Storm Water Pollution Prevention Plan (SWPPP) Completeness Checklist

Permittee: Ash Grove Cement Company
Project Name: New Kiln Construction
Project City: Foreman

Tracking Number: ARR15 2462

Yes	No	N/A		Notes
			A. A site description, including:	
X			1. The nature of the activity?	Part II.A.4.a.i
X			2. Intended sequence of major construction activities.	Part II.A.4.a.ii
X			3. The total area of the site.	Part II.A.4.a.iii
X			4. The area of the site that is expected to undergo excavation.	Part II.A.4.a.iii
X			5. The runoff coefficient of the site after construction is complete.	Part II.A.4.a.iv
X			6. Existing soil or storm water data.	Part II.A.4.a.iv
X	X		7. Endangered Species information.	Part II.A.4.a.vii Contact US Fish and Wildlife.
X			8. Location of SWPPP.	Where SWPPP will be located on site.
			B. Site Map showing:	
X	X		1. Drainage patterns.	Part II.A.4.a.v Drainage arrows.
X	X		2. Approximate slopes after major grading.	Part II.A.4.a.v Grading lines
X			3. Area of soil disturbance.	Part II.A.4.a.v What will be disturbed.
X			4. Outline of areas which will not be disturbed.	Part II.A.4.a.v Areas left undisturbed.
X	X		5. Location of major structural and non-structural controls.	Part II.A.4.a.v Where controls will be. This can change on a daily basis.
X			6. Areas where stabilization practices are expected to occur.	Part II.A.4.a.v What area will be stabilized either temp. or perm.
X			7. Surface waters.	Part II.A.4.a.v Any water bodies on site.
X	X		8. Storm water discharge locations.	Part II.A.4.a.v Where does the stormwater leave the site.
X			9. The name of the receiving water(s).	Part II.A.4.a.vi From trib to ultimate receiving stream. This can be in the written portion.
			C. Description of Controls:	
			1. Erosion and sediment controls, including:	
X			a) Stabilization practices for all areas disturbed by construction.	Part II.A.4.b.i.A Be sure to include timing and specs.
X			b) Structural practices for all drainage/discharge locations.	Part II.A.4.b.i.B
X			c) Does construction site have >=10ac draining to a common drainage location?	Part II.A.4.b.i.B(1) & (2) Cannot tell based on map/description
X			d) If yes, description and placement of sedimentation basin.	Part II.A.4.b.i.B(1) & (2) No place for sed basin
X			i) Sediment basin dimensions and calculations.	Part II.A.4.b.i.B(1) & (2), greater than 10 acres, must meet 10 yr 24 hour storm or 3600 cf/ac
X			ii) Sediment basin outfall type, size, capacity, etc. calculations.	Part II.A.4.b.i.B(1) & (2)
			2. Storm Water management controls, including:	
X			a) Measures used to control pollutants occurring in storm water discharges after construction activities are complete.	Part II.A.4.b.ii Be sure to include timing and any needed specs.
X			b) Velocity dissipation devices to provide non-erosive flow conditions from the discharge point along the length of any outfall channel.	Part II.A.4.b.ii.B Design details for both temp. and perm. Structures.
			3. Other controls including:	
X			a) Waste disposal practices which prevent discharge of solid materials to waters of the U. S.?	Part II.A.4.b.iii.A Will there be dumpsters on-site?
X			b) Measures to minimize offsite tracking of sediments by construction vehicles.	Part II.A.4.b.iii.B Construction exit? Design details?
X	X		c) Measures to ensure compliance with State or local waste disposal, sanitary sewer, or septic system regulations.	Part II.A.4.b.iii.C Will there be portable toilets? Will there be an office that is used?
X			d) Does the site have a concrete washout area?	Please describe plans for waste concrete
X			Is the washout area design/description included?	
X			4. Description of the timing during the construction when measures will be implemented.	Part II.A.4.b

NPDES PERMIT FILE
NPDES # ARR15 2462
AFIN # 41-00001
____ Permit
____ Correspondence
____ Technical
9-7-07 Date Scanned & Init
MR

Permittee: Ash Grove Cement Company
Project Name: New Kiln Construction
Project City: Foreman

Tracking Number: ARR15 2462

X	X		D. Are State or local requirements incorporated into the plans?	Part II.A.4.c Verify with local officials that no other requirements are needed.
X	X		E. Are maintenance procedures for control measures identified in the plan?	Part II.A.4.d Timing of repairs. When will silt fencing be cleaned, constr. exit be cleaned, etc.
X			F. Are inspection procedures identified in the plan?	Part II.A.4.e
X	X		1. Is the inspector listed?	Who will be doing inspections?
X	X		2. Are the inspectors certifactions/qualifications listed?	What makes this person(s) qualified?
X	X		3. Is the inpsector certifcation signed?	A sample certification is at the bottom of this checklist. Must be signed or have a statement that it will be signed.
X	X		4. Does the inspection report have certifications?	Inspection forms should have a certification that all reported information is true and accurate
X			G. Documentation of permit eligibility related to Total Maximum Daily Loads (TMDL).	Part II.A.4.f See http://www.adeq.state.ar.us/water/branch_planning/ See 2004 list of TMDLs and 303(d) list
X			H. Documentation of attainment of Water Quality Standards after authorization.	Part II.A.4.g What will happen if water quality standards change after permit issuance?
X	X		I. Identification of allowable non-storm water discharges identified in the plan?	Part II.A.5
X	X		J. Signed Contractor certification.	Part II.A.6 Must be signed or have a statement that it will be signed prior to commencment of construction.
X			K. Signed Plan certification.	Part II.A.2 & Part II.B.10 Must be signed by permittee.

SAMPLE INSPECTOR CERTIFICATION

SITE INSPECTOR CERTIFICATION

I certify under penalty of law that I am knowledgeable in the principals of erosion and sediment control, who possesses the skills to evaluate conditions at the above construction site that could impact stormwater quality, and knowledgeable in the correct installation of erosion and sediment controls. I certify that I am able to assess the effectiveness of any sediment and erosion control measures selected in the SWPPP to control the quality of stormwater discharges from the construction site. Additionally, I certify that I have reviewed the Arkansas Stormwater Construction General Permit ARR150000 and SWPPP which was prepared by the owner of this site.

Printed Name of Title of Person Construction Activities

Signature and Date

CONSTRUCTION STORM WATER POLLUTION PREVENTION PLAN

ASH GROVE CEMENT COMPANY
FOREMAN, ARKANSAS

AUGUST, 30 2007

Prepared for:

ASH GROVE CEMENT COMPANY
4457 HIGHWAY 108
FOREMAN, ARKANSAS

Project No. 070127

SCHREIBER & YONLEY ASSOCIATES
ENVIRONMENTAL ENGINEERS

16252 Westwoods Business Park Drive • Ellisville, MO 63021 • (636) 256-7200
www.perma-fix.com/sya

CONSTRUCTION STORM WATER POLLUTION PREVENTION PLAN

ASH GROVE CEMENT COMPANY FOREMAN, ARKANSAS

MANAGEMENT APPROVAL

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

SIGNATURE: _____ **DATE:** 8-17-07

NAME: F.L. Streitman

TITLE: Vice President Environmental Affairs

CONSTRUCTION STORM WATER POLLUTION PREVENTION PLAN

ASH GROVE CEMENT
FOREMAN, ARKANSAS

CONTRACTOR APPROVAL

I certify under penalty of law that I understand the terms and conditions of the general National Pollutant Discharge Elimination System permit that authorizes the storm water discharges associated with industrial activity from the construction site identified as part of this certification.

This Plan will be implemented as herein described.

SIGNATURE: _____ **DATE:** _____

NAME: _____

TITLE: _____

COMPANY: _____

ADDRESS: _____

_____

PHONE: _____

CONSTRUCTION STORM WATER POLLUTION PREVENTION PLAN

ASH GROVE CEMENT
FOREMAN, ARKANSAS

SITE INSPECTOR CERTIFICATION

I certify under penalty of law that I am knowledgeable in the principals of erosion and sediment control, who possesses the skills to evaluate conditions at the above construction site that could impact storm water quality, and knowledgeable in the correct installation of erosion and sediment controls. I certify that I am able to assess the effectiveness of any sediment and erosion control measures selected in the SWPPP to control the quality of storm water discharges from the construction site. Additionally, I certify that I have reviewed the Arkansas Storm Water Construction General Permit ARR150000 and SWPPP which was prepared by the owner of this site.

SIGNATURE: _____ **DATE:** _____

NAME: _____

TITLE: _____

COMPANY: _____

ADDRESS: _____

_____

PHONE: _____

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STORM WATER POLLUTION PREVENTION PLAN
ASHGROVE CEMENT FOREMAN, ARKANSAS FACILIY

1.0 INTRODUCTION/SITE DESCRIPTION

Pursuant to the Federal Clean Water Act (33 USC 1251) and the Arkansas Water and Air Pollution Control Act (Act 472 as amended), this Storm Water Pollution Prevention Plan (SWPPP or Plan) applies to the Ash Grove Cement Company Foreman, Arkansas Facility located at 4457 Highway 108, Foreman, Arkansas 71836 (Figure 1). This Plan will guide and assist the facility in meeting permit conditions of General Permit ARR150000 and state water quality standards by preventing pollutants from entering storm water discharge flow. The Notice of Intent for the general permit is included as Appendix A.

The Foreman Facility is a manufacturer of cement products. Raw materials are quarried on-site or purchased, crushed, screened and separated, sent through a kiln process, cooled, milled, and then stored in silos as finished product prior to shipping. Ash Grove Cement Company is building a new "dry process" cement manufacturing line south and adjacent to its existing "wet process" lines. Included in the expansion will be new raw material storage and grinding, a new dry process pre-calciner kiln pyroprocessing system and a new vertical finish mill. There will also be material transport equipment utilized in the new plant and connecting to the old plants storage, shipping, and finish grinding systems. The Foreman Facility occupies approximately 2,100 acres. Approximately 104 acres will be disturbed to complete this project. Figure 2 shows the project area.

2.0 DRAINAGE AREAS

The Ash Grove Foreman Facility holds an NPDES Permit AR0042846 for the operation of the current facility and has applied for coverage under NPDES Permit ARR150000 for the construction of the addition. The entire active construction and construction lay-down areas will drain to the Process Pond, a 245 million gallon sedimentation pond located on-site. The Process Pond drains to Outfall 003 covered under permit AR0042846. Currently, the Process Pond and Outfall 003 receive storm water and some non-storm water discharges from the existing plant. The Outfall 003 receiving water is an unnamed tributary to French Creek. French Creek flows into Walnut Bayou and into Segment 1B of the Red River Basin. According to the NPDES Permit AR0042846 and the 2004 Arkansas TMDL list, the receiving stream is not on the 303(d) list. Outfall 003 will continue to be monitored as described in the NPDES Permit AR0042846.

Figure 3 shows the current plant, storm water flow directions, surface water body locations, and outfall locations. Figure 4 shows the same information for the plant after construction is complete. The construction area is primarily composed of limestone bedrock overlain with clay soils. The area is currently wooded. The runoff coefficient for the area prior to the construction is estimated to be between 0.2 and 0.3 using a table of runoff coefficients calculated with the Rational Formula as show in Attachment 1. The runoff coefficient after construction is complete is estimated to remain 0.2 to 0.3 for the lay-down areas and change to between 0.7 and 0.8 for the built area.

3.0 POLLUTION PREVENTION TEAM

The work telephone number for all team members is 870-542-6217.

Team Leader: Aaron Bufmack, Ash Grove Cement Project Manager

Mr. Bufmack will coordinate all stages of plan development and implementation. He will ensure all reports are submitted in a timely manner.

Designated Construction Team Leader: {Contractor Designee}

{The Contractor Designee} will note any process changes that could affect pollution prevention and assign responsibilities of stabilization, housekeeping, preventative maintenance, spill prevention and response, visual inspections, and compliance inspections.

The following lists the Pollution Prevention Team and their responsibilities:

- {Contractor Designee(s)}
  - Engineering changes that affect discharges and erosion control,
  - Visual inspections and employee training.
- Ash Grove Coordinator
  - Coordinate construction activities to ensure conformance with the Foreman plant's SWPPP.

4.0 CONSTRUCTION ACTIVITY

This construction project is estimated to begin October 2007 and has an estimated end date of December 2009. Construction activities during this project will include but are not limited to ground clearing, grading and drainage improvements, pilings and footings placement, erection, and startup. This construction site has many areas of construction that are independent of each other. It is likely that one area could still be in the grading and drainage stage while another could be near completion of construction. Figure 5 shows the current construction areas, current locations of structural sediment and erosion controls, and areas that have been stabilized. This figure will be updated periodically throughout the project as noted in Section 6.

For each portion of the construction site, the following general schedule will be followed:

- The first task will include minimal clearing and grubbing to allow for the installation of appropriate perimeter sediment and erosion control measures.
- The remainder of the construction site portion will then be cleared and graded, and any required and appropriate drainage structures will be installed.
- Buildings or other structures will be constructed, which may include excavation of top soil down to bedrock.
- Stabilization will occur as soon as practicable but no later than 14 days after the construction activity in that portion of the site has temporarily or permanently ceased.

5.0 BEST MANAGEMENT PRACTICES

5.1 Stabilization

Stabilization measures at construction areas will be initiated as soon as practicable but no later than 14 days after the construction activities have temporarily or permanently ceased. Stabilization practices may include:

- temporary seeding,
- permanent seeding,
- mulching or placing rock,
- geotextiles,
- sod stabilization,
- vegetative buffer strips, and
- protection of existing vegetation and trees.

A log of the construction areas, when construction temporarily or permanently ceased, and when stabilization measures were initiated will be kept on-site. A sample log is included in Appendix B.

5.2 Structural Controls

The storm water from the construction area flows to the existing sedimentation pond (The Blue Hole), the Process Pond, and then to Outfall 003. The capacity of the Process Pond is approximately 245 million gallons (32 million ft^3). The NPDES Permit ARR150000 requires a sedimentation pond sized for the smaller of a) 3,600 ft^3/acre of construction area or b) capacity to store storm water from a 10-year/24-hour storm event.

a) ~104 acres of disturbed area x 3,600 ft^3/acre = 37,440 ft^3 required capacity

b) 10-yr/24-hr storm event is just under 7 inches (0.58 ft).
0.58 ft x 104 acres (x 43,560 ft^2/acre) = 2,627,539 ft^3 required capacity

No additional sedimentation pond capacity is required for this construction event since the 32 million ft^3 capacity of the Process Pond is well above the required capacity of 37,440 ft^3. The Process Pond will continue to be monitored periodically per NPDES Permit AR0042846 to make sure that sediment is not discharged through Outfall 003 in excess of the permit limits.

Structural storm water erosion and sediment controls will be installed at the perimeter of the construction site areas to reduce flows through exposed soils, limit runoff and limit the discharge of pollutants. These controls will include but not be limited to:

- properly installed and maintained silt fences
- earth dikes
- drainage swales, and
- rock outlet protection.

Details of these structural controls are included as Appendix C.

5.3 Non-Structural Controls

Best management practices (BMPs) are utilized to prevent pollution in storm water discharge. These practices include:

- Outside storages during construction are to be maintained neat and orderly.
- No stray trash shall be permitted. Contractors shall be required to provide appropriate trash containers and remove trash as needed to properly maintain the site during each construction phase.
- Any diesel fuel or other petroleum-based liquids used by contractors shall be stored in a tank and provided with secondary containment. All other liquid products, such as paints, solvents, and oils (including waste liquids), in use shall be stored under roof and provided with secondary containment.
- Bi-weekly documented inspections of the erosion control measures to assure continuous integrity shall be conducted. See Appendix B for a sample form.
- Documented inspections immediately (not to exceed 24 hours) following heavy rains (0.5 inch or greater) of the erosion control measures to assure continuous integrity. See Appendix B for a sample form.

5.4 Other Controls

Contractors will be using portable toilets. In addition, contractor trailers will have toilets with holding tanks. The holding tanks will be pumped on a weekly basis.

5.5 Non-Storm Water Discharges

There will be no non-storm water discharges other than fire fighting activities from the construction area during the construction period.

6.0 MAINTENANCE AND INSPECTION SCHEDULE

The construction areas for this project shall be inspected at least once per 14 calendar days and within 24 hours following heavy rains (0.5 inch or greater). The form in Appendix B or another appropriate form may be used and inspection records shall be kept on file on site. Contractor inspection forms are to be forwarded to Keith Byerly of Ash Grove Cement Company when completed.

Each inspection will include checking the structural controls and noting any necessary maintenance items including, but not limited to, removal of sediment deposits; replacement or repair of silt fence; repair of rock displacement or erosion around check dams. Make any required repairs immediately. Any necessary changes to this SWPPP or Figure 5, Current Sediment Controls, shall be noted during each inspection and the documents revised accordingly within 7 days of the inspection.

7.0 RESPONSIBLE INDIVIDUAL

{The Contractor Designee} will be responsible for compliance with environmental matters and for the conduct of environmental inspections related to the construction project.

8.0 LOCAL REQUIREMENTS

The City of Foreman does not have storm water requirements more stringent than the State of Arkansas.

9.0 TRAINING

Contractor employees are trained to the extent required by their specific job responsibilities. Contractor employees conducting earth-moving activities or who may impact BMPs shall receive a general orientation on environmental issues for the construction site. Training records are maintained by the Contractor. A Training Module for this SWPPP is provided by Appendix D.

10.0 PLAN UPDATES

The Pollution Prevention Team shall meet annually to review the bi-weekly and other inspection reports, to assess the status and effectiveness of the BMPs, and to determine any necessary changes to this Plan. The Plan should be amended under the following circumstances:

- the design, operation, or maintenance of BMPs is changed;
- the inspections indicate deficiencies in the SWPPP or any BMP;
- ADEQ notifies the permittee in writing of deficiencies in the SWPPP;
- the SWPPP is determined to be ineffective in significantly minimizing or controlling erosion and sedimentation;
- Non-compliance with the NPDES Permit AR0042846 for Outfall 003;
- ADEQ determines violations of Water Quality Standards may occur or have occurred.

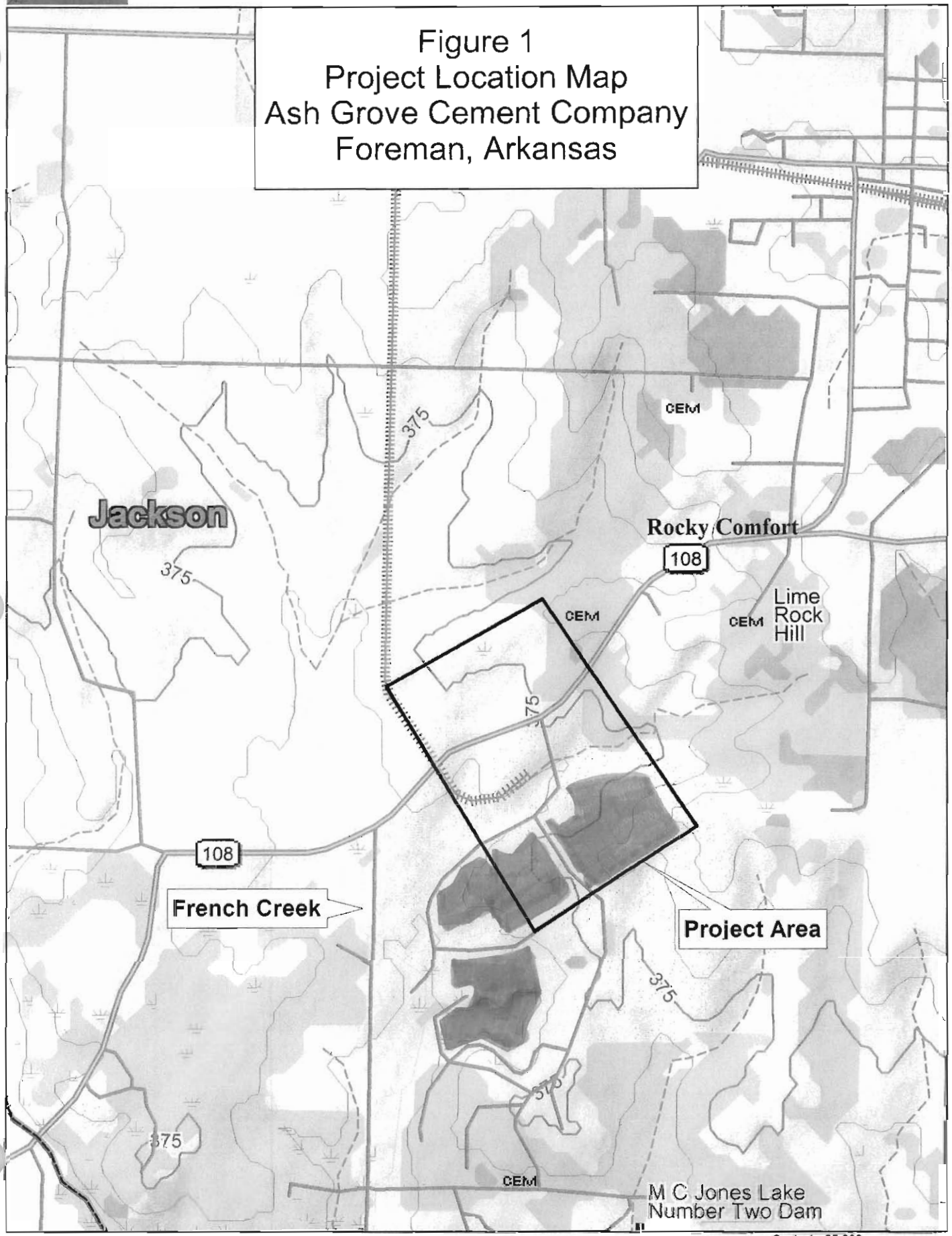
A written report of the annual assessment shall be attached to Appendix E of this SWPPP.

FIGURES

ATTACHMENT 1

From: Robert A. Corbitt, "Standard Handbook of Environmental Engineering", McGraw Hill, Inc., 1990

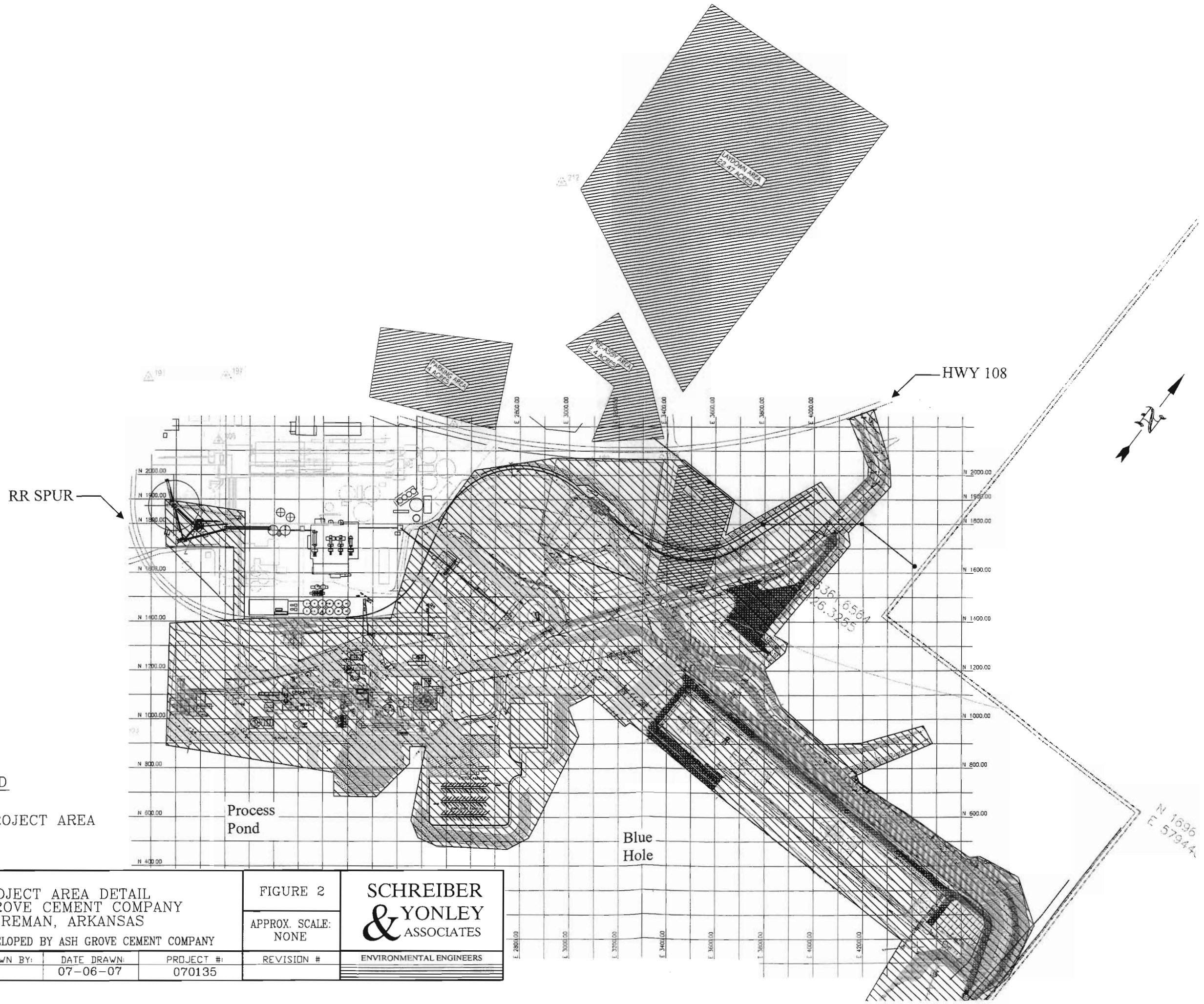
Figure 1
Project Location Map
Ash Grove Cement Company
Foreman, Arkansas



TN
MN (0.0°E)

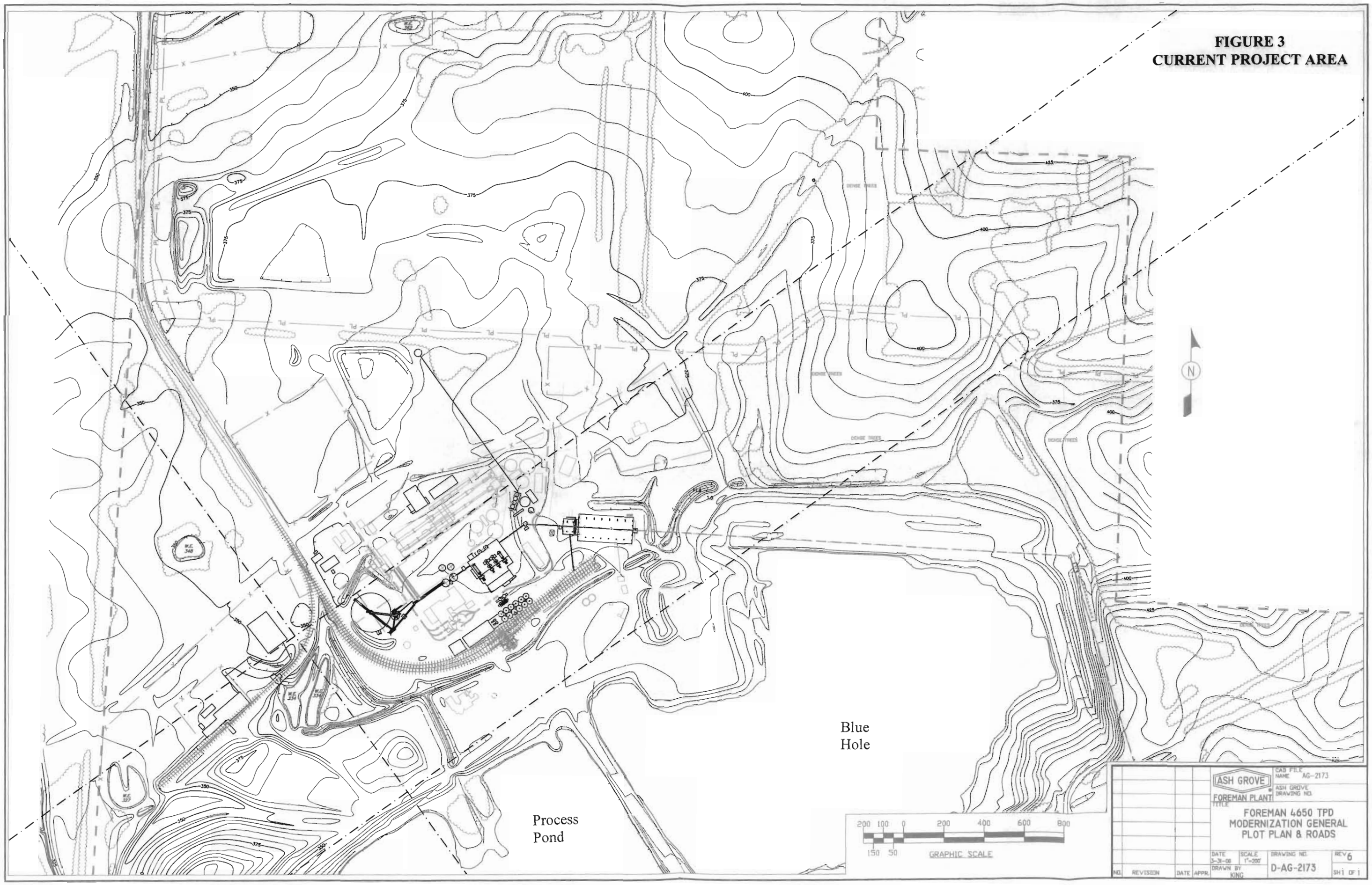
Scale 1 : 25,000

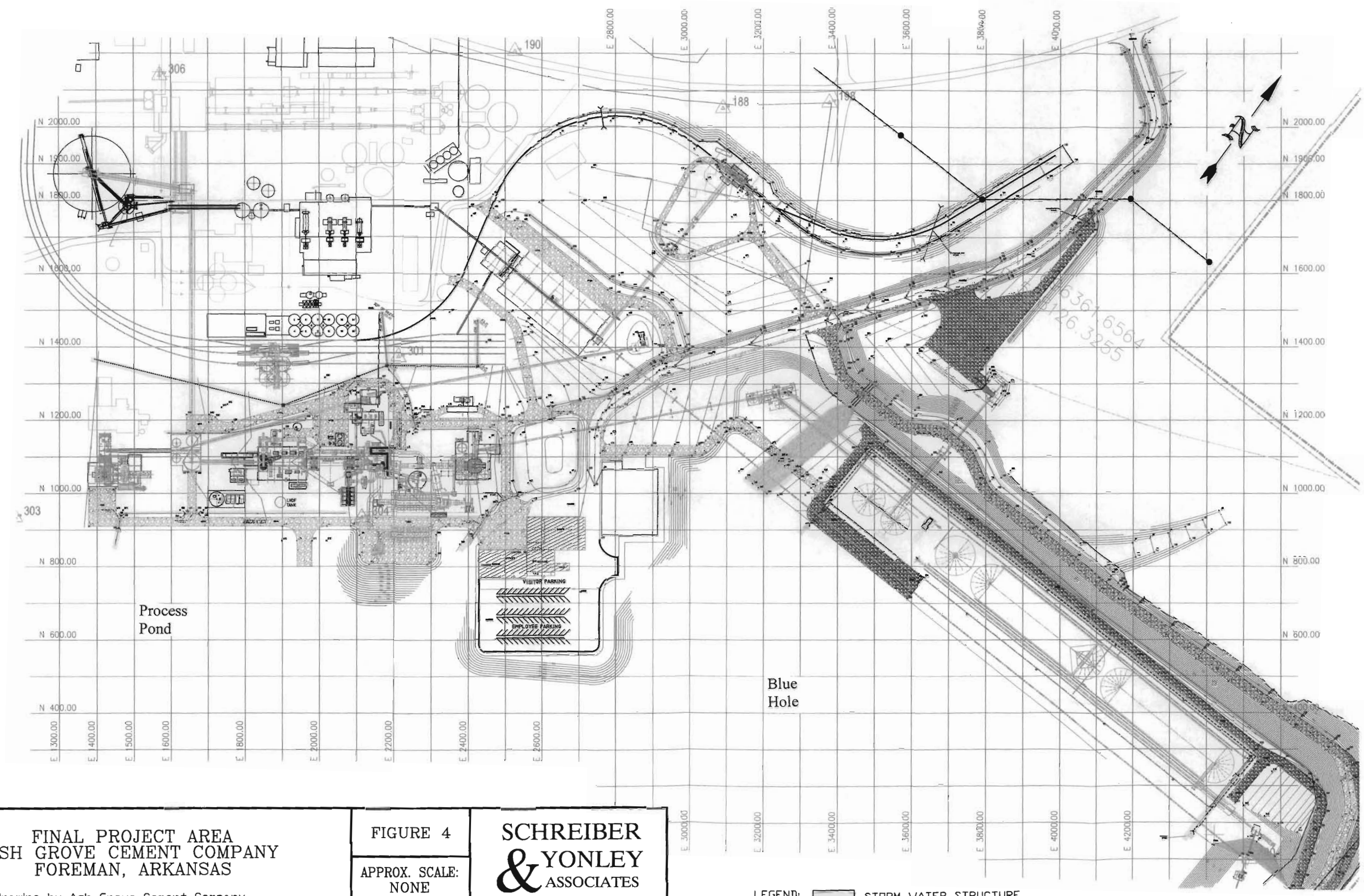
1" = 2,083.3 ft Data Zoom 12-0



PROJECT AREA DETAIL ASH GROVE CEMENT COMPANY FOREMAN, ARKANSAS FROM A DRAWING DEVELOPED BY ASH GROVE CEMENT COMPANY				FIGURE 2 APPROX. SCALE: NONE	SCHREIBER & YONLEY ASSOCIATES ENVIRONMENTAL ENGINEERS
CHECKED BY:	DRAWN BY:	DATE DRAWN:	PROJECT #:	REVISION #	
NJM		07-06-07	070135		

FIGURE 3
CURRENT PROJECT AREA





FINAL PROJECT AREA ASH GROVE CEMENT COMPANY FOREMAN, ARKANSAS Based on a drawing by Ash Grove Cement Company				FIGURE 4 APPROX. SCALE: NONE	SCHREIBER & YONLEY ASSOCIATES ENVIRONMENTAL ENGINEERS
CHECKED BY:	DRAWN BY:	DATE DRAWN:	PROJECT #:	REVISION #	
NJM	BAH	07-23-07	070135		

LEGEND: STORM WATER STRUCTURE

ATTACHMENT 1

From: Robert A. Corbitt, "Standard Handbook of Environmental Engineering", McGraw Hill, Inc., 1990

TABLE 7.6 Runoff Coefficients for the Rational Formula by Hydrologic Soil Group and Slope Range (37)*

Land use	A			B			C			D		
	0–2%	2–6%	6%+	0–2%	2–6%	6%+	0–2%	2–6%	6%+	0–2%	2–6%	6%+
Cultivated land	0.08	0.13	0.16	0.11	0.15	0.21	0.14	0.19	0.26	0.18	0.23	0.31
	0.14	0.18	0.22	0.16	0.21	0.28	0.20	0.25	0.34	0.24	0.29	0.41
Pasture	0.12	0.20	0.30	0.18	0.28	0.37	0.24	0.34	0.44	0.30	0.40	0.50
	0.15	0.25	0.37	0.23	0.34	0.45	0.30	0.42	0.52	0.37	0.50	0.62
Meadow	0.10	0.16	0.25	0.14	0.22	0.30	0.20	0.28	0.36	0.24	0.30	0.40
	0.14	0.22	0.30	0.20	0.28	0.37	0.26	0.35	0.44	0.30	0.40	0.50
Forest	0.05	0.08	0.11	0.08	0.11	0.14	0.10	0.13	0.16	0.12	0.16	0.20
	0.08	0.11	0.14	0.10	0.14	0.18	0.12	0.16	0.20	0.15	0.20	0.25
Residential												
Lot size $\frac{1}{8}$ acre	0.25	0.28	0.31	0.27	0.30	0.35	0.30	0.33	0.38	0.33	0.36	0.42
(0.05 ha)	0.33	0.37	0.40	0.35	0.39	0.44	0.38	0.42	0.49	0.41	0.45	0.54
Lot size $\frac{1}{4}$ acre	0.22	0.26	0.29	0.24	0.29	0.33	0.27	0.31	0.36	0.30	0.34	0.40
(0.10 ha)	0.30	0.34	0.37	0.33	0.37	0.42	0.36	0.40	0.47	0.38	0.42	0.52
Lot size $\frac{1}{3}$ acre	0.19	0.23	0.26	0.22	0.26	0.30	0.25	0.29	0.34	0.28	0.32	0.39
(0.13 ha)	0.28	0.32	0.35	0.30	0.35	0.39	0.33	0.38	0.45	0.36	0.40	0.50
Lot size $\frac{1}{2}$ acre	0.16	0.20	0.24	0.19	0.23	0.28	0.22	0.27	0.32	0.26	0.30	0.37
(0.2 ha)	0.25	0.29	0.32	0.28	0.32	0.36	0.31	0.35	0.42	0.34	0.38	0.48
Lot size 1 acre	0.14	0.19	0.22	0.17	0.21	0.26	0.20	0.25	0.31	0.24	0.29	0.35
(0.4 ha)	0.22	0.26	0.29	0.24	0.28	0.34	0.28	0.32	0.40	0.31	0.35	0.46
Industrial	0.67	0.68	0.68	0.68	0.68	0.69	0.68	0.69	0.69	0.69	0.69	0.70
	0.85	0.85	0.86	0.85	0.86	0.86	0.86	0.86	0.87	0.86	0.86	0.88
Commercial	0.71	0.71	0.72	0.71	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72
	0.88	0.88	0.89	0.89	0.89	0.89	0.89	0.89	0.90	0.89	0.89	0.90
Streets	0.70	0.71	0.72	0.71	0.72	0.74	0.72	0.73	0.76	0.73	0.75	0.78
	0.76	0.77	0.79	0.80	0.82	0.84	0.84	0.85	0.89	0.89	0.91	0.95
Open space	0.05	0.10	0.14	0.08	0.13	0.19	0.12	0.17	0.24	0.16	0.21	0.28
	0.11	0.16	0.20	0.14	0.19	0.26	0.18	0.23	0.32	0.22	0.27	0.39
Parking	0.85	0.86	0.87	0.85	0.86	0.87	0.85	0.86	0.87	0.85	0.86	0.87
	0.95	0.96	0.97	0.95	0.96	0.97	0.95	0.96	0.97	0.95	0.96	0.97

*First row of each entry gives runoff coefficients for storm recurrence intervals less than 25 years; second row gives runoff coefficients for storm recurrence intervals of 25 years or more.

$$V = S_d (1 - e^{-K\rho})$$

where S_d = the depression storage capacity of the basin
$K = 1/S_d$

These authors suggest a range of 0.25 in (0.64 cm) for S_d in pervious areas to 0.0625 in (0.16 cm) in impervious surfaces. Typical depression storage values for the Denver area are presented in Table 7.7.

Infiltration. Infiltration is the passage of water through the soil surface. The maximum rate that water can enter the soil is the infiltration capacity f_ρ, which decreases rapidly from a maximum f_o at the beginning of the storm to a constant

APPENDIX A

ARKANSAS DEPARTMENT OF ENVIRONMENTAL QUALITY
NPDES PERMIT ARR150000
NOTICE OF INTENT

APPENDIX B

INSPECTION AND MAINTENANCE CHECK LISTS

STABILIZATION LOG

CONSTRUCTION AREA	DATE CONSTR. ACTIVITIES CEASED	TEMP/ PERM	STABILIZATION METHOD	DATE STABILIZATION INITIATED

Site Inspection Form

Project Name and Identification: _____
Type of Inspection, Bi-weekly or Post-storm: _____
Inspection Date: _____
Inspected By: _____

Erosion Control	
Are there any bare areas which require temporary or permanent stabilization?	OK, Needs Attention, NA
Are all finished cut and fill slopes adequately stabilized?	OK, Needs Attention, NA
Do any structural practices show evidence of overtopping, breaks or erosion?	OK, Needs Attention, NA
Are all earthen structures seeded and mulched? Is vegetation providing adequate protection?	OK, Needs Attention, NA
Sediment Control	
Are sediment trapping measures in place and functioning properly?	OK, Needs Attention, NA
Have sediment-trapping practices been installed in the proper location and before extensive grading begins?	OK, Needs Attention, NA
Is sediment leaving the site and/or damaging adjacent property?	OK, Needs Attention, NA
Is there mud on public roads or at intersections with public roads?	OK, Needs Attention, NA
Runoff Conveyance and Control	
Are all drainage channels and outlets adequately stabilized?	OK, Needs Attention, NA
Are all operational storm sewer inlets protected so that sediment will not enter the system?	OK, Needs Attention, NA
Is there evidence of increased off-site erosion since the project began?	OK, Needs Attention, NA
Are downstream waterways and property adequately protected from increases in storm water runoff?	OK, Needs Attention, NA
Maintenance	
Do any seeded areas require fertilizer, reseeding or additional mulch?	OK, Needs Attention, NA
Do any structural practices require repair or clean-out?	OK, Needs Attention, NA
Have temporary structural practices that are no longer needed been removed?	OK, Needs Attention, NA
Is any work occurring in streams? Is channel damage being minimized? Is stabilization needed?	OK, Needs Attention, NA
Pollutant Sources	
Are there any debris piles with petroleum cans, chemical containers or other sources of possible pollution?	OK, Needs Attention, NA

NA – Not Applicable

Inspection Date: _____

NA – Not Applicable

General Condition of Site: _____

_____

Corrective Actions Recommended: _____

_____

Corrective Actions Implemented: _____

_____ Date Implemented: _____

Other Observations: _____

_____

_____

List areas where land disturbance activities have permanently or temporarily stopped: _____

_____

Mark any changes required to the SWPPP and Figure 5, Current Sediment Controls.

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage this system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Inspector Signature: _____ **Date:** _____

APPENDIX C

EROSION AND SEDIMENT CONTROL MEASURES

Table of Construction Activities and BMPs

BMP Fact Sheets From "Protecting Water Quality", Missouri Department of Natural Resources, Publication 000488:

- **Temporary Gravel Construction Entrance/Exit Pad**
- **Dust Control**
- **Sediment Fence**
- **Mulching**
- **Check Dams**
- **Inlet Protection**

BMP Fact Sheets from the Flood Control District of Maricopa County, AZ, Drainage Design Manual, Erosion Control:

- **Diversion Dike**
- **Drainage Swale**
- **Solid Waste Management**
- **Equipment Maintenance Procedures**
- **Designated Washdown Areas**

Table of Construction Activities and BMPs

Activity	Best Management Practice (BMP)	Pollutants Addressed
Clearing or grading land	• Control runoff and dust during construction and install sediment controls per SWPPP. • Clean and maintain sediment basins. • Proper disposal of debris. • Inspection and maintenance.	Sediment, nutrients, other pollutants attached to the sediment
Handling fresh concrete or other cement-related mortars	• Never wash fresh concrete mortar into a storm drain or stream. • Use designed wash-out areas. • When building concrete aggregate driveways, wash fines to the side, to straw bales, or to a sediment basin.	Toxic and acidic pollutants, sediments.
Painting, sanding, plastering, applying drywall, paper, or tile, or other activities using paints, solvents or adhesives	• Keep residues such as paint chips from entering storm drain. • Keep paints, solvents, and other chemicals and their waste containers and oiled rags covered from the rain. • Prepare for and clean up spills. • Minimize wastes and properly dispose of all wastes. • Fix any oil leaks in equipment.	Toxics, including metals, and oils and greases.
All activities producing or handling wastes, such as batteries and solvents	• Minimize wastes and properly dispose of all wastes. • Ensures all workers know proper procedures. • Provide secure storage site/construction yard. • Erect barriers or isolate area to prevent contact with stormwater runoff.	Toxic pollutants, including metals.
General contracting and construction management	• Make sure all applicable BMPs are followed. • Ensure all local, state, and federal permits are in place and followed.	All
Training new employees	• Include training about water quality BMPs. • Ensure all employees understand the project SWPPP	Potentially all

APPENDIX D

TRAINING MODULE

STORM WATER POLLUTION PREVENTION
TRAINING MODULE

A. General overview of storm water pollution planning requirements and this Plan.

B. List of areas and activities that have the potential to pollute storm water.

- Disturbed soil on slopes
- Fuel Tanks
- Parking Lot/Storage Areas for Construction
- Large Equipment Tracking Dirt to Street

C. Pollution prevention activities.

- Existing BMPs
- Good Housekeeping
- Maintain Siltation Barriers and Other BMPs
- Employee Training
- Weekly and Storm Event Inspections

D. Contractors must be notified of the existence of the SWPPP and what action or precautions shall be taken to minimize the potential for erosion and the potential for damaging any BMP.

APPENDIX E

ANNUAL REPORTS OF PLAN ASSESSMENT

SAMPLE SWPPP ANNUAL CHECKLIST

			DEFICIENCIES/CORRECTIVE ACTION	DATE CORRECTED
GENERAL				
Do all elements of the Storm Water Pollution Prevention Plan reflect actual site conditions?	YES ☐	NO ☐	_____	_____
Is the site map accurate?	YES ☐	NO ☐	_____	_____
Are inspection and training records in order?	YES ☐	NO ☐	_____	_____
Have there been any spill events since the last inspection? (If yes, this information should be included in the SWPPP.)	YES ☐	NO ☐	_____	_____

INSPECTOR SIGNATURE: _____ DATE: _____

APPENDIX F

GENERAL STORM WATER PERMIT ARR150000

SCHREIBER & YONLEY ASSOCIATES
ENVIRONMENTAL ENGINEERS

16252 Westwoods Business Park Drive
Ellisville, Missouri 63021
636/256-7200 • Fax 636/256-7202
www.perma-fix.com/sya

July 13, 2007

RECEIVED
JUL 16 2007
ARK FIELD OFFICE

US Fish and Wildlife
Environmental Services Office
110 South Amity, Suite 300
Conway, AR 72032

Re: Endangered Species Act Review for
ADEQ Construction NPDES General Permit ARR150000
Foreman, Arkansas
Latitude: N33.6948 Longitude: W94.4192

To Whom It May Concern:

Ash Grove Cement Company is requesting an Endangered Species Act review as part of their application for the Arkansas Department of Environmental Quality (ADEQ) NPDES General Permit for Construction Sites (ARR 150000). Ash Grove Cement Company will be engaging in construction activities at its plant located at 4457 Highway 108, Foreman, Arkansas, 71836. Figure 1 attached is a Project Location Map identifying the project area on a topographic map.

Ash Grove Cement Company is building a new "dry process" cement manufacturing line south and adjacent to its existing "wet process" lines. Included in the expansion will be new raw material storage and grinding, a new dry process pre-calciner kiln pyroprocessing system, and a new vertical finish mill. There will also be material transport equipment utilized in the new plant and connecting to the old plant's storage, shipping, and finish grinding systems. The activities will include, but are not limited to, ground clearing, grading and drainage improvements, pilings and footings placement, and erection and startup. Storm water runoff from the construction and lay down areas will be directed toward the existing retention ponds at the facility. Figure 2 is a larger scale map of the project area.

The portion of the current project area north of Highway was reviewed in 2000-2001 by the Arkansas Natural Heritage Commission, and a database search was completed for endangered species listed by the US Fish and Wildlife Service at that time. During this review it was noted that the American burying beetle was known to occur in Little River County. This 1997 recorded occurrence was found to be approximately 11-12 miles northeast of the Ash Grove Cement Company property. A copy of the previous results is attached.

Storm water discharge from the construction area will flow to the existing sedimentation ponds and out through Outfall 3 currently permitted in NPDES Permit # AR0042846. The existing plant area and storm water discharges were reviewed by ADEQ in 2006 as part of issuing the NPDES permit #AR0042846. As stated on page 2 of the Statement of Basis, the receiving waters for Outfall #3 are not listed on the Arkansas 303(d) list, and the USF&WS did not have

any comments regarding the permit application. A copy of pages 1-3 of the Statement of Basis is included.

Please let us know if there are any questions or if you need further information about this project.

Sincerely,

SCHREIBER, YONLEY & ASSOCIATES

Nancy J. Morgan

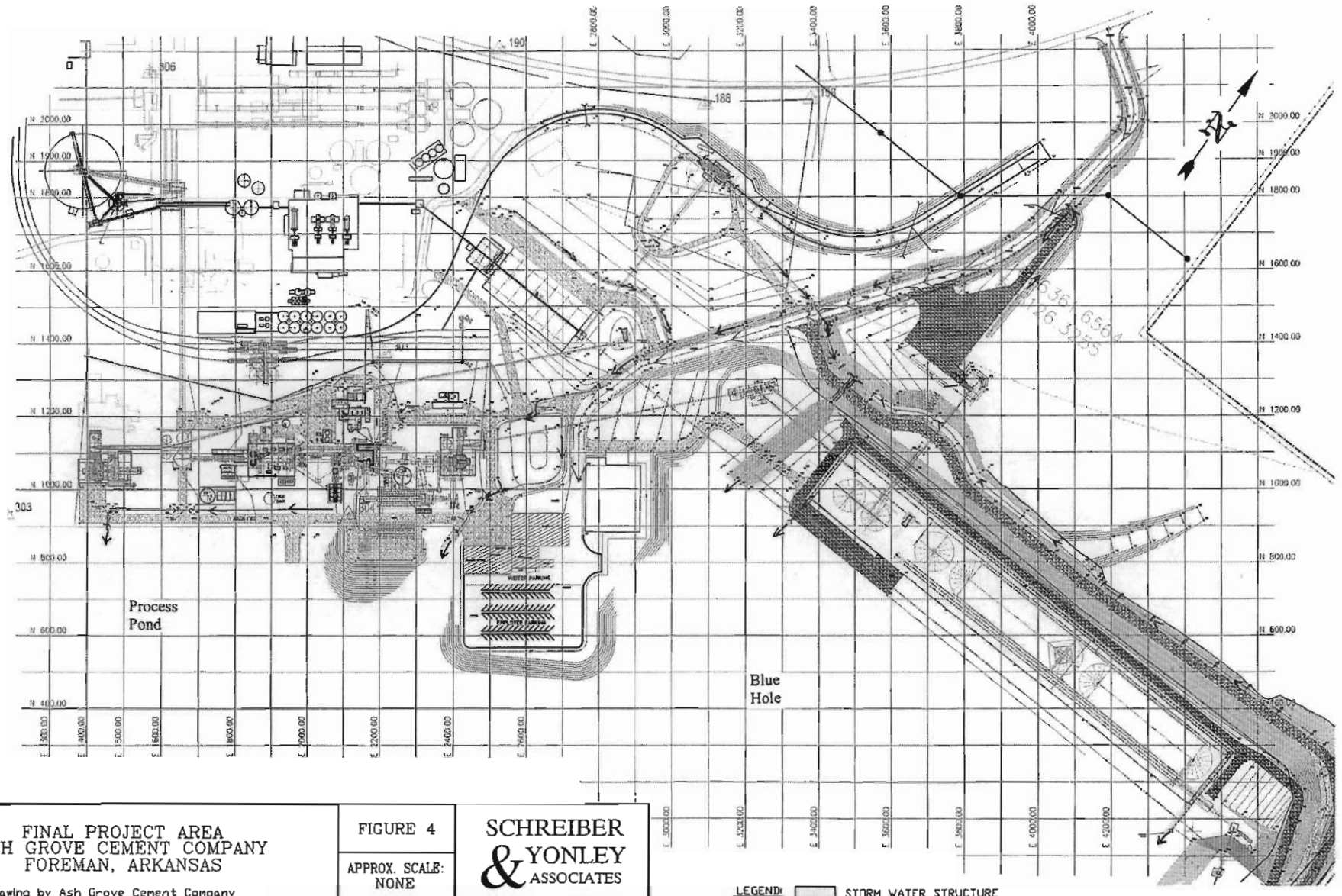
Nancy J. Morgan, P.E.
Environmental Engineer

NJM:bah
Attachments
X:\ASHFOR\070135 - SWPPP\F&W Letter.doc

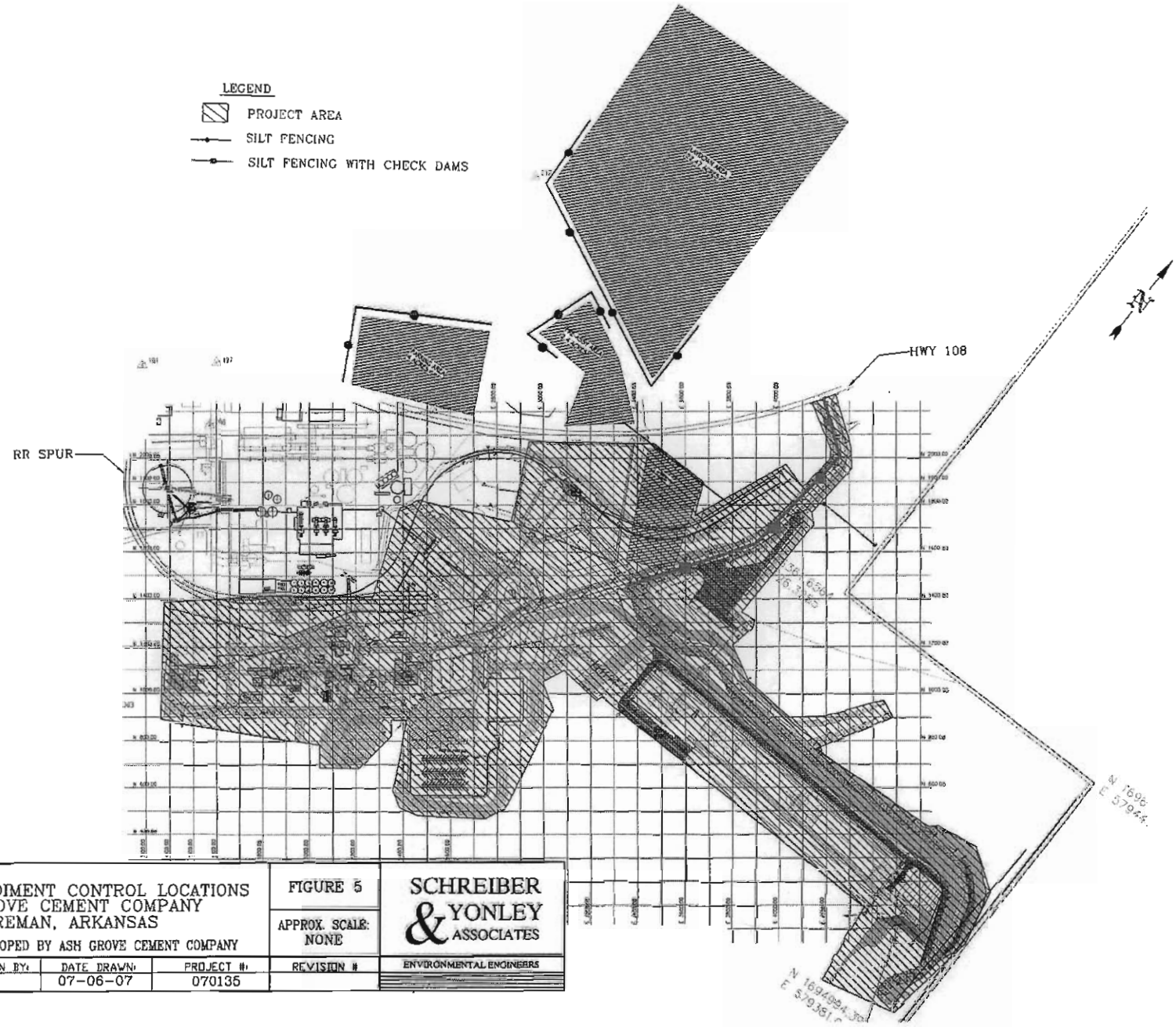
Site may contain wetlands. Contact Corps of Engineers for necessary permits. (telephone (501) 324-5295)

Margaret Harvey
Environmental Coordinator
U.S. Fish and Wildlife Service
Log# 43421-2007-I-0401/EA-0793
Aug 23, 2007
Date

No federally listed endangered, threatened or candidate species present



FINAL PROJECT AREA ASH GROVE CEMENT COMPANY FOREMAN, ARKANSAS				FIGURE 4	SCHREIBER & YONLEY ASSOCIATES
Based on a drawing by Ash Grove Cement Company				APPROX. SCALE: NONE	
CHECKED BY:	DRAWN BY:	DATE DRAWN:	PROJECT #:	REVISION #	ENVIRONMENTAL ENGINEERS
NJM	BAH	07-23-07	070135		



CURRENT SEDIMENT CONTROL LOCATIONS ASH GROVE CEMENT COMPANY FOREMAN, ARKANSAS FROM A DRAWING DEVELOPED BY ASH GROVE CEMENT COMPANY				FIGURE 5 APPROX. SCALE: NONE	SCHREIBER & YONLEY ASSOCIATES ENVIRONMENTAL ENGINEERS
CHECKED BY:	DRAWN BY:	DATE DRAWN:	PROJECT #:	REVISION #	
NJM		07-06-07	070135		

Willis, Nicholas

From: Nancy Morgan [Nancym@syaeng.com]
Sent: Friday, August 31, 2007 2:23 PM
To: Willis, Nicholas
Cc: Fran Streitman; Keith Byerly
Subject: Re: New Kiln Construction SWPPP Ash Grove Cement.

C SWPPP rev 8-31-07.doc (369 K.. figure 5.pdf (1 MB) figure 4 rev.pdf (1 MB)

Nick -
Attached are the changes that were made to the SWPPP per the checklist you provided:

Item A7: The F&W letter was sent to you 8/27/07 via e-mail.

Items B1-B9: Addressed by adding Figure 5 and referencing the drawing and updates to the drawing in Section 4.0 and 6.0 of the SWPPP.

Item C3: Addressed by adding Section 5.4 to the SWPPP.

Item D: Addressed by adding Section 8.0 to the SWPPP.

Item F1,2,4: Addressed through the addition of an Inspector Certification page to the front of the document and adding a certification statement to the end of the inspection report in Appendix B.

Item I: Addressed by adding Section 5.5

Item J and F3: A contractor has not been chosen at this time. After the contractor has been chosen and prior to the start of construction, both the Contractor Certification and the Inspector Certification will be signed. Names will also be entered in the SWPPP Sections 3.0 and 7.0 after they are designated and prior to the start of construction.

Let me know if you have questions or need further information.

Nancy Morgan, PE
Schreiber, Yonley & Associates
16252 Westwoods Business Park Dr
Ellisville, MO 63021
636-256-5655 (direct)
636-256-5642 (fax)
314-220-7026 (nextel cell)
nancym@syaeng.com

>>> "Willis, Nicholas" <WILLIS@adeq.state.ar.us> 8/27/2007 10:47 AM
>>>
Nancy,

The Department is in receipt of a Notice of Intent (NOI), permit fee, and Stormwater Pollution Prevention Plan (SWPPP) for the referenced project. The SWPPP has been reviewed and determined to be deficient. The checklist identifying the deficiencies is attached for your review. A complete SWPPP must be submitted before processing of the NOI can begin. Once the SWPPP has been deemed complete, it will take a maximum of 2 weeks to issue the construction permit. Construction on the project can not commence before the permit is issued. Please submit the updated SWPPP on or before September 10, 2007.

To clarify the issues with the map, drainage patterns need to be shown. Also, if there are controls other than the sedimentation in the process pond planned, I would like to see the tentative locations of these controls. They don't have to be set in concrete (pun intended), but during construction, the site maps will need to be updated as controls are installed and removed.

If there are any questions, please give me a call or send me an email.

Thanks,

Nicholas Willis

Engineer II, NPDES Branch

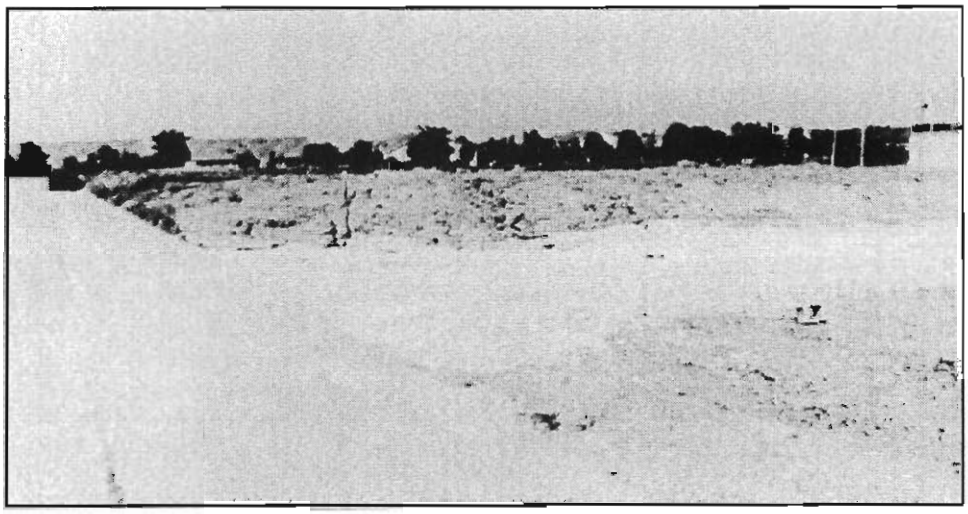
501-682-0619

willis@adeq.state.ar.us

Temporary Gravel Construction Entrance/Exit Pad

Practice Description

A stone base designed to provide a buffer area where construction vehicles can drop their mud to avoid transporting it onto public roads. This practice applies anywhere traffic will be leaving a construction site and moving directly onto a public road or other paved area.



C. Rahm, NRCS, St. Charles Co.

A temporary gravel construction entrance can reduce sediment and resulting safety hazards on public streets.

Recommended Minimum Requirements

Prior to start of construction, temporary gravel construction entrance/exit pads should be designed by a qualified professional and plans and specifications should be available to field personnel.

- **Aggregate Size:** 2- to 3-inch washed stone
- **Pad Design:**
  Thickness: 6 inches minimum
  Width: 12 feet minimum or full width of roadway, whichever is greater
  Length: 50 feet minimum
- **Washing Facility (Optional):** Level area with minimum of 3 inches of washed stone

- **Geotextile Fabric:** An underliner of woven geotextile (fabric) may be used under wet conditions to provide stability

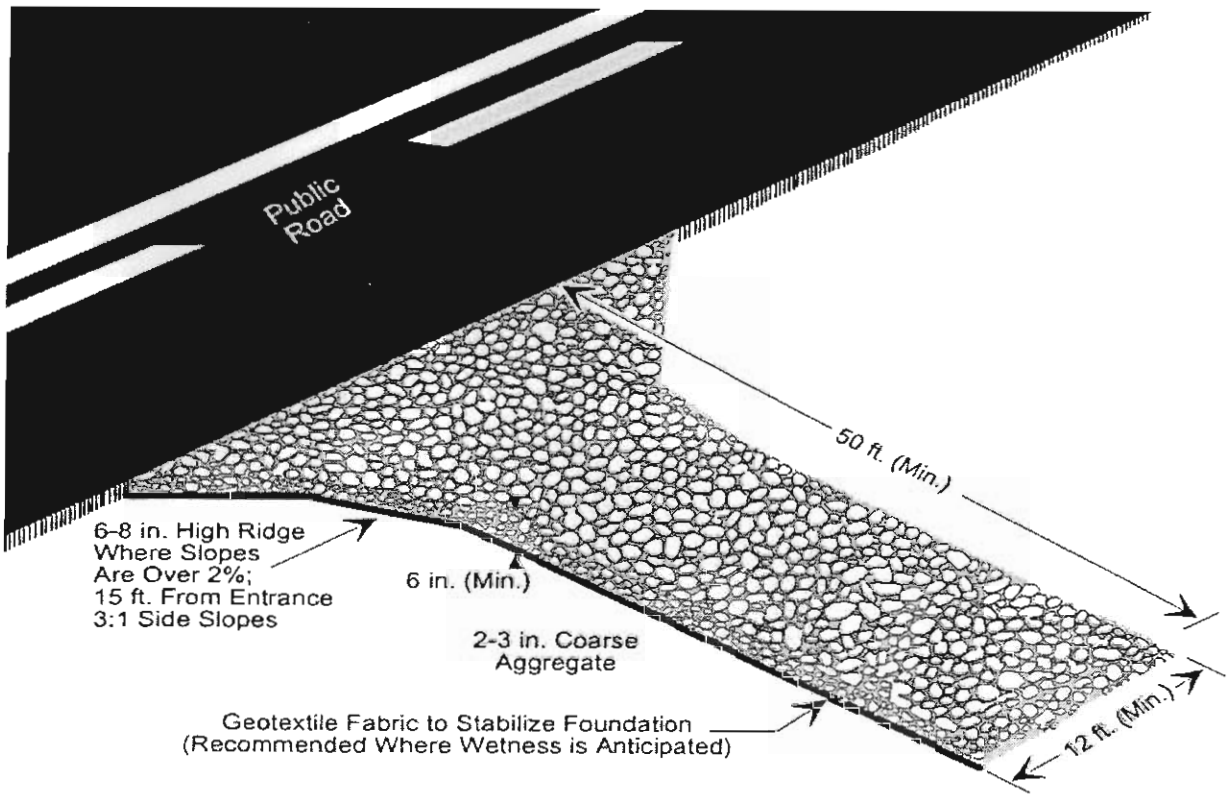


Figure 5.1 Typical Temporary Gravel Construction Entrance

Construction

Avoid locating on steep slopes or at curves on public roads. If possible, locate where permanent roads will eventually be constructed.

Site Preparation

Remove all vegetation and other unsuitable material from the foundation area, grade and crown for positive drainage.

Grading

If slope towards the road exceeds 2%, construct a 6- to 8-inch high ridge with 3:1 side slopes across the foundation approximately 15 feet from the entrance to divert runoff away from the public road.

Install pipe under the pad if needed to maintain drainage ditches along public roads.

Place stone to dimensions and grade shown on plans. Leave surface smooth and sloped for drainage.

Divert all surface runoff and drainage from the stone pad to a sediment trap or basin.

Stabilization

If wet conditions are anticipated, place geotextile filter fabric on the graded foundation to improve stability.

Maintenance

Inspect stone pad and sediment disposal area weekly and after storm events or heavy use.

Reshape pad as needed for drainage and runoff control.

Topdress with clean 2-inch stone as needed.

Immediately remove mud or sediment tracked or washed onto public road.

Repair any broken road pavement immediately.

Remove all temporary road materials from areas where permanent vegetation will be established.

Common Problems

Inadequate runoff control; sediment washes onto public road—install diversions or other runoff control measures.

Stone too small, pad too thin or geotextile fabric absent; results in ruts and muddy conditions as stone is pressed into soil—increase stone size or pad thickness, or add geotextile fabric.

Pad too short for heavy construction traffic—extend pad beyond the minimum 50-foot length as necessary.

Dust Control

Practice Description

Includes a wide range of techniques that reduce movement of windborne soil particles (dust) from disturbed soil surfaces. This practice applies to construction routes and other disturbed areas where on-site and off-site damage or hazards may occur if dust is not controlled.

C. Rahm, NRCS. St. Charles Co.

Spraying water is effective for dust control on haul roads, although it must be frequently repeated during hot days or heavy traffic periods.

Recommended Minimum Requirements

Dust control measures should be designed by a qualified professional and plans and specifications should be made available to field personnel prior to start of construction.

Whenever possible, leave undisturbed vegetated buffer areas between graded areas.

- **Scheduling:** Plan and schedule construction operations so that the smallest area is disturbed at one time
- **Erosion Control:** Install surface stabilization measures immediately after completing the land grading

Construction

Any combination of the following may be used to help reduce the dust and air pollution at a construction site.

- **Vegetative Cover:** For areas not subjected to traffic, vegetation provides the most practical method of dust control (See *Temporary* or *Permanent Seeding*).

- **Sprinkling:** The site can be sprinkled with water until the surface is moist. This practice is effective for dust control on haul roads or other traffic routes, but constant repetition is required for effective control.

- **Barriers:** Board fences placed perpendicular to the prevailing winds at intervals of 15 times the barrier height can control blowing soil. In areas of known dust problems, windbreak vegetation should be preserved.

- **Street Cleaning:** Use of a street sweeper in the area of a development site can aid in controlling dust.

- **Mulching:** This practice offers a fast and effective means of controlling dust when properly applied. Binders or tackifiers should be used to tack organic mulches (See *Mulching*). Mulching is not recommended for areas with heavy traffic.

If the following materials or any other chemicals are used for dust control, please contact the Missouri Department of Natural Resources, Water Pollution Control Program, or the Kansas Department of Health and Environment for permit requirements.

- **Calcium Chloride:** This material is best used on road surfaces. It can be applied by a mechanical spreader at a rate that keeps the surface moist.

  Note: This method may cause restrictions for vegetation establishment.

Construction Verification

- **Spray-on Adhesives:** Spray-on adhesives are effective on non-organic soils and many will withstand heavy traffic loads. Table 5.13 presents examples of spray-on adhesives that have been used successfully for dust control.

Table 5.13 Application Rates for Spray-on Adhesives used in Dust Control

Adhesive	Water Dilution (adhesive: water)	Type of Nozzle	Application Rate (gallons/acre)
Anionic Asphalt Emulsion	7:1	Coarse	1200
Latex Emulsion	12.5:1	Fine	235
Resin in Water	4:1	Fine	300
Acrylic Emulsion (Non-traffic)	7:1	Coarse	450
Non-Acrylic Emulsion (Traffic)	3.5:1	Coarse	350

Source: Virginia Erosion and Sediment Control Handbook, 1993

Check construction site during vehicular traffic or windy conditions to see if measures are working adequately.

Troubleshooting

Consult with a qualified professional if the following occurs:

- Spray-on adhesives are specified. A permit may be needed.

Maintenance

Maintain dust control measures continuously throughout dry weather periods, until all disturbed areas have been stabilized.

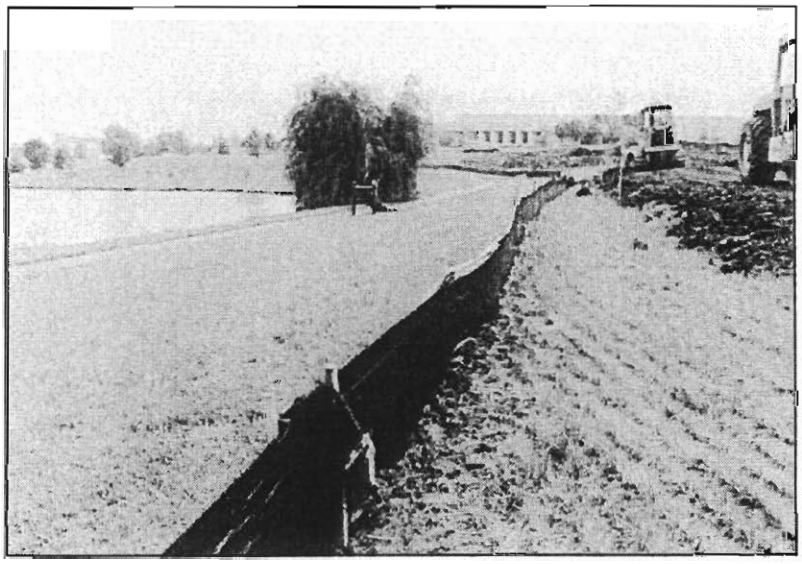
Common Problems Drought conditions; results in dry soils and increase in dust problems—use greater precautions during these periods.

Sediment Fence

Practice Description

A temporary sediment barrier consisting of a geotextile fabric which is attached to supporting posts and trenched into the ground. Sediment-laden runoff ponds uphill from the sediment fence and runoff is temporarily stored to allow sediment to settle out of the water.

This practice applies where sheet erosion occurs on small disturbed areas. Sediment fences are intended to intercept and detain small amounts of sediment from disturbed areas in order to prevent sediment from leaving the site. Sediment fences can also prevent sheet erosion by decreasing the velocity of the runoff.



A properly installed sediment fence slows water flow long enough for the sediment to settle out.

C. Raitt, NRCS, Platte Co.

Recommended Minimum Requirements

Prior to start of construction, sediment fences should be designed by a qualified professional. Plans and specifications should be referred to by field personnel throughout the construction process.

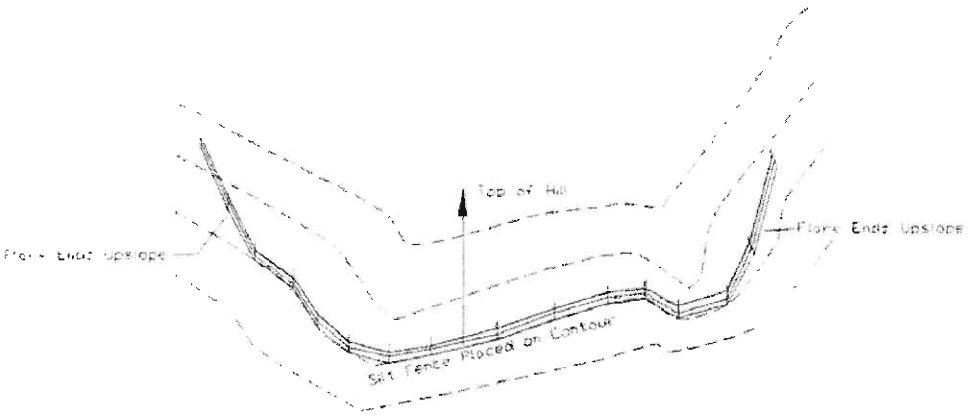
- **Drainage Area:** Limited to 1/4 acre per 100 feet of fence. Area is further restricted by slope steepness as shown in Table 5.16.

- **Location:** Fence should be built on a nearly level grade and at least 10 feet from the toe of the slope to provide a broad shallow sediment pool. Install on the contour, where fence can intercept runoff as a sheet flow; not located crossing channels, waterways or other concentrated flow paths; not attached to existing trees.

- **Length:** Maximum of 600 feet; flare ends of fence uphill to temporarily impound water as shown in Figure 5.33a.

Table 5.16 Typical Land Slope and Distance for Sediment Fence

Land Slope (%)	Maximum Slope Distance * above Fence (feet)
less than 2	100
2 to 5	75
5 to 10	50
greater than 10	*



* Follow manufacturers' recommendations for proper spacing.

Figure 5.33a Placement of Sediment Fence

- **Spacing of Support Posts:** 10 feet maximum for fence supported by wire; 6 feet maximum for high strength fabric without supportive wire backing

- **Trench:** Bottom 1 foot of fence must be buried minimum of 6 inches deep.

- **Impounded Water Height:** Depth of impounded water should not exceed 1.5 feet at any point along the fence.

- **Support Posts:** 4-inch diameter wood or 1.33 lb/linear foot steel, buried or driven to a depth of 24 inches with support wire; 2-inch square wood or 1.0 lb/linear foot steel without support wire. Steel posts should have projections for fastening fabric.

Table 5.17 Example Specifications for Sediment Fence Fabric

Physical Property	Minimum Requirement
Filtering Efficiency	85%
Tensile strength at 20% (maximum) elongation:	
Standard strength	30 lb/linear inch
High strength	50 lb/linear inch

Source: Adapted from North Carolina Field Manual, 1991

- **Support Wire:** Wire fence (14-gauge with 6-inch mesh), necessary if standard strength fabric is used

- **Reinforced, Stabilized Outlets:** Should be located to limit water depth to 1.5 feet measured at lowest point along crest line.
  Crest Height: 1 foot maximum
  Width of splash pad: 5 feet maximum
  Length of splash pad: 5 feet minimum
  Supports: 4 foot spacing

- **Synthetic Geotextile Fabric:** Conforming to specifications in Table 5.17 and containing ultraviolet light inhibitors and stabilizers. Minimum design life of 6 months.

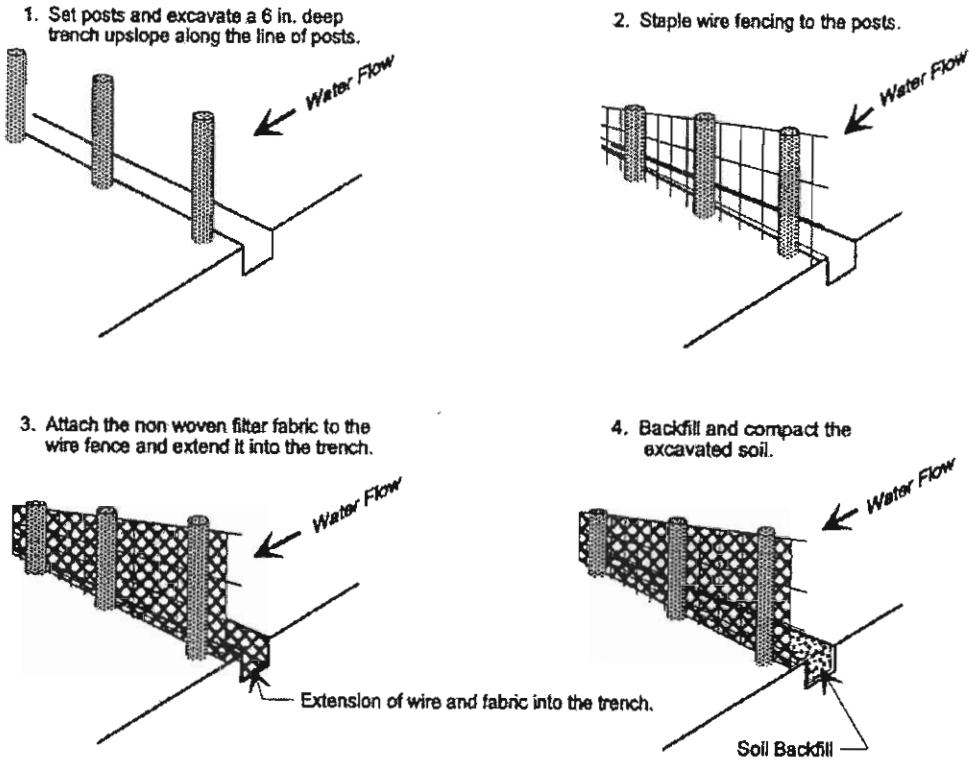


Figure 5.33 Installation of Sediment Fence

Construction

Site Preparation

Determine exact location of underground utilities.

Grade alignment of fence as needed to provide broad, nearly level area upstream of fence.

Fence Installation

Dig a trench at least 6 inches deep along the fence alignment as shown in Figure 5.33.

Drive posts at least 24 inches into the ground on the downslope side of the trench. Space posts a maximum of 10 feet if fence is supported by wire, or 6 feet if high strength fabric and no support fence is used.

Fasten support wire fence to upslope side of posts, extending 6 inches into the trench as shown in Figure 5.33.

Attach continuous length of fabric to upslope side of fence posts. Try to minimize the number of joints. Avoid joints at low points in the fence line. Where joints are necessary, fasten fabric securely to support posts and overlap to the next post.

Place the bottom 1 foot of fabric in the 6-inch deep trench (minimum), lapping toward the upslope side. Backfill with compacted earth or gravel as shown in Figure 5.34.

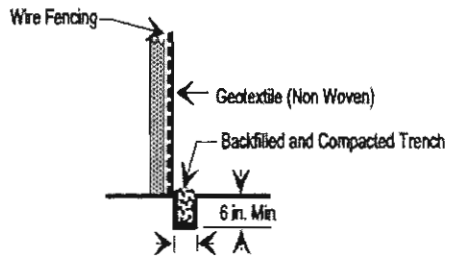


Figure 5.34 Detail of Sediment Fence Installation

To reduce maintenance, excavate a shallow sediment storage area in the upslope side of the fence. Provide good access in areas of heavy sedimentation for clean out and maintenance.

Reinforced Stabilized Outlet Installation

Allow for safe bypass of storm flow to prevent overtopping failure of fence.

Set outlet elevation so that water depth cannot exceed 1.5 feet at the lowest point along the fence.

Drive posts securely at least 24 inches into the ground, at a spacing of 4 feet. Install a horizontal brace between the support posts to serve as an overflow weir and to support the top of the fabric.

Immediately downslope of the fabric, excavate foundation for splashpad a minimum of 5 feet wide, 5 feet long and 1 foot deep. Place 1 foot of riprap in the excavated foundation. The surface of the riprap should be flush with the undisturbed ground (no outfall).

Erosion Control

Stabilize disturbed areas in accordance with vegetation plan.

Construction Verification

Check finished grades and dimensions of the sediment fence. Check materials for compliance with specifications.

Troubleshooting

Consult with registered design professional if any of the following occur:

- Variations in topography on site indicate sediment fence will not function as intended; changes in plan may be needed.
- Design specifications for filter fabric, support posts, support fence, gravel or riprap cannot be met; substitutions may be required. Unapproved substitutions could lead to failure.

Maintenance

Inspect sediment fences at least once a week and after each rainfall. Make any required repairs immediately.

Should the fabric of a sediment fence collapse, tear, decompose or become ineffective, replace it promptly.

Remove sediment deposits as necessary to provide adequate storage volume for the next rain and to reduce pressure on the fence. Take care to avoid damaging or undermining the fence during cleanout.

Remove all fencing materials and unstable sediment deposits and bring the area to grade and stabilize it after the contributing drainage area has been properly stabilized.

Common Problems

Drainage area too large or too much sediment accumulation allowed before cleanout; results in overtopping, sagging or collapse of fence. Increase sediment storage capacity upslope of fence or remove accumulation more frequently—repair fence.

Approach too steep; results in collapse of fence due to high velocity or undercutting of fence—reduce slope of approach area, or consult with registered design professional.

Fence not adequately supported; results in sagging or collapse of fence—add additional supports.

Bottom of fence not buried properly, results in undercutting of fence—reinstall fence using proper method of trenching.

Fence installed across drainageway; results in sagging, collapse or undercutting of fence—relocate fence away from drainageway.

Mulching

Practice Description

The application of plant residues such as straw or other suitable materials to the soil surface. Mulch protects the soil surface from the erosive force of raindrop impact and reduces the velocity of overland flow. It helps seedlings germinate and grow by conserving moisture, protecting against temperature extremes and controlling weeds. Mulch also maintains the infiltration capacity of the soil.

Mulch can be applied to seeded areas to help establish plant cover. It can also be used in unseeded areas to protect against erosion over the winter or until final grading and shaping can be accomplished.

N. Klopfenstein, NRCS. St. Charles Co.

It takes about two tons per acre of straw mulch to cover at least 75 percent of the ground surface. To prevent erosion and provide the best microclimate for seed establishment, straw mulch should be physically anchored or tied down with a tackifier.

Recommended Minimum Requirements

Prior to start of construction, mulch requirements should be designed by a qualified professional. Plans and specifications should be referred to by field personnel throughout the construction process.

- **Material:** As specified in the approved site plan. If not specified, select from mulch materials listed in Table 5.10. The choice should be based upon soils, slope steepness and length, flow conditions and time of year (See Figure 5.4).

- **Coverage:** At least 75% of the soil surface
- **Anchoring:** Light materials such as hay and straw should be anchored mechanically, or with tackifiers or netting. Heavy material mulches such as wood chips will not require anchoring.

Installation

Site Preparation

Divert runoff water from areas above the site that will be mulched.

Remove stumps, roots and other debris from the construction area.

Grade area as needed to permit the use of equipment for seeding, mulching and maintenance. Shape area so that it is relatively smooth.

If the area will be seeded, follow seeding specifications in the design plan (See *Temporary* and *Permanent Seeding*) and apply mulch immediately after seeding.

Mulching

Spread straw or cereal grain mulch uniformly over the area with a power blower, hydroseeder or by hand. No more than 25% of the ground surface should be visible after spreading.

Apply at the rates shown in Table 5.10. Use higher rates for steep slopes, channels and other erosive areas.

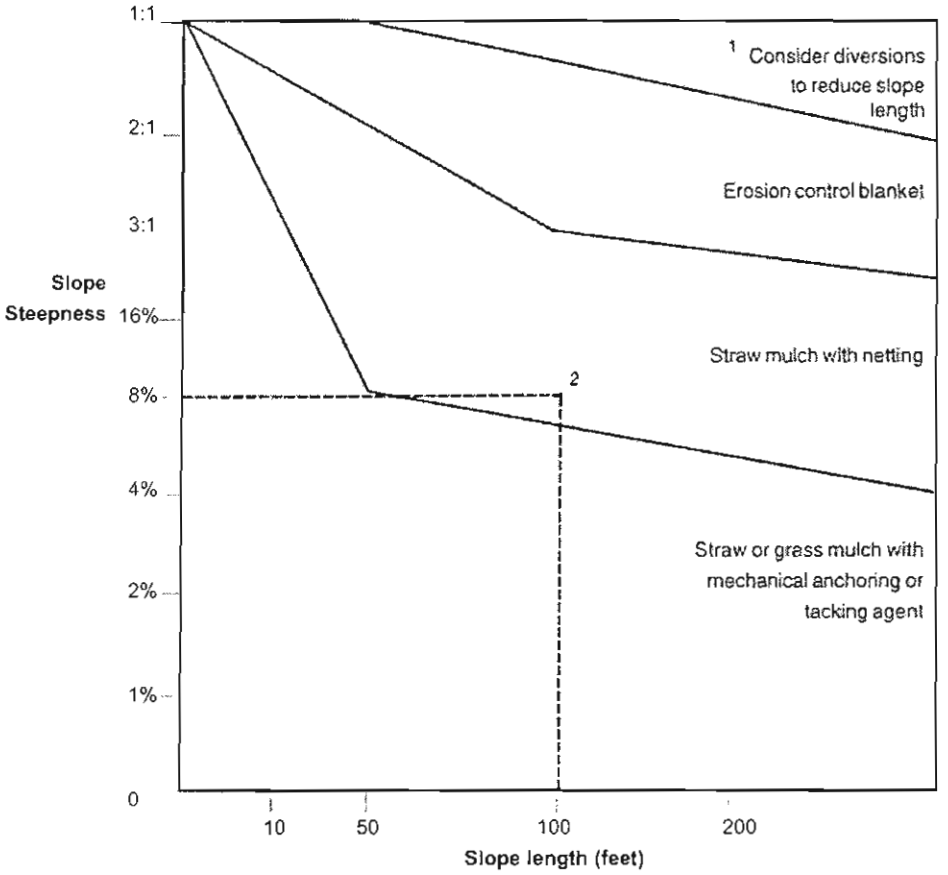
Anchor straw or wood cellulose mulch by one of the following methods:

- Crimp with a weighted, straight, notched disc or a mulch anchoring tool to punch the straw into the soil.
- Tack with a liquid tackifier designed to hold mulch in place. Use suitable spray equipment and follow manufacturer's recommendations.
- Cover with netting, using a degradable natural or synthetic mesh to hold mulch materials in more erosive areas. The netting should be anchored according to manufacturer's specifications (See *Erosion Control Blankets*).

Table 5.10 Typical Mulching Materials and Application Rates

	Material	Rate per Acre	Requirements	Installation/Uses
Organic Mulches:	Straw	1 1/2 - 2 1/2 tons	Dry, unchopped, unweathered; free of weed seeds and rot;	Spread by hand or machine 1.5 to 2.5 inches deep; must be tacked or tied down.
	Wood fiber, wood cellulose, recycled newsprint, bonded fiber matrix	1 - 2 tons	Double the application rate for erosion control on critical areas	Use with power mulcher or hydroseeder; may be used to tack straw on steep slopes. Do not use in hot, dry weather.
	Wood chips	10 - 20 tons	Air dry. Add Nitrogen fertilizer, 20 to 25 lbs of N/ton of mulch	Apply with blower, chip handler or by hand. Not for fine turf areas. Most effective around trees and shrubs. Not recommended for mowed areas.
	Bark	35 yd^3	Air dry, shredded or hammermilled or chips. Add Nitrogen fertilizer, 20 to 25 lbs of N/ton of mulch	Apply with mulch blower, chip handler or by hand. Do not use asphalt tack. Resistant to wind blowing. Most effective around trees and shrubs. Not recommended for mowed areas.
Nets, Mats and Roving:	Netting	Cover area	Uniform natural or synthetic netting. Used with or without organic mulch, depending on product.	Withstands water flow. Must be anchored.
	Erosion control mats/blankets	Cover area	Use without additional mulch.	Suitable for steep areas and areas with concentrated water flow. Must be anchored with good blanket-to-soil contact.
	Fiberglass roving	1/2 - 1 ton	Continuous fibers of drawn glass bound together with a nontoxic agent. Use with organic mulch.	Apply with compressed air ejector. Tack with emulsified asphalt at rate of 25 - 35 gal/1000 ft^2.
Tackifiers	Mulch Tackifiers: Many commercial products	Follow manufacturer's specifications	Biodegradable powders, water dispersable.	Use to hold mulch on steep or wet areas. Apply with suitable spray equipment at manufacturer's recommended rate.
Soil Binders:	Chemical Stabilizers: Many Trade Names	Follow manufacturer's specifications.	Use for temporary stabilization of soil.	Not beneficial to plant growth. Do not attempt to seed/mulch over the soil binder.

Source: adapted from North Carolina Field Manual, 1991



1 For slopes steeper than 1:1, consider building a diversion above slope to divert water.
2 Example: An 8% slope 100' long requires a straw mulch with netting.

Figure 5.4 General Mulch Recommendations to Protect from Splash and Sheet Flow *

Source: Adapted from Minnesota "Protecting Water Quality in Urban Areas," 1991

* Recommendations for specific sites may vary depending upon local conditions.

Use heavy natural nets without additional mulch, synthetic netting with additional mulch or erosion control mats/blankets to control erosion on steep slopes and in areas needing a higher degree of protection such as waterways, swales and diversion channels. These commercial materials vary greatly in longevity, strength, heaviness and the rate of water flow they can handle.

Install netting and mats/blankets according to manufacturer's specifications making sure materials are properly anchored (See *Erosion Control Blankets*).

Construction Verification

Check materials and installation for compliance with specifications.

Troubleshooting

Consult with qualified design professional if any of the following occur:

- Variations in topography on site indicate the mulching materials will not function as intended; changes in plan may be needed.
- Design specifications for mulching materials or seeding requirements cannot be met; substitution may be required. Unapproved substitutions could result in erosion or seeding failure.

Maintenance

Inspect all mulched areas periodically and after rainstorms for erosion and damage to the mulch. Repair promptly and restore to original condition. Continue inspections until vegetation is well established. Keep mower height high if plastic netting is used to prevent netting from wrapping around mower blades or shaft.

Common Problems

Erosion, washout and poor plant establishment—repair eroded surface, reseed, remulch and anchor mulch.

Mulch is lost to wind or stormwater runoff—reapply mulch and anchor by crimping, netting or tacking.

Mulch not anchored in channel; resulting in channel bottom eroding—

repair damage, replace mulch and anchor or install appropriate channel liner.

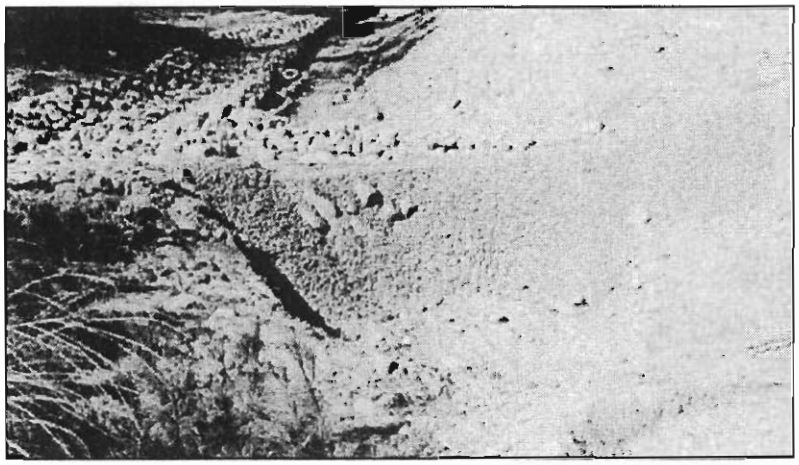
Mulch deteriorates before plant establishment—reapply mulch, do not hydromulch in winter.

Rock Dam

Practice Description

A stone embankment designed to capture sediment on the construction site and prevent off-site sedimentation in streams, lakes and drainageways.

This practice can be used as an alternative to a standard sediment basin for locations with a drainage area of 20 acres or less. It may be preferable to standard sediment basins for sites where an earthen embankment would be difficult to construct.



DEHNR, North Carolina

Rock dams can provide sediment control in drainageways.

Recommended Minimum Requirements

Prior to start of construction, rock dams should be designed by a registered design professional. Plans and specifications should be referred to by field personnel throughout the construction process. The rock dam should be built according to planned grades and dimensions.

- **Drainage Area:** 20 acres or less
- **Dam Height:** Limited to 8 feet
- **Design Life:** 3 years or less

- **Basin Requirements:** Provide large surface area for high trapping efficiency; sediment storage capacity of 1800 feet^3/acre disturbed (see Fig. 5.37).

- **Spillway capacity:** Peak runoff from 10-year, 24-hour duration or design storm, with maximum flow depth of 1 foot and minimum freeboard of 1 foot (length of dam may serve as spillway)

- **Embankment:** Top Width: 6 feet minimum
  Sideslopes: 2.5:1 or flatter upstream; 3:1 or flatter downstream or where vehicles must cross

- **Abutments:** Abutments should be uniformly graded at a slope of 2.5:1 or flatter. The abutments should be protected by riprap extending up the slope to a stable grade (at least 1 foot above the maximum level of spillway discharge).

- **Outlet:** The outlet should be protected by a riprap apron, installed at zero grade with a thickness of at least 1.5 feet, a length equal to the height of the dam or greater length as needed to prevent erosion.

- **Rock:** Well graded, hard, angular, durable stone with a d_{50} of 9 inches minimum

- **Filter:** High strength geotextile covering the entire foundation and abutment area

- **Drainage:** Through 1 foot thick layer of 1/2 - to 3/4-inch gravel covering the upstream face of the dam

- **Location:** So that basin intercepts runoff primarily from disturbed areas, is accessible for periodic sediment removal and does not interfere with construction activities

Construction

Site Preparation

Determine exact location of underground utilities.

Follow all state and local requirements on impoundment sites.

Divert runoff from undisturbed areas away from the rock dam and basin area.

Excavate the foundation for the apron, using it as a temporary sediment basin during construction of the dam.

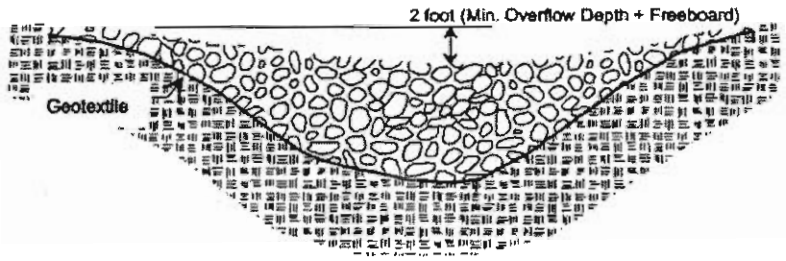


Figure 5.37 Head-on View of Rock Dam, Filter Fabric and Abutments

Clear and grub the area under the dam, removing and properly disposing of all root material, brush and other debris.

Grade the earth abutments no steeper than 2.5:1; 3:1 where vehicles must cross.

Smooth the dam foundation.

Dam and Basin Construction

Cover the entire foundation, including both earth abutments, with filter fabric, making sure the upstream strips overlap the downstream strips at least 1 foot and the upslope end is keyed in (see Fig. 5.38).

Construct the dam to planned dimensions.

Once the dam is in place, clear the sediment basin area properly disposing of the cleared material.

Set a marker stake to indicate the clean out elevation (i.e., point at which the basin is 50% full of sediment).

Divert construction site runoff flow into the upper end of the basin using temporary diversions.

Stabilize all disturbed areas except the lower half of the basin.

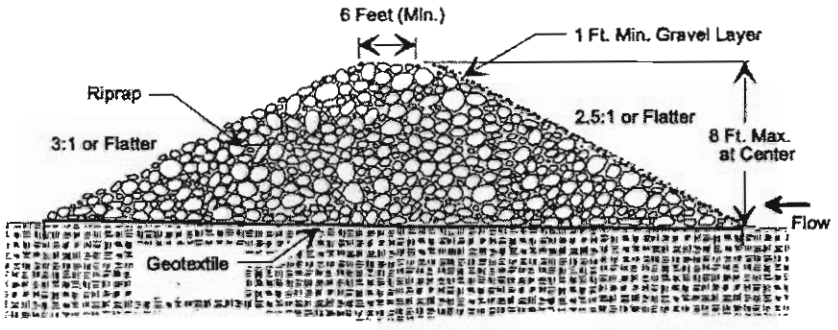


Figure 5.38 Cross Section of Rock Dam Embankment

Safety

Because rock dam sediment basins impound water they should be considered potentially hazardous. The following precautions should be taken:

- Avoid steep slopes; both cut and fill slopes should be 2.5:1 or flatter; 3:1 where maintained with tractor or other equipment.
- Fence area and post warning signs if trespassing is likely.

Construction Verification

Check finished grades and dimensions of the rock dam. Check materials for compliance with specifications.

Troubleshooting

Consult with registered design professional if the following occurs:

- Variations in topography on site indicate rock dam will not function as intended; changes in plan may be needed.

Maintenance

Inspect the rock dam and basin after each storm event.

Remove sediment when it accumulates to half the design volume.

Check the dam and abutments for erosion, piping or rock displacement and repair immediately.

If the basin does not drain between storms, replace the stone on the upstream face of the dam.

Once the construction site has become permanently stabilized, remove the structure and any unstable sediment. Smooth the basin site to blend with the surrounding area and stabilize. All water and sediment should be removed from the basin prior to dam removal. Sediment should be placed in designated disposal areas and not allowed to flow into streams or drainageways during structure removal.

Common Problems

Filter material not properly installed; results in piping and failure of dam—reconstruct dam using proper method to install filter.

Stone size is too small or embankment slope is too steep; results in displacement of rock—replace stone with larger size or reduce slope.

Apron was not extended to stable grade; results in erosion of downstream area—repair erosion and extend apron.

Rock is not high enough on abutment; results in erosion of abutments during spillway flow—extend rock higher on abutment.

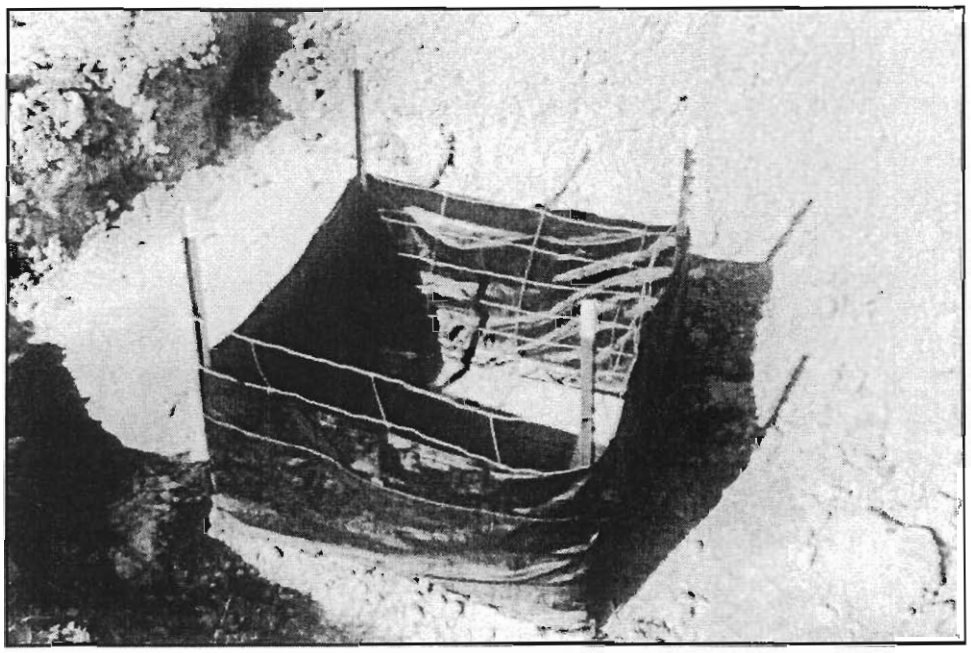
Drainage area is too large; results in sediment being carried through the spillway or accumulation of excess sediment between clean outs—divert runoff from undisturbed areas away from the basin, enlarge basin and clean out basin more frequently; or consult the professional designer for other alternatives.

Layer of gravel aggregate on the upstream face is not thick enough or is too coarse to restrict flow through the dam; results in sediment loss through the dam—replace gravel aggregate with material having proper gradation to provide filtration.

Fabric Drop Inlet Protection

Practice Description

A temporary woven geotextile barrier placed around a drop inlet to prevent sediment from entering the storm drains during construction operations. This practice applies where early use of the storm drain system is necessary.



DEHNR. North Carolina

Filter fabric is only one way of protecting stormwater inlets from siltation early in the grading process.

Recommended Minimum Requirements

Prior to start of construction, fabric drop inlet protection structures should be designed by a registered design professional. Plans and specifications should be referred to by field personnel throughout the construction process.

- **Drainage area:** Less than 1 acre per inlet.
- **Capacity:** 10-year or design storm should enter inlet without bypass flow.
- **Height of fabric:** 1.5 feet maximum, 1 foot minimum; base of fabric should be buried at least 6 inches below the ground surface.

- **Approach:** Less than 1% slope.
- **Sediment Storage:** Generally 35 yard^3/disturbed acre/year for watershed slopes of under 8%; 100 yard^3/disturbed acre/year for slopes over 8%.
- **Support Posts:** Steel fence posts or 2-inch x 4-inch wooden posts. Minimum length of the stakes should be 3 feet; maximum spacing of stakes should be 3 feet.
- **Fabric:** Durable, high-strength synthetic woven fabric.
- **Framing:** Use frame to connect the tops of the posts to stabilize the structure.
- **Stakes:** Close to the drop inlet so that overflow will fall directly into the structure and not onto unprotected soil.
- **Safety:** Provide protection to prevent children from entering the inlet and outlet.

Construction

Space stakes evenly around the perimeter of the inlet a maximum of 3 feet apart, and securely drive them into the ground, approximately 18 inches deep.

To provide needed stability to the installation, frame with 2 x 4-inch wood strips or other suitable materials around the crest of the overflow area at a maximum of 18 inches above the drop inlet crest.

If possible, cut fabric from one continuous roll to eliminate joints.

Place the bottom 12 inches of the fabric in a trench and backfill the trench with crushed stone or compacted soil.

Fasten the fabric securely to the stakes and frame. Joints should be overlapped to the next stake.

Optional: Wire fence may be used to support the fabric. The wire should be 14-gage minimum with maximum mesh spacing of 6 inches. The top

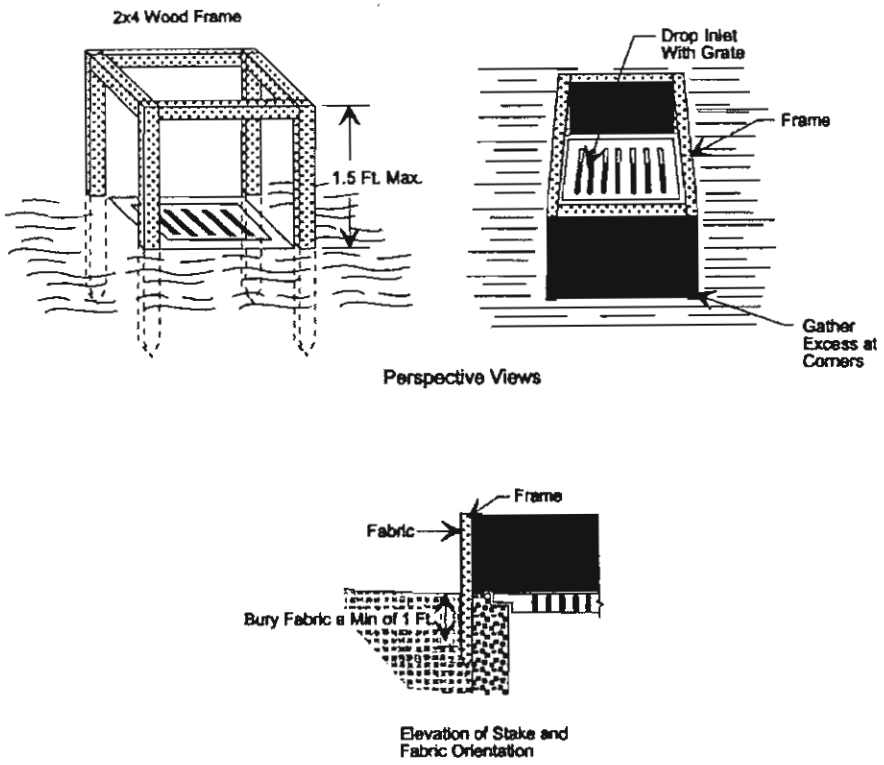


Figure 5.28 Fabric Drop Inlet Protection

of the fence should be level, and the bottom should be buried at least 6 inches below ground surface.

The top of the frame and fabric must be well below the ground elevation downslope from the drop inlet to keep runoff from bypassing the inlet. It may be necessary to build a temporary dike on the downslope side of the structure to prevent bypass flow. Material from within the sediment pool may be used for dike construction.

Optional: Straw bales may be used in lieu of fabric. If this method is selected, install bales as described in *Straw Bale Sediment Trap* section. Straw bales should be set back 12 to 24 inches from inlet.

Stabilization Stabilize all bare areas around the inlet.

Construction Verification Check finished grades and dimensions of fabric drop inlet protection structures.

Troubleshooting

Consult with registered design professional if any of the following occur:

- Variations in topography on site indicate fabric drop inlet protection will not function as intended; changes in plan may be needed.
- Design specifications for posts, fabric or fencing cannot be met; substitution may be required. Unapproved substitutions could result in failure of the structure.

Maintenance

Inspect fabric barrier after each rainfall event and make needed repairs immediately.

Remove sediment from the pool area as necessary to provide adequate storage volume for the next rain. Take care not to damage or undercut the fabric during the sediment removal.

When the contributing drainage area has been adequately stabilized, remove all materials and unstable sediment and dispose of properly. Bring the disturbed area to the grade of the drop inlet; smooth and compact it.

Common Problems

Posts and fabric not supported at top—use frame to support tops of post and fence to support fabric.

Fabric not properly buried at bottom; resulting in undercutting—use proper installation to bury fabric.

Sediment not removed from pool; resulting in inadequate storage volume for the next storm—remove sediment as needed to prevent build-up.

Top of fabric set too high; resulting in flow bypassing the inlet—lower top of fabric.

Fence not close enough to inlet; resulting in erosion and undercutting of inlet—relocate fence adjacent to inlet.

Land slope at drain inlet too steep; resulting in high flow velocity and poor trapping efficiency—flatten slope at inlet.

Excavated Drop Inlet Protection

Practice Description

An excavated area in the approach to a storm drain drop inlet or curb inlet. The purpose is to trap sediment at the approach to the storm drainage system and not permit sediment to flow into the storm drain. This practice applies where early use of the storm drain system is necessary.

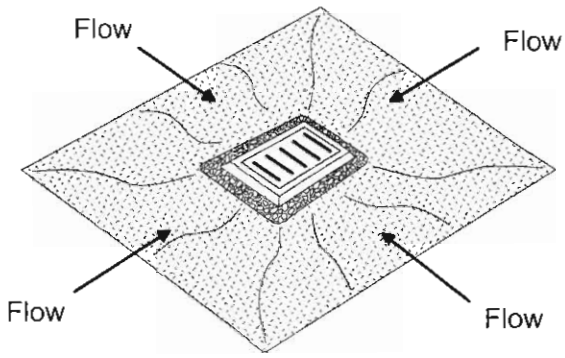


Figure 5.29 Perspective of Excavated Drop Inlet Protection

Recommended Minimum Requirements

Prior to start of construction, excavated drop inlet protection structures should be designed by a registered design professional. Plans and specifications should be referred to by field personnel throughout the construction process.

- **Drainage Area:** Less than 1 acre per inlet.
- **Capacity:** 10-year or design storm should enter inlet without bypass flow.
- **Minimum Depth:** 1 foot, as measured from the top of the drop inlet.
- **Maximum Depth:** 2 feet, as measured from the top of the drop inlet.

- **Side Slopes:** 2:1 or flatter around the excavation.
- **Dewatering:** Place drain holes in drop inlet, covered with wire screen and gravel.
- **Gravel:** Use clean gravel, 1/2 to 3/4 inch in diameter.
- **Sediment Storage:** Keep the minimum volume of excavated material around the drop inlet at approximately 35 yd^3/disturbed acre.
- **Basin Shape:** To fit site conditions, with the longest dimension oriented toward the longest inflow area to provide maximum settling efficiency.
- **Drain:** Install provision for draining the temporary pool to improve trapping efficiency for small storms and to avoid problems from standing water after heavy rains.
- **Safety:** Provide protection to prevent children from entering the inlet or outlet.

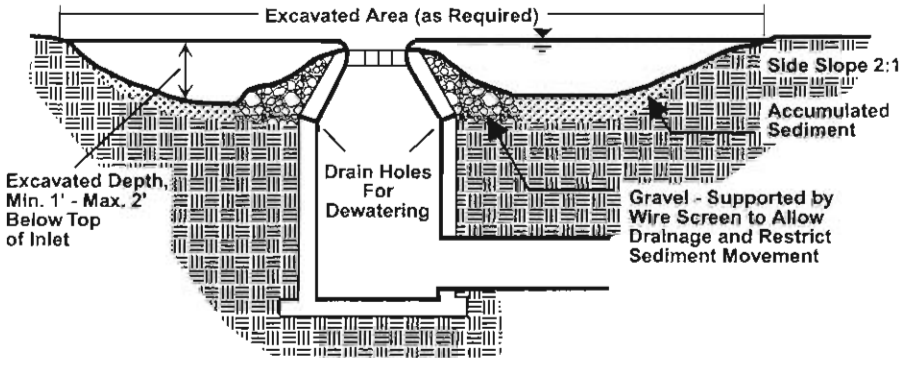


Figure 5.30 Cross section of Excavated Drop Inlet Protection

Construction

Determine exact location of underground utilities.

Clear the area of all debris that might hinder excavation and disposal of spoil.

Excavate the basin to the depth, side slopes and dimensions shown on the plans.

Grade the approach to the inlet uniformly.

Install drain holes in the drop inlet to drain pool slowly. Cover holes with wire screen and place gravel around sides of inlet.

When necessary, spoil may be placed to form a dike on the downstream side of the excavation to prevent bypass flow.

Erosion Control

Stabilize disturbed areas, except the excavated pool bottom, in accordance with vegetation plan.

Construction Verification

Check finished grades and dimensions of excavated drop inlet protection structures.

Troubleshooting

Consult with registered design professional if the following occurs:

- Variations in topography on site indicate excavated drop inlet protection will not function as intended; changes in plan may be needed.

Maintenance

Inspect, clean and properly maintain the excavated basin after every storm until the contributing drainage area has been permanently stabilized.

Remove sediment when the excavated volume is approximately one-half full.

Spread all excavated material evenly over the surrounding land area or stockpile and stabilize it appropriately.

When the contributing drainage area has been permanently stabilized, seal drain holes, fill the basin with stable soil to final grading elevations, compact it properly, and establish vegetation or provide other means of protection.

Common Problems

Sediment producing area too large for basin design or inlet not properly maintained; resulting in sediment entering drain—enlarge basin and maintain inlet.

Gravel over drain holes plugged with sediment; resulting in excessive ponding—remove debris, clear sediment and replace gravel.

Blockage of storm drain from debris entering inlet; resulting in flooding and erosion—install trash rack around inlet.

Block and Gravel Inlet Protection

Practice Description

A sediment control barrier formed around a storm drain inlet by the use of standard concrete block and gravel. The purpose is to help prevent sediment from entering storm drains before the disturbed construction area is revegetated and stabilized. This practice applies where early use of the storm drain system is necessary.

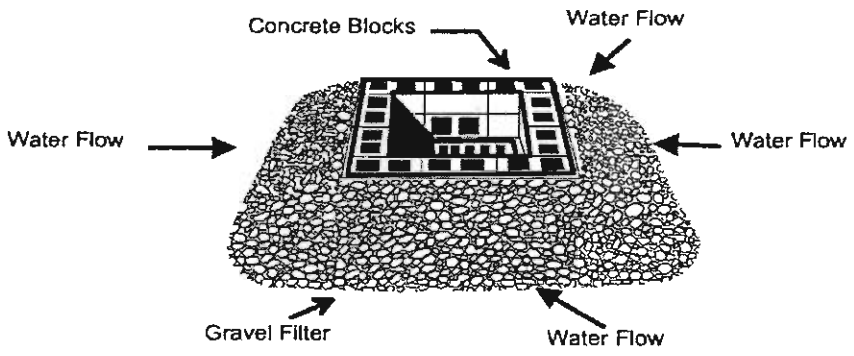


Figure 5.31 Typical Block and Gravel Drop Inlet Protection

Recommended Minimum Requirements

Prior to start of construction, block and gravel inlet protection structures should be designed by a registered design professional. Plans and specifications should be referred to by field personnel throughout the construction process.

- **Drainage Area:** Less than 1 acre
- **Capacity:** 10-year or design storm should enter inlet without bypass flow.
- **Height:** Height of barrier should be between 1 and 2 feet.
- **Side Slopes:** Gravel placed around the concrete block structure should have side slopes of 2:1 or flatter.

- **Dewatering:** Some blocks in bottom row should be placed on their side for drainage.
- **Gravel:** Use clean gravel, 1/2 to 3/4 inch in diameter. Place hardware cloth or comparable wire mesh with 1/2-inch openings over all block openings to hold gravel in place.
- **Safety:** Provide protection to prevent children from entering the pipe inlet.

The top elevation of the structure must be at least 6 inches lower than the ground elevation downslope from the inlet. It is important that all storm flows pass over the structure and into the storm drain and not past the structure. Temporary dikes below the structure may be necessary to prevent bypass flow. Material may be excavated from inside the sediment pool for this purpose.

Construction

Determine exact location of underground utilities.

Clear area of all debris that might hinder excavation and disposal of spoil.

Grade the approach to the inlet uniformly.

Lay one block on its side in the bottom row on each side of the structure to allow pool drainage. The foundation should be excavated at least 2 inches below the crest of the storm drain. Place the bottom row of blocks against the edge of the storm drain for lateral support and to avoid washouts when overflow occurs. If needed, give lateral support to subsequent rows by placing 2 x 4 wood studs through block openings.

Carefully fit hardware cloth or comparable wire mesh with 1/2-inch openings over all block openings to hold gravel.

Place gravel around blocks on a 2:1 slope or flatter, 2 inches below the top of the blocks, and smooth to an even grade.

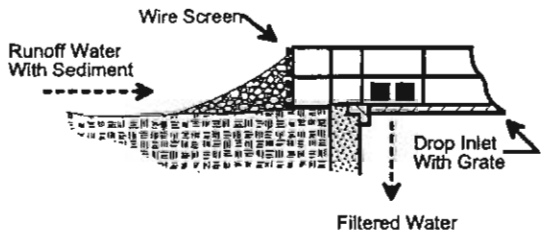


Figure 5.32 Detail of Block and Gravel Drop Inlet

Erosion Control

Stabilize disturbed areas in accordance with the vegetation plan.

Construction Verification

Check finished grades and dimensions of block and gravel drop inlet protection structures.

Troubleshooting

Consult with registered design professional if the following occurs:

- Variations in topography on site indicate block and gravel drop inlet protection will not function as intended; changes in plan may be needed.

Maintenance

Inspect the barrier after each rain and make repairs as needed.

Remove sediment as necessary to provide adequate storage volume for subsequent rains.

When the contributing drainage area has been adequately stabilized, remove all materials and any unstable soil, and salvage or dispose of it properly. Bring the disturbed area to proper grade, then smooth and compact it. Appropriately stabilize all bare areas around the inlet.

Common Problems

Top of structure too high; resulting in bypass flow and erosion—lower height of structure.

Blocks not placed firmly against storm drain inlet; resulting in scour—reset blocks firmly against drain inlet.

Drainage area too large; resulting in poor trap efficiency and/or sediment overload—increase size of temporary sediment pool.

Approach to drain too steep; resulting in high flow velocity and poor trap efficiency—use excavated basin (see *Excavated Drop Inlet Protection*).

Sediment not removed promptly; resulting in sediment entering the storm drain—remove sediment promptly following storms.

EC-9 Diversion Dikes

DEFINITION

A ridge of compacted soil (recommended with a vegetated lining) that is often located at the top or base of a sloping disturbed area, and redirects runoff to a less sensitive outfall or area.

GENERAL INFORMATION

Applicability - Effectiveness

Slope Protection - high
Excavated areas (trenches, pits, etc.) - high
Perimeter and Access Controls - high

Most effective when used with:

EC-1 Erosion Control Mats to help reduce erosion along the dike.

EC-4 Pipe Slope Drains to provide additional control if flow cannot be completely routed around the disturbed area.

Alternative BMPs:

For a less expensive, temporary control, consider SPC-2 Sand Bag Barrier

RATINGS

Associated Costs	H	M	L
Implementation		X	
Maintenance		X	
Training		X	
Target Pollutants Removal	**H**	**M**	**L**
Oil and Grease			X
Nutrients			X
Sediment		X	
Floatable Material		X	
Metals			X
Other Construction Waste			X

FIGURES

Photos/Sketches

EC-9 Diversion Dikes Photos

CAD Drawings

Diversion Dikes

PURPOSE

Depending on the location and topography, diversion dikes can achieve two different goals:

- Located on the upslope of a site, they can prevent surface sheet flow runoff from entering a disturbed construction site.
- Located on the downslope of a site, they can divert sediment-laden runoff created onsite to sediment trapping devices, preventing soil loss from the disturbed area.

APPROPRIATE APPLICATIONS

Diversion dikes may be used to:

- Intercept and divert runoff to avoid sheet flow over sloped surfaces.
- Divert and direct runoff towards a stabilized watercourse, drainage pipe or channel.
- Intercept runoff from paved surfaces.

Diversion dikes may be installed:

- Below steep grades where runoff begins to concentrate.
- Along roadways and facility improvements subject to flood drainage.
- At the top of slopes to divert runon from adjacent or undisturbed slopes.
- At bottom and mid-slope locations to intercept sheet flow and convey concentrated flows.

LIMITATIONS

- Limit to upstream drainage areas of 10 acres or less and for slopes less than 5 percent. For larger areas more permanent structures should be built.
- All structures should be in compliance with hydraulic design standards set by the local municipality or Flood Control District of Maricopa County.
- Earth dikes may create more disturbed area on site and become barriers to construction equipment.
- Earth dikes must be stabilized immediately which increases maintenance and installation costs.
- Diverted stormwater flow may cause flood damage to adjacent areas.
- Diversion dikes are not suitable as sediment trapping devices.

- The concentrated runoff in a channel or ditch has increased erosion potential. To alleviate this erosion capability, diversion dikes must be used in conjunction with sediment trapping devices, soil stabilization, and sediment controls.

PLANNING CONSIDERATIONS

Several considerations must be made before installing diversion dikes. Diversion dikes can either be installed temporarily or as a permanent structure:

Temporary diversion dikes are generally made up of earth material. Earth dikes are advantageous because they can handle flows from large drainage areas, are relatively inexpensive and easy to install, use onsite materials, and once stabilized, earth dikes require little maintenance. However, earth dikes, alone, do not control erosion or remove sediment from runoff. Rather, they direct runoff to an erosion control device such as a Temporary Sediment basin or a Temporary Sediment Trap, or away from an erodible surface. Temporary diversion dikes should not adversely impact adjacent properties and must conform to local floodplain management regulations.

For large flows, earth dikes can begin to erode and further contribute to the sediment loading in the runoff. Stone, recycled concrete, rip-rap, or filter cloth can be used to temporarily stabilize a diversion dike (see Recommended Standards and specifications below).

Consider using Erosion Control Mats and Pipe Slope Drains in conjunction with Sand Bag Barriers for additional erosion control and stabilization.

RECOMMENDED STANDARDS AND SPECIFICATIONS

- All dikes should be compacted by earth-moving equipment.
- All dikes should have positive drainage to an outlet.
- Top width may be wider and side slopes may be flatter if desired to facilitate crossing by construction traffic.
- Runoff should be conveyed to a sediment trapping device such as a sediment trap or sediment basin when either the dike channel or the drainage area above the dike are not adequately stabilized.
- Temporary stabilization, when necessary, should be as scheduled below:
    - Stone or recycled concrete equivalent, should be applied in a layer at least 8 inches in thickness and be pressed into the soil with construction equipment.
    - Rip-rap should be applied in a layer at least two times the D50 and pressed into the soil.
    - Approved equivalents can be substituted for any of the above materials.

- Filter cloth and erosion control mats may be used for dikes in use for long periods.

RECOMMENDED MAINTENANCE AND INSPECTION

- Inspect temporary measures prior to the rainy season, after rainfall events, and regularly during the rainy season.
- Inspect ditches and berms for washouts. Replace lost riprap, damaged linings or soil stabilizers as needed.

POST CONSTRUCTION METHODS

By providing a vegetated cover to the diversion dike, the dike can become a permanent structure.

REFERENCES

Tacoma Public Works Environmental Services, January 1993, City of Tacoma Surface Water Management Manual Volume II, Construction Stormwater Pollution Prevention. http://www.ci.tacoma.wa.us/waterservices/permits/Manual.htm

CALTRANS, State of California Department of Transportation, March 2003, Construction Site Best Management Practices (BMPs) Manual. http://www.dot.ca.gov/hq/construc/stormwater/manuals.htm

U.S. Environmental Protection Agency, December 1999, Construction Site Storm Water Runoff Control, National Menu of Best Management Practices for Storm Water Phase II. http://cfpub2.epa.gov/npdes/stormwater/menuofbmps/con_site.cfm

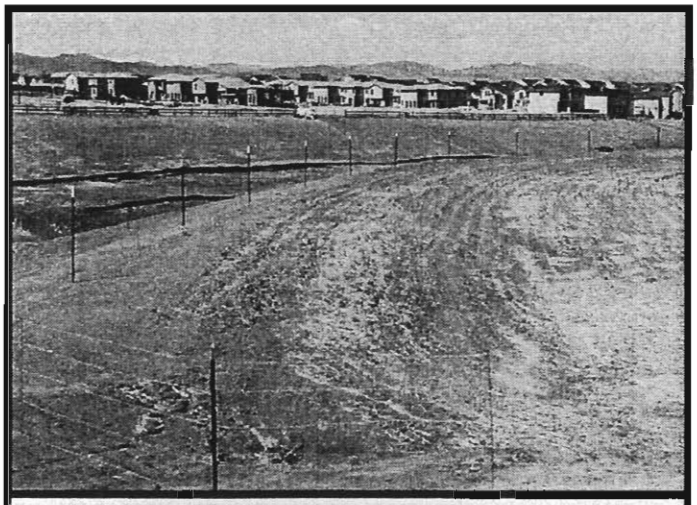
North Central Texas Council of Governments, December 2003, integrated Storm Water Management (iSWM) Design Manual for Construction.

North Carolina Department of Transportation, August 2003, Best Management Practices for Construction and Maintenance Activities, Chapter 5.0 "Operation Best Management Practices", http://www.doh.dot.state.nc.us/operations/BMP_manual/

Center for Watershed Protection, Inc., Stormwater Manager's Resource Center (SMRC). http://www.stormwatercenter.net/

Kamber Engineering Gaithersberg, Maryland, April, 1991, Sedimentation and Erosion Control, An Inventory of Current Practices, USEPA.

EC-9 Diversion Dikes Photos

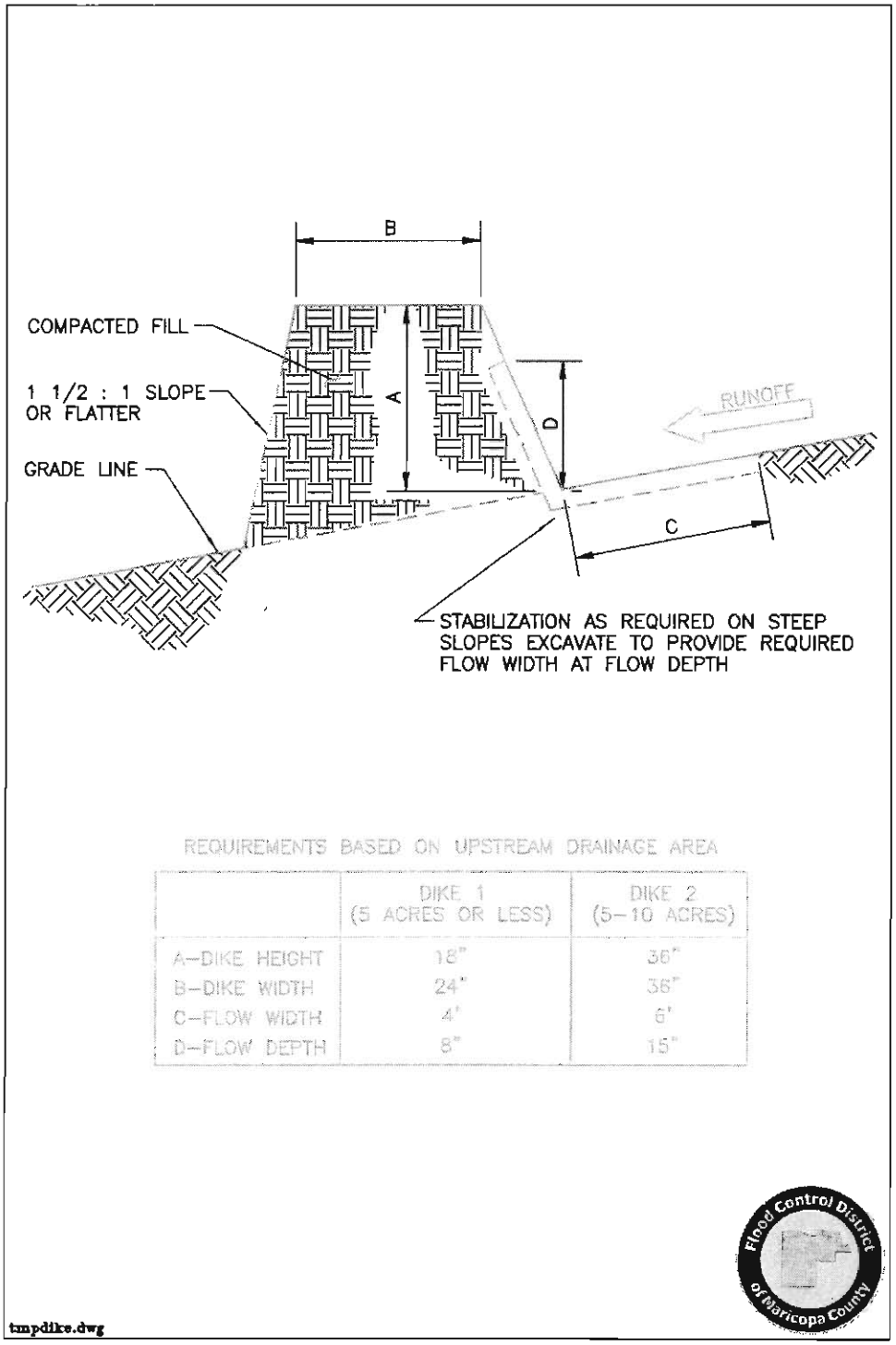


A temporary diversion dike can be stabilized with straw mulching.

Courtesy of Douglas County

Permanent diversion dikes can be constructed of grouted riprap and vegetated.

EC-9 Diversion Dikes Drawing



EC-10 Drainage Swales

DEFINITION

A drainage way with a lining of grass, stone, asphalt, concrete, or other material. Permanent channels must be designed and constructed in accordance with appropriate local design standards.

GENERAL INFORMATION

Applicability - Effectiveness

Slope Protection - high
Excavated Areas (trenches, pits, etc.) - high
Perimeter and Access Controls - high
Channels and Medians - high

Most effective when used with:

EC-11 Outlet Protection, Velocity Dissipation Devices

EC-1 Erosion Control Mats

SPC-4 Check Dams

All of the above provide erosion control for higher flows.

Alternative BMPs:

EC-9 Diversion Dikes

RATINGS

Associated Costs	H	M	L
Implementation	X		
Maintenance		X	
Training		X	
Target Pollutants Removal	**H**	**M**	**L**
Oil and Grease			X
Nutrients			X
Sediment	X		
Floatable Material			X
Metals		X	
Other Construction Waste		X	

FIGURES

Photos/Sketches

EC-10 Drainage Swales Photos

CAD Drawings

Drainage Swales

PURPOSE

Drainage swales are used as perimeter controls or slope protection to convey runoff without causing erosion by intercepting runoff from above unprotected slopes or at the perimeter and directing the runoff to a sediment trapping device or stabilized outlet. Depending on the design of the drainage swale, different objectives can be achieved. A meandering or winding swale with vegetation helps to reduce flow velocities and reduce suspended sediments. A straight, lined swale provides the maximum conveyance of drainage flows.

APPROPRIATE APPLICATIONS

Drainage swales and lined ditches may be used to:

- Convey surface runoff down sloping land.
- Intercept and divert runoff to avoid sheet flow over sloped surfaces.
- Divert and direct runoff towards a stabilized watercourse, drainage pipe or treatment facility.
- Intercept runoff from paved surfaces.

Drainage swales and lined ditches may be used:

- Below steep grades where runoff begins to concentrate.
- Along roadways and facility improvements subject to flood drainage.
- At the top of slopes to divert runon from adjacent or undisturbed slopes.
- At bottom and mid-slope locations to intercept sheet flow and convey concentrated flows.

LIMITATIONS

- Temporary drainage swales or any diversion of runoff should not adversely impact upstream or downstream properties and must conform to local floodplain management regulations.
- Constructing the proper swale to handle the desired runoff flows often requires engineering design work which can be costly.
- Swales can be expensive to construct if a liner is required.
- Interceptor swales must be stabilized quickly upon excavation in order not to contribute further to the sediment loading.

PLANNING CONSIDERATIONS

Consider using Outlet Protection, Velocity Dissipation Devices, Erosion Control Mats, and Check Dams in conjunction with Drainage Swales to provide erosion control for higher flow rates.

RECOMMENDED STANDARDS AND SPECIFICATIONS

Once the proper geometry and lining is used in a drainage swale, large volumes of flows can be effectively conveyed and/or treated with little maintenance. Velocity dissipation devices should be installed at the beginning or end of the swale to prevent erosion or scour.

Design and Sizing Criteria

The Hydraulics Manual of the Flood Control District of Maricopa County will be used for all appropriate design criteria. In addition:

1. All temporary swales should have uninterrupted grade to an outlet.
2. Diverted runoff from a disturbed area should be conveyed to a sediment trapping device.
3. Diverted runoff from an undisturbed area should outlet directly into an undisturbed stabilized area at non-erosive velocity.
4. All trees, brush, stumps, and obstructions, may need to be removed and disposed of so as not to interfere with the proper functioning of the swale, but can remain for sediment filtration.
5. The swale should be excavated or shaped to line, grade, and cross section as required to meet the criteria specified herein and be free of bank projections or other irregularities which will impede normal flow.
6. Fills should be compacted by earth moving equipment.
7. All earth removed and not needed on construction should be placed so that it will not interfere with the functioning of the swale.
8. For flow velocities up to 4 feet per second, use vegetation. For flow velocities less than 4 feet per second, apply a vegetated cover to the channel. For velocities greater than 4 feet per second, consult the table below.

Flow Stabilization

Type of Treatment	Channel Grade%	Average Diameter of Rock Drainage Area <5 acres	5-10 acres
1	0.5 - 1.0	4" Rock	4" Rock
2	1.1 - 2.0	6" Rock	6" Rock
3	2.1 - 3.0	8" Rock	Rip-Rap 6-12"
4	3.1 - 5.0	8-12" Rip-Rap	Engineered

Note: Refer to the drainage swale CAD drawing file for specified dimensions.

RECOMMENDED MAINTENANCE AND INSPECTION

- Inspect temporary measures prior to the rainy season, after rainfall events, and regularly during the rainy season.
- Inspect ditches and berms for washouts. Replace lost riprap, damaged linings or soil stabilizers as needed.
- Inspect channel linings, embankments, and beds of ditches and berms for erosion and accumulation of debris and sediment. Remove debris and sediment, and repair linings and embankments as needed.
- Temporary conveyances should be completely removed as soon as the surrounding drainage area has been stabilized, or at the completion of construction.

POST CONSTRUCTION METHODS

By providing a vegetated cover to the diversion swale, the swale can become a permanent structure.

REFERENCES

Tacoma Public Works Environmental Services, January 1993, City of Tacoma Surface Water Management Manual Volume II, Construction Stormwater Pollution Prevention. http://www.ci.tacoma.wa.us/waterservices/permits/Manual.htm

CALTRANS, State of California Department of Transportation, March 2003, Construction Site Best Management Practices (BMPs) Manual. http://www.dot.ca.gov/hq/construc/stormwater/manuals.htm

U.S. Environmental Protection Agency, December 1999, Construction Site Storm Water Runoff Control, National Menu of Best Management Practices for Storm Water Phase II.

http://cfpub2.epa.gov/npdes/stormwater/menuofbmps/con_site.cfm

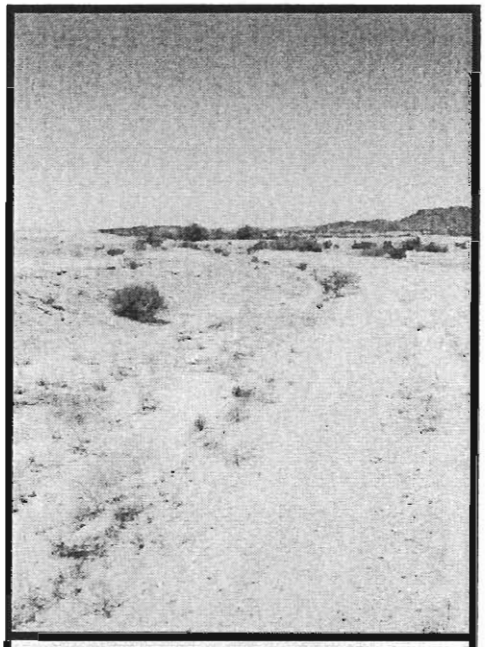
North Central Texas Council of Governments, December 2003, integrated Storm Water Management (iSWM) Design Manual for Construction.

Center for Watershed Protection, Inc., Stormwater Manager's Resource Center (SMRC). http://www.stormwatercenter.net/

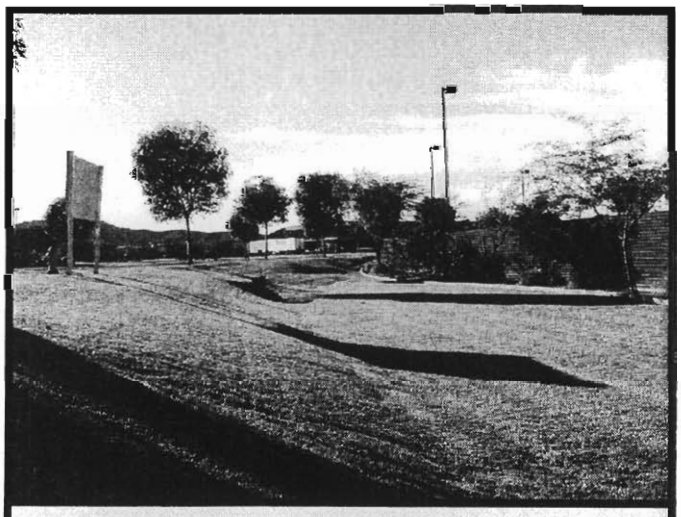
Kamber Engineering Gaithersberg, Maryland, April, 1991, Sedimentation and Erosion Control, An Inventory of Current Practices, USEPA.

Washington Department of Ecology, August 2001, Stormwater Management Manual for Western Washington, Publications #99-11 through 99-15.

EC-10 Drainage Swales Photos

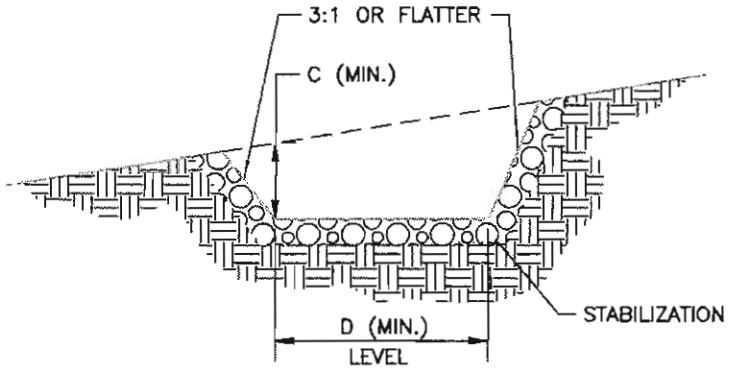


When possible, leave existing vegetation in the drainage swale for added velocity reduction.



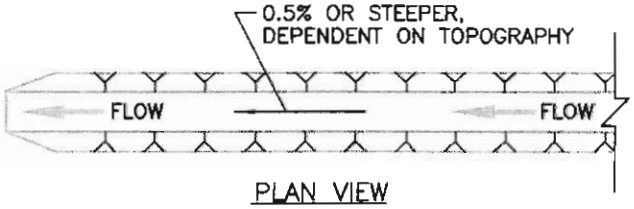
Permanent drainage swales are often vegetated.

EC-10 Drainage Swales Drawing



	SWALE A	SWALE B
C	1'	1'
D	4'	6'

CROSS SECTION VIEW



PLAN VIEW

tmpswale.dwg

GH-2 Solid Waste Management

DEFINITION

The routine collection, recycling, and disposal of accumulated solid waste generated at the construction site.

GENERAL INFORMATION
Applicability - Effectiveness Debris Management, Cleanup, and Washout - moderate Trash Collection/Management - high
Most effective when used with: GH-1 Chemical Management GH-3 Equipment Maintenance Procedures GH-5 Spill Containment Plan
Alternative BMPs: None

RATINGS			
Associated Costs	**H**	**M**	**L**
Implementation		X	
Maintenance		X	
Training		X	
Target Pollutants Removal	**H**	**M**	**L**
Oil and Grease			X
Nutrients		X	
Sediment			X
Floatable Material	X		
Metals	X		
Other Construction Waste	X		

FIGURES
Photos/Sketches GH-2 Solid Waste Management Photos
CAD Drawings None

PURPOSE

Solid waste is one of the major pollutants caused by construction activities. By limiting the trash and debris on site and through proper disposal methods, stormwater quality is improved and there is reduced clean up at the completion of a project.

APPROPRIATE APPLICATIONS

Proper solid waste management is applicable to all construction activities. Solid wastes include, but are not limited to:

- Construction wastes including plastic, glass, rubber, brick, mortar, timber, steel and metal scraps, sawdust, pipe and electrical cuttings, non-hazardous equipment parts, styrofoam and other materials used to transport and package construction materials, materials from the demolition of structures. Highway planting wastes, including vegetative material, plant containers, and packaging materials.

- Domestic waste products, including sanitary wastes, food containers, beverage cans, coffee cups, paper bags, plastic wrappers, cigarettes, and litter generated by the public.

LIMITATIONS

- Temporary stockpiling of certain construction wastes may not necessitate stringent drainage related controls during the non-rainy season or in desert areas with low rainfall.

- This practice only applies to non-hazardous solid waste.

RECOMMENDED STANDARDS AND SPECIFICATIONS

Education

- Site supervisor or other designated personnel should oversee and enforce proper solid waste procedures and practices.

- Instruct employees and subcontractors on identification of solid waste and hazardous waste, solid waste storage and disposal procedures. Require that employees and subcontractors follow solid waste handling and storage procedures.

- Hold regular meetings to discuss and reinforce disposal procedures (incorporate into regular safety meetings).

- Prohibit littering by employees, subcontractors, and visitors.

- Wherever possible, minimize production of solid waste materials.

Collection, Storage, and Disposal

- Covered dumpsters of sufficient size and number should be provided to contain the solid waste generated by the project operations.
- Prevent clogging of the storm drainage system by removing litter and debris from drainage grates, trash racks, and ditch lines.
- Trash receptacles should be provided in the contractor's yard, field trailer areas, and at locations where workers congregate for lunch and break periods.
- Construction debris and litter from work areas within the construction limits of the project site should be collected and placed in watertight dumpsters at least weekly regardless of whether the litter was generated by the contractor, the public, or others. Collected litter and debris should not be placed in or next to drain inlets, stormwater drainage systems, or watercourses.
- Full dumpsters should be removed from the project site.
- Litter stored in collection areas and containers should be handled and disposed of by trash hauling contractors every two weeks or more frequently, if necessary. Notify trash hauling contractors that only watertight dumpsters are acceptable for use onsite. Plan for additional containers and more frequent pickup during the demolition phase of construction.
- Stormwater runoff should be prevented from contacting stored solid waste through the use of berms, dikes, or other temporary diversion structures.
- Solid waste storage areas should be located more than 50 ft from drainage facilities and watercourses and should not be located in areas prone to flooding or ponding.
- Dumpster washout on the project site is not allowed.
- Keep the site clean of litter debris.

Hazardous Waste Management

- Segregate potentially hazardous waste from non-hazardous construction site waste. Make sure that toxic liquid wastes (e.g., used oils, solvents, and paints) and chemicals (e.g., acids, pesticides, additives, curing compounds) are not disposed of in dumpsters designated for construction debris. For disposal of hazardous waste, see Chemical Management. Have hazardous waste hauled to an appropriate disposal and/or recycling facility.

Recycling

- Salvage or recycle useful vegetation debris, packaging and/or surplus building materials when practical. For example, trees and shrubs from land clearing can be converted into

wood chips, then used as mulch on graded areas. Wood pallets, cardboard boxes, and construction scraps can also be recycled.

Sanitary Waste Management

- Educate employees, subcontractors, and suppliers on sanitary/septic waste storage and disposal procedures and potential dangers to humans and the environment from sanitary/ septic wastes.
- Hold regular meetings to discuss and reinforce disposal procedures (incorporate into regular safety meetings) and to educate new employees.
- Locate portable toilets a minimum of 20 feet away from storm drain inlets, drainage facilities, watercourses, and from traffic circulation. If unable to meet the 20-foot distance requirement, provide secondary containment for portable toilets.
- Properly connect temporary sanitary facilities that discharge to the sanitary sewer system to avoid illicit discharges. Sanitary and septic systems that discharge directly into sanitary sewer systems, where permissible, should comply with the local health agency, city, county, and sewer district requirements.
- If using an on site disposal system, such as a septic system, comply with local health agency requirements.
- Ensure that sanitary/septic facilities are maintained in good working order by a licensed service. Use only reputable, licensed sanitary/septic waste haulers.

The effectiveness of solid waste management is enhanced when the following BMPs are also implemented: Chemical Management, Equipment Maintenance Procedures, and Spill Containment Plan.

RECOMMENDED MAINTENANCE AND INSPECTION

- Onsite trash should be collected and disposed of on a regular basis. Sanitary systems should also be regularly serviced.
- Repair trash containers and dumpsters on an as needed basis. Where possible provide cover for waste containers to prevent the entry of rainwater and loss of contents by wind.
- Maintain a contingency plan in the case that hazardous or toxic materials are discovered onsite.

POST CONSTRUCTION METHODS

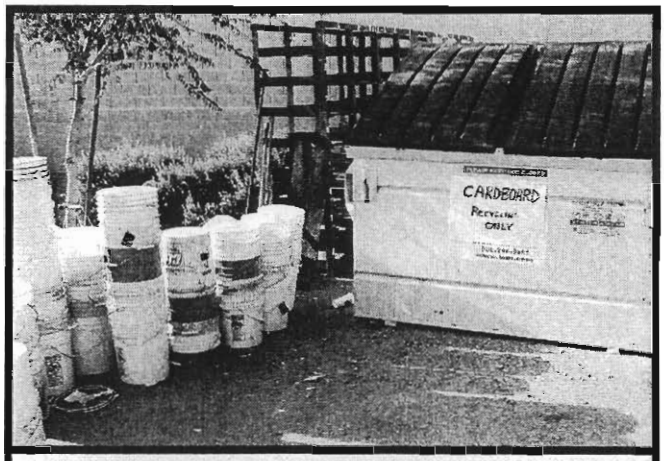
Long term solid waste practices should be implemented (i.e. dumpsters, and regular trash pick-ups, etc.)

REFERENCES

North Central Texas Council of Governments, December 2003, integrated Storm Water Management (iSWM) Design Manual for Construction.

Washington Department of Ecology, August 2001, Stormwater Management Manual for Western Washington, Publications #99-11 through 99-15.

GH-2 Solid Waste Management Photos



Separate out different wastes from each other for recycling.

Place signage on the dumpster to prevent improper disposal of hazardous wastes.

GH-3 Equipment Maintenance Procedures

DEFINITION

Establish a program of equipment maintenance procedures, which will reduce contamination of onsite soils.

GENERAL INFORMATION
Applicability - Effectiveness Equipment Storage/Maintenance - high Debris Management, Cleanup, and Wash-out- moderate Trash Collection/Management - moderate
Most effective when used with: GH-1 Chemical Management GH-4 Designated Washdown Areas GH-5 Spill Containment Plan
Alternative BMPs: None

RATINGS			
Associated Costs	**H**	**M**	**L**
Implementation		X	
Maintenance		X	
Training		X	
Target Pollutants Removal	**H**	**M**	**L**
Oil and Grease	X		
Nutrients			X
Sediment			X
Floatable Material			X
Metals	X		
Other Construction Waste		X	

FIGURES
Photos/Sketches GH-3 Equipment Maintenance Procedures Photos **CAD Drawings** None

PURPOSE

Non-sediment stormwater pollution can occur through improper disposal of equipment fluids and disposables such as filters, batteries, and tires. An established program of maintenance procedures can prevent job site pollution and contamination of stormwater.

APPROPRIATE APPLICATIONS

These procedures are applied on all construction projects where an onsite yard area is necessary for storage and maintenance of heavy equipment and vehicles. Perform equipment maintenance, if possible, back at the maintenance shop.

LIMITATIONS

None identified.

RECOMMENDED STANDARDS AND SPECIFICATIONS

- Drip pans or absorbent pads should be used during vehicle and equipment maintenance work that involves fluids, unless the maintenance work is performed over an impermeable surface in a dedicated maintenance area.
- All maintenance areas are required to have spill kits and/or use other spill protection devices.
- Dedicated maintenance areas should be protected from stormwater runon and runoff, and should be located at least 50 ft from downstream drainage facilities and watercourses.
- Absorbent spill clean-up materials should be available in maintenance areas and should be disposed of properly after use. Substances used to coat asphalt transport trucks and asphalt spreading equipment should be non-toxic.
- Use offsite maintenance facilities whenever practical.
- For long-term projects, consider constructing roofs or portable tents over maintenance areas.
- Properly dispose of used oils, fluids, lubricants, and spill cleanup materials. Do not dump fuels and lubricants onto the ground, place used oil in a dumpster, or pour into a storm drain or watercourse. Repair fluid and oil leaks immediately. Provide spill containment dikes or secondary containment around stored oil and chemical drums.
- Properly dispose or recycle used batteries.

The effectiveness of equipment maintenance procedures is enhanced when the following BMPs are also implemented: Chemical Management, Designated Washdown Areas, and Spill Containment Plan.

RECOMMENDED MAINTENANCE AND INSPECTION

- Maintain waste fluid containers in leak proof condition.
- Vehicle and equipment maintenance areas should be inspected regularly.
- Vehicles and equipment should be inspected on each day of use. Leaks should be repaired immediately or the problem vehicle(s) or equipment should be removed from the project site.
- Inspect equipment for damaged hoses and leaky gaskets routinely. Repair or replace as needed.

POST CONSTRUCTION METHODS

None.

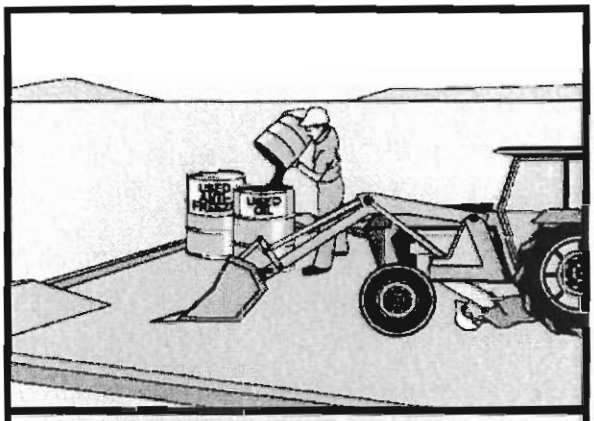
REFERENCES

CALTRANS, State of California Department of Transportation, March 2003, Construction Site Best Management Practices (BMPs) Manual. http://www.dot.ca.gov/hq/construc/stormwater/manuals.htm

U.S. Environmental Protection Agency, December 1999, Construction Site Storm Water Runoff Control, National Menu of Best Management Practices for Storm Water Phase II. http://cfpub2.epa.gov/npdes/stormwater/menuofbmps/con_site.cfm

Washington Department of Ecology, August 2001, Stormwater Management Manual for Western Washington, Publications #99-11 through 99-15.

GH-3 Equipment Maintenance Procedures Photos



Schematic of used oil containment.

Courtesy of CALTRANS

Enclosed area maintenance.

Courtesy of EPA

GH-4 Designated Washdown Areas

DEFINITION

Procedures and practices that are designed to minimize or eliminate the discharge of concrete waste materials to the storm drain systems of watercourses.

GENERAL INFORMATION
Applicability - Effectiveness Inlet Drain Protection - high Debris Management, Cleanup, and Washout - high
Most effective when used with: GH-1 Chemical Management GH-3 Equipment Maintenance Procedures GH-5 Spill Containment Plan
Alternative BMPs: None

RATINGS			
Associated Costs	**H**	**M**	**L**
Implementation		X	
Maintenance		X	
Training		X	
Target Pollutants Removal	**H**	**M**	**L**
Oil and Grease		X	
Nutrients			X
Sediment			X
Floatable Material			X
Metals		X	
Other Construction Waste	X		

FIGURES
Photos/Sketches GH-4 Designated Washdown Areas Photos
CAD Drawings None

PURPOSE

Designated washout areas and associated procedures ensure the proper washout of concrete trucks, tools, and equipment and prevents fresh concrete or cement laden mortar from entering a storm drainage system.

APPROPRIATE APPLICATIONS

Concrete waste management procedures and practices are implemented on construction projects where concrete is used as a construction material or where concrete dust and debris result from demolition activities.

- Where slurries containing portland cement concrete (PCC) or asphalt concrete (AC) are generated, such as from sawcutting, coring, grinding, grooving, and hydro-concrete demolition.
- Where mortar-mixing stations exist.
- Where concrete trucks and other concrete-coated equipment are washed on site. See also Equipment Maintenance Procedures.

LIMITATIONS

None.

PLANNING CONSIDERATIONS

- Educate employees, subcontractors, and suppliers on the concrete waste management techniques described herein.
- The site supervisor or designated personnel should oversee and enforce concrete waste management procedures.

The effectiveness of washdown areas may be enhanced when the following BMPs are also implemented: Chemical Management, Equipment Maintenance Procedures, and Spill Containment Plan.

RECOMMENDED STANDARDS AND SPECIFICATIONS

PCC and AC Wastes

- PCC and AC waste should not be allowed to enter storm drains or watercourses. Instead, PCC and AC waste should be collected and properly disposed of outside the highway right-of-way or placed in a temporary concrete washout structure.
- Install a sign adjacent to each temporary concrete washout structure to inform concrete equipment operators to utilize the installed structures.

- A foreman and/or construction supervisor should monitor onsite concrete working tasks, such as saw cutting, coring, grinding and grooving to ensure proper methods are implemented.

- Saw cutting residue should not be allowed to flow across the pavement, and should not be left on the surface of the pavement. Vacuum slurry residue and dispose in a temporary facility and allow slurry to dry. Dispose of dry slurry residue in accordance with Solid Waste Management.

- Similarly, residue from grinding operations should be picked up by means of a vacuum attachment to the grinding machine.

Onsite Temporary Concrete Washout Facility Procedures

- Temporary concrete washout facilities should be located a minimum of 50 feet from storm drain inlets, open drainage facilities, and watercourses, unless determined infeasible by the site supervisor. Each facility should be located away from construction traffic or access areas to prevent disturbance or tracking.

- Temporary concrete washout facilities should be constructed above grade or below grade at the option of the contractor and have sufficient quantity and size to contain all liquid and concrete waste generated by washout operations.

- Perform washout of concrete mixer trucks in designated areas only. A sign should be installed adjacent to each washout facility to inform concrete equipment operators to utilize the proper facilities.

- Wash concrete only from mixer truck chutes into approved concrete washout facility. Washout may be collected in an impermeable bag for disposal.

Above Grade Temporary Concrete Washout Structure

- Above grade temporary concrete washout structures should have a minimum length and width of 10 feet or larger to provide sufficient volume to contain all liquid and concrete waste generated by washout operations. If deemed necessary, the length and width of the washout structure may be expanded for more capacity.

- Straw bales, wood stakes, and sandbag materials should conform to the specifications in Organic Filter Barrier and Sand Bag Barrier.

- Plastic lining material should be a minimum of 10-mil polyethylene sheeting and should be free of holes, tears or other defects that compromise the impermeability of the material.

Below Grade Temporary Concrete Washout Structure

- Below grade temporary concrete washout should have a minimum length and width of 10 feet or larger to provide sufficient volume to contain all liquid and concrete

waste generated by washout operations. If deemed necessary, the length and width of the washout structure may be expanded for more capacity.

- Plastic lining material should be a minimum of 10-mil polyethylene sheeting and should be free of holes, tears or other defects that compromise the impermeability of the material.

- Ensure that the soil base is free of rocks or other debris that may cause tears or holes in the plastic lining material.

Removal of Temporary Concrete Washout Facilities

- When temporary concrete washout facilities are no longer required for the work, as determined by the site supervisor, hardened concrete should be broken up, removed, and disposed of in accordance with Solid Waste Management.

- Holes, depressions or other ground disturbance caused by the removal of the temporary concrete washout facilities should be backfilled.

RECOMMENDED MAINTENANCE AND INSPECTION

- Monitor on site concrete waste storage and disposal procedures at least weekly.

- Monitor concrete working tasks, such as saw cutting, coring, grinding and grooving to ensure proper mehtods are employed.

POST CONSTRUCTION METHODS

None.

REFERENCES

CALTRANS, State of California Department of Transportation, March 2003, Construction Site Best Management Practices (BMPs) Manual. http://www.dot.ca.gov/hq/construc/stormwater/manuals.htm

U.S. Environmental Protection Agency, December 1999, Construction Site Storm Water Runoff Control, National Menu of Best Management Practices for Storm Water Phase II. http://cfpub2.epa.gov/npdes/stormwater/menuofbmps/con_site.cfm

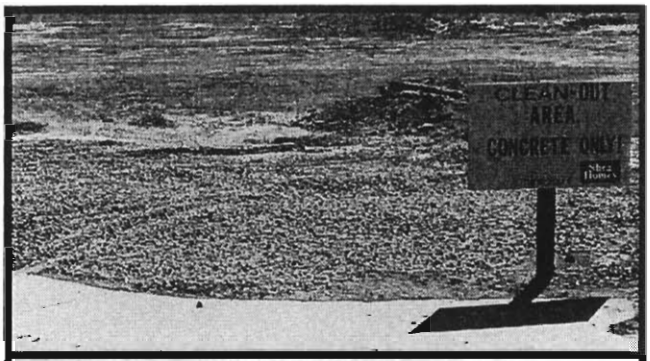
North Central Texas Council of Governments, December 2003, integrated Storm Water Management (iSWM) Design Manual for Construction.

Washington Department of Ecology, August 2001, Stormwater Management Manual for Western Washington, Publications #99-11 through 99-15.

GH-4 Designated Washdown Areas Photos

Concrete washout container.

Courtesy of Concrete Washout Systems, Inc.



Concrete washout area.

Courtesy of Douglas County

APPENDIX D

TRAINING MODULE

STORM WATER POLLUTION PREVENTION TRAINING MODULE

A. General overview of storm water pollution planning requirements and this Plan.

B. List of areas and activities that have the potential to pollute storm water.

- Disturbed soil on slopes
- Fuel Tanks
- Parking Lot/Storage Areas for Construction
- Large Equipment Tracking Dirt to Street

C. Pollution prevention activities.

- Existing BMPs
- Good Housekeeping
- Maintain Siltation Barriers and Other BMPs
- Employee Training
- Weekly and Storm Event Inspections

D. Contractors must be notified of the existence of the SWPPP and what action or precautions shall be taken to minimize the potential for erosion and the potential for damaging any BMP.

APPENDIX E

ANNUAL REPORTS OF PLAN ASSESSMENT

SAMPLE SWPPP ANNUAL CHECKLIST

			DEFICIENCIES/CORRECTIVE ACTION	DATE CORRECTED
GENERAL				
Do all elements of the Storm Water Pollution Prevention Plan reflect actual site conditions?	YES ☐	NO ☐		
Is the site map accurate?	YES ☐	NO ☐		
Are inspection and training records in order?	YES ☐	NO ☐		
Have there been any spill events since the last inspection? (If yes, this information should be included in the SWPPP.)	YES ☐	NO ☐		

INSPECTOR SIGNATURE: _____ DATE: _____