the "permanent buffer" as designated by the Mining Commission and referenced in the first paragraph of Section 3 on Page 4 of 13 of the original permit.

It is our belief that in trying to incorporate as many of the original permit conditions as possible into the new permit you may have inadvertently used the phrase "10 year buffer" when you were thinking "permanent buffer". In an effort to rectify this ambiguity we suggest you revise Paragraph D. of page 4 of 15 to read:

> "An undisturbed buffer of existing natural vegetation shall be maintained between the mining disturbance and both Crabtree Creek and the 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 (2) vegetated earthen berms and erosion control structures as specified by the revised Site Plan dated February 14, 1991."

Enclosed is a copy of the March 10, 1981 Site Plan which delineates the "10 year buffer" and "permanent buffer" as designated by the Mining Commission. By comparing the 1981 plan to the February 14, 1991 revised Site Plan you will see we have honored these buffers in our mining activities to date as well as in our plans for the expansion of the mining activities at the Triangle Quarry. If you have any questions concerning our request for the revision to Paragraph D, please call me at 266-1100.

Sincerely,
Wake Stone Corporation

David F. Lee

David F. Lee

Enclosure

State of North Carolina
Department of Environment, Health, and Natural Resources
Division of Land Resources

James G. Martin, Governor
William W. Cobey, Jr., Secretary

Charles H. Gardner
Director

April 1, 1991

Mr. David Lee
Wake Stone Corporation
P. O. Box 190
Knightdale, NC 27545

RE: Permit #92-10
Triangle Quarry
Wake County

Dear Mr. Lee:

Your application for renewal and modification of Permit No. 92-10 for the Triangle Quarry in Wake County has been approved. A copy of the renewed and modified permit is enclosed.

The conditions in the permit renewal and modification were based primarily upon the initial application. Modifications were made as indicated by the renewal and modification request and as required to insure compliance with The Mining Act of 1971. The new expiration date is April 1, 2001.

Please review the renewed and modified permit and advise this office at (919) 733-4574 should you have any question concerning this matter.

Sincerely,

Tracy E. Davis, E.I.T.
Mining Specialist
Land Quality Section

TED/se

Enclosures

cc: Mr. John Holley, P.E.

DEPARTMENT OF ENVIRONMENT, HEALTH AND NATURAL RESOURCES

DIVISION OF LAND RESOURCES

LAND QUALITY SECTION

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

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.

In accordance with the application for this mining permit, which is hereby approved by the Department of Environment, Health 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:

A. This permit has been modified to include the 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 by the revised Site Plan and supplemental information dated February 14, 1991.

B.

Expiration Date

This permit shall be effective from the date of its issuance until April 1, 2001.

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

   Any wastewater processing or mine dewatering shall be in accordance with the requirements and rules promulgated by the N.C. Environmental Management Commission.

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.

   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. Sprays shall be used throughout the plant at transfer points to control dust.

   F. Drill hole 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 wetlands shall be in accordance with the requirements and regulations promulgated by the U.S. Army Corps of Engineers.

B. Sufficient buffer shall be maintained between any affected land and any adjoining waterway to prevent sedimentation of that waterway from erosion of the affected land and to preserve the integrity of the natural watercourse.

C. The dotted line labelled as buffer along the northern boundary and along the eastern boundary is the permanent buffer as designated by the Mining Commission. (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 the 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 (2) 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 edge 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 U.S. Corps of Engineers requirements for Crabtree Creek Watershed.

F. A minimum buffer zone of 100 feet shall be maintained between any mining activity and Crabtree Creek along the west side of the mine site.

G. 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.

H. 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.

I. The only exceptions to these undisturbed buffers of natural vegetation are:

   A. The construction of berms as approved by the Department for visual and noise screening.

   B. The installation of drainage and sedimentation controls as approved by the Department to protect Crabtree Creek.

   C. The construction of a water supply dam as shown on drawings submitted in a permit modification request dated September 30, 1986 approved by the Department.

4. Erosion and Sediment Control

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

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 insure the stability of the embankments.

C. The 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 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 5 feet, the minimum elevation of the top of the road fill shall be set at elevation 292, (3) temporary diversions TD-1A, TD-1B, TD-2A 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 1/2:1 slope or flatter.

D. 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. Such areas include, but are not limited to, expansion outside of the initial pit area, creek crossings, or expansion of overburden disposal areas.

5. Groundwater Protection

Observation wells shall be installed, maintained and monitored as deemed appropriate by the Department.

6. Noise Abatement

All reasonable precautions shall be taken to minimize the impact of operational noise upon Umstead Park. Such measures shall include but not be limited to:

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 outset 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 measures, 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 whisperized 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 only on Monday through Friday and shall not be operated on the following recognized holidays: New Year's 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 P.M. on Saturdays, but hauling shall not be done at any other time on weekends or on holidays without prior approval by the Department.

7. Processing Plant Location

A. The processing and stockpiling facilities shall be located as indicated on the Wake Stone Corporation site plan dated March 10, 1981.

B. The plant shall be located to place the processing and stockpiling facilities at the lowest possible elevation to reduce visibility and noise impact on the 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 offsite 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 pit opening shall be graded to a minimum 1 1/2 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 the 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 provide to the Department a copy of the findings of any seismic studies conducted at this facility. The operator shall make every reasonable effort to incorporate the report's recommendations into the production blasting program.

The following blasting conditions shall be observed by the operator to prevent hazard to persons and adjacent property from thrown rock or vibrations:

A. In all blasting operations, except as hereinafter otherwise provided, the maximum peak particle velocity of any component of ground motion shall not exceed 1 inch per second at the immediate location of any building outside of the permitted area regularly occupied by human beings such as dwelling house, church, school, public building, or commercial or institutional building outside of the permitted area. The operator shall monitor each blast with a seismograph.

B. Airblast overpressure shall not exceed 128 decibels linear (dBL) as measured at the immediate location of any regularly occupied building such as any dwelling house, church, school, public building, or commercial or institutional building.

C. The operator shall take all reasonable precautions to insure that flyrock is not thrown beyond areas where the access is temporarily or permanently guarded by the operator. Should flyrock occur beyond the guarded area or the levels in Items A and B above are exceeded, the operator shall report the incident to the Department immediately and further use of explosive at the site shall be immediately 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 satisfactory report detailing the investigation shall be provided to the Department within 10 days of the incident. Said 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 site. Failure to take corrective measures to prevent flyrock and repeated instances of flyrock shall be considered a violation of this permit.

D. 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; and blast location. Records shall be maintained at the permittee's mine office and copies shall be provided to the Department upon request.

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

11. <u>High Wall Barrier</u>

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

12. <u>Visual Screening</u>

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.

B. Berms shall be located and constructed as shown on the revised Site Plan and supplemental information dated February 14, 1991. Construction of berms shall be completed within one (1) year of the start of quarrying activities. In addition to grasses, loblolly and/or Virginia pines 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 the 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 plans 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 the 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 2 horizontal to 1 vertical grade 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 plan as 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 the park.

13. 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. Approval to implement such changes must be obtained from the Department prior to on-site implementation of the revisions.

14. Refuse Disposal

A. No on-site disposal of refuse or other solid waste that are 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 Solid Waste Management and the Land Quality Section, Department of Environment, Health and Natural Resources. The method of disposal shall be consistent with the approved reclamation plan.

B. Refuse generated on-site and directly associated with the mining activity such as drill steel, conveyor belting, screen cloth and cable may be disposed of in a designated refuse area provided that said disposal is in accordance with the regulations and requirements administered by the Division of Solid Waste Management. All other waste products must be disposed of in an approved offsite disposal facility. No petroleum products, acids, solvents or their storage containers or any other material that maybe considered hazardous shall be disposed of within the permitted area.

15. 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.

16. Bonding

The security which was posted pursuant to N.C.G.S. 74-54 in the form of a $25,000.00 blanket bond is sufficient to cover the operation as indicated on 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.

17. 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

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, 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 highwall, 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. All 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.

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

E. No contaminants shall be permanently disposed of at the mine site. On-site disposal of waste shall be in accordance with Operating Condition 12A and B.

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.

3. Revegetation Plan:

All disturbed areas in unconsolidated material shall be permanently revegetated utilizing 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 obstruction 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 Conditions 12A and B above. Surface runoff will 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 results or at a rate of 2,000 lbs./ac. of lime and 1,000 lbs./ac. of 10-20-20 fertilizer.

Seedbed Preparation: Lime and fertilizer shall be mixed with the soil to a depth of 3 to 4 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 include Korean or Kobe, or sericea. All rye species to be utilized shall be ryegrain rather than ryegrass. In fall or spring plantings, seeding mixtures will 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 will 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 will be utilized. Scarified seed will be utilized in spring plantings. Newly seeded areas will 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 pine and red cedar seedlings will be planted at selected sites to provide visual screens and revegetation. Evergreen seedling plantings are typically done on a staggered 4' by 4' pattern.

Maintenance: Plant replacement 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.

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 recordation 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 U.S. Government, State of North Carolina, Wake County, any municipality having jurisdiction, or by any court from removing Wake Stone Corporation's property all quarryable stone which is outside the buffer zone referred to in condition 3, page 3. The requirements by the State that Wake Stone Corporation comply with laws and rules and regulations generally applicable to stone quarries 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, ad 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 the exercise of its options 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 obligation 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 belonging to or under the control of Wake Stone Corporation during the period of its quarrying operations and which lies between the 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 an election within said six month period or shall elect not to accept a conveyance of the quarry site, the option shall 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 will 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, 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 condition of the land to be transferred will be in accordance with the criteria identified in the "Principles Governing the Establishment Extension and Development of State Parks, State Recreation Areas and State Natural Areas."

This permit, issued May 13, 1981 and modified April 15, 1986, is hereby renewed and contemporaneously modified this 1st day of April, 1991 pursuant to G.S. 74-52.

By: Charles H. Gardner

Charles H. Gardner, Director
Division of Land Resources
By Authority of the Secretary
Of the Department of Environment, Health and Natural Resources

B. Sufficient buffer shall be maintained between any affected land and any adjoining waterway to prevent sedimentation of that waterway from erosion of the affected land and to preserve the integrity of the natural watercourse.

C. The dotted line labelled as buffer along the northern boundary and along the eastern boundary is the permanent buffer as designated by the Mining Commission. (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 the Umstead Park property as indicated by the ~~"10 year~~ buffer" shown on the site plan dated March 10, 1981, with the exception of the installation of the two (2) 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 edge 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 U.S. Corps of Engineers requirements for Crabtree Creek Watershed.

F. A minimum buffer zone of 100 feet shall be maintained between any mining activity and Crabtree Creek along the west side of the mine site.

G. 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.

H. 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.

I. The only exceptions to these undisturbed buffers of natural vegetation are:

   A. The construction of berms as approved by the Department for visual and noise screening.

   B. The installation of drainage and sedimentation controls as approved by the Department to protect Crabtree Creek.

   C. The construction of a water supply dam as shown on drawings submitted in a permit modification request dated September 30, 1986 approved by the Department.

SPEED LETTER

TO John Holley
DEQ-LQS

DATE

FROM
LQS

DATE 5/1/91

SUBJECT Wake Stone Corp. - D (Cary) Quarry (#92-10), Wake County

— FOLD NO. 9 or 10

MESSAGE

Please find attached a letter from David Lee of Wake Stone Corp. requesting that the wording of O.C. #3 D on Page 4 of the recently issued Renewed/Modified Mining Permit be revised according to them the wording provided in his 4/19/91 letter. Please review his request and let me know in writing of your

— FOLD FOR NO. 9

— FOLD FOR NO. 10

REPLY

recommendations/comments by May 10, 1991, if possible. Thanks for your assistance on this project!

SIGNED

SIGNED

SENDER: DETACH AND RETAIN YELLOW COPY, SEND WHITE AND PINK COPIES

State of North Carolina
Department of Environment, Health, and Natural Resources
Division of Land Resources

James G. Martin, Governor
William W. Cobey, Jr., Secretary

Charles H. Gardner
Director

June 17, 1991

Mr. David Lee
Wake Stone Corporation
P. O. Box 190
Knightdale, NC 27545

RE: Revision to Mining Permit No. 92-10
Triangle Quarry
Wake County

Dear Mr. Lee:

This office has reviewed your proposed revision to Operating Condition No. 3.D. of the above referenced mining permit which was recently renewed and modified on April 1, 1991. I hereby approve said revision and have attached a revised Page 4 of 15 of the mining permit in order for you to replace the previous, incorrect page for future reference.

Thank you for your cooperation in this matter. Please advise Mr. Tracy Davis if you should have any additional questions or concerns.

Very truly yours,

Charles H. Gardner, P.G., P.E.

CHG/TED/se

Attachment

cc: Mr. Tracy Davis
Mr. John Holley

P.O. Box 27687 • Raleigh, N.C. 27611-7687 • Telephone (919) 733-3833

Wake Stone Corporation

Quarry Phone Numbers:
919/266-9266—Knightdale
919/677-0050—Triangle
919/775-7349—Moncure
919/985-4411—Nash County

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.

Business Office Address:
P.O. Box 190
Knightdale, N.C. 27545
919/266-1100

February 17, 1992

Mr. Tracy E. Davis, E. I. T.,
Mining Specialist
Land Quality Section - DEHNR
P. O. Box 27687
Raleigh, North Carolina 27611-7687

SUBJECT: Triangle Quarry Western Road Project
Maintenance of Undisturbed Natural Vegetation Buffer

Dear Mr. Davis:

I am writing in response to your concerns about our ability to maintain a buffer of existing natural vegetation between the western road area and Crabtree Creek at our Triangle Quarry. We have recently completed a series of slope and horizontal measurements of the area between the creek and the on-going road sinking project. As a result of these measurements, we believe we will be able to maintain a minimum of 50 feet of existing natural vegetation as a buffer between the creek and the western roadway. This we believe will be a sufficient width to prevent the occurrence of any off-site sedimentation.

We are currently proceeding with the road project utilizing an explosives technician to assist us in blast design and execution as was indicated in Mr. Theodore D. Bratton's January 8, 1992 letter to you. We are also following the other recommendations outlined in that letter as they apply to blast design and continuing the sink in two lifts.

I hope I have adequately addressed your concerns about the width of buffer we will be able to maintain as the western roadway project continues. If not, please call me at 266-1100. We will remain in contact with your staff as the project continues.

Sincerely,
Wake Stone Corporation

David F. Lee

David F. Lee

DFL/