LANCE R. LEFLEUR
DIRECTOR

KAY IVEY
GOVERNOR

Alabama Department of Environmental Management
adem.alabama.gov
1400 Coliseum Blvd. 36110-2400 ▪ Post Office Box 301463
Montgomery, Alabama 36130-1463
(334) 271-7700 ▪ FAX (334) 271-7950

March 3, 2025

Mr. T. Ryan Reed
Vice President
Mineral Manufacturing Corporation
10627 Hartslog Valley Rd
Huntingdon, PA 16652

RE: Draft Permit
MMC-Hutchinson Bauxite Mine
NPDES Permit Number AL0084506
Barbour County (005)

Dear Mr. Reed:

Transmitted herein is a draft of the above referenced permit. Please review the enclosed draft permit carefully. If previously permitted, the draft may contain additions/revisions to the language in your current permit. Please submit any comments on the draft permit to the Department within 30 days from the date of receipt of this letter.

Since the Department has made a tentative decision to issue the above referenced permit, ADEM Admin. Code r. 335-6-6-.21 requires a public notice of the draft permit followed by a period of at least 30 days for public comment before the permit can be issued. The United States Environmental Protection Agency will also receive the draft permit for review during the 30-day public comment period.

Any mining, processing, construction, land disturbance, or other regulated activity proposed to be authorized by this draft permit is prohibited prior to the effective date of the formal permit. Any mining or processing activity within the drainage basin associated with each permitted outfall which is conducted prior to Departmental receipt of certification from a professional engineer licensed to practice in the State of Alabama, that the Pollution Abatement/Prevention Plan was implemented according to the design plan, or notification from the Alabama Surface Mining Commission that the sediment control structures have been certified, is prohibited.

This permit requires Discharge Monitoring Reports (DMR) to be submitted utilizing the Department's web-based electronic reporting system. Please read Part I.D of the permit carefully and visit https://aepacs.adem.alabama.gov/nviro/ncore/external/home.

Should you have any questions concerning this matter, please contact Skylar Wilson at (334) 274-4231 or eva.wilson@adem.alabama.gov.

Sincerely,

William D. McClimans, Chief
Mining and Natural Resource Section
Stormwater Management Branch
Water Division

WDM/esw File: DPER/61163

cc: Skylar Wilson, ADEM
Environmental Protection Agency Region IV
Alabama Department of Conservation and Natural Resources
U.S. Fish and Wildlife Service
Alabama Historical Commission
Advisory Council on Historic Preservation
U.S. Army Corps of Engineers Mobile District
Alabama Department of Labor

Birmingham Office
110 Vulcan Road
Birmingham, AL 35209-4702
(205) 942-6168
(205) 941-1603 (FAX)

Decatur Office
2715 Sandlin Road, S.W.
Decatur, AL 35603-1333
(256) 353-1713
(256) 340-9359 (FAX)

Coastal Office
1615 South Broad Street
Mobile, AL 36605
(251) 450-3400
(251) 479-2593 (FAX)

ADEM
Alabama Department of Environmental Management

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM PERMIT

PERMITTEE: Mineral Manufacturing Corporation
10627 Hartslog Valley Rd
Huntingdon, PA 16652

FACILITY LOCATION: MMC-Hutchinson Bauxite Mine
Barbour County Road 75
Bakerhill, AL 36027
Barbour County
T9N, R27E, S33

PERMIT NUMBER: AL0084506

DSN & RECEIVING STREAM: 001 - 1 East Fork Choctawhatchee River

In accordance with and subject to the provisions of the Federal Water Pollution Control Act, as amended, 33 U.S.C. §§1251-1388 (the "FWPCA"), the Alabama Water Pollution Control Act, as amended, ***Code of Alabama 1975****, §§ 22-22-1 to 22-22-14 (the "AWPCA"), the Alabama Environmental Management Act, as amended,* ***Code of Alabama 1975****, §§22-22A-1 to 22-22A-17, and rules and regulations adopted thereunder, and subject further to the terms and conditions set forth in this permit, the Permittee is hereby authorized to discharge into the above-named receiving waters.*

ISSUANCE DATE:

EFFECTIVE DATE:

EXPIRATION DATE:

Draft

Alabama Department of Environmental Management

MINING AND NATURAL RESOURCE SECTION
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT

TABLE OF CONTENTS

PART I DISCHARGE LIMITATIONS, CONDITIONS, AND REQUIREMENTS

A. DISCHARGE LIMITATIONS AND MONITORING REQUIREMENTS

During the period beginning on the effective date of this Permit and lasting through the expiration date of this Permit, the Permittee is authorized to discharge from each point source identified on Page 1 of this Permit and described more fully in the Permittee's application, if the outfalls have been constructed and certified. Discharges shall be limited and monitored by the Permittee as specified below:

Parameter	Discharge Limitations			Monitoring Requirements	
	Daily Minimum	Monthly Average	Daily Maximum	Sample Type	Measurement Frequency[1]
pH 00400	6.0 s.u.	-------	9.0 s.u.	Grab	2/Month
Solids, Total Suspended 00530	-------	20.0 mg/L	30.0 mg/L	Grab	2/Month
Iron, Total (as Fe) 01045	-------	0.5 mg/L	1.0 mg/L	Grab	2/Month
Aluminum, Total (as Al) 01105	-------	1.0 mg/L	2.0 mg/L	Grab	2/Month
Flow, In Conduit or Thru Treatment Plant[2] 50050	-------	Report MGD	Report MGD	Instantaneous	2/Month

B. REQUIREMENTS TO ACTIVATE A PROPOSED MINING OUTFALL

1. Discharge from any point source identified on Page 1 of this Permit which is a proposed outfall is not authorized by this Permit until the outfall has been constructed and certification received by the Department from a professional engineer, registered in the State of Alabama, certifying that such facility has been constructed according to good engineering practices and in accordance with the Pollution Abatement and/or Prevention (PAP) Plan.

2. Certification required by Part I.B.1. shall be submitted on a completed ADEM Form 432. The certification shall include the latitude and longitude of the constructed and certified outfall.

3. Discharge monitoring and Discharge Monitoring Report (DMR) reporting requirements described in Part I.C. of this Permit do not apply to point sources that have not been constructed and certified.

4. Upon submittal of the certification required by Part I.B.1. to the Department, all monitoring and DMR submittal requirements shall apply to the constructed and certified outfall.

C. DISCHARGE MONITORING AND RECORD KEEPING REQUIREMENTS

1. Sampling Schedule and Frequency

a. The Permittee shall collect at least one grab sample of the discharge to surface waters from each constructed and certified point source identified on Page 1 of this Permit and

---

[1] See Part I.C.2. for further measurement frequency requirements.

[2] Flow must be determined at the time of sample collection by direct measurement, calculation, or other method acceptable to the Department.

described more fully in the Permittee's application twice per month at a rate of at least every other week if a discharge occurs at any time during the two week period, but need not collect more than two samples per calendar month. Each sample collected shall be analyzed for each parameter specified in Part I.A. of this Permit.

b. If the final effluent is pumped in order to discharge (e.g. from incised ponds, old highwall cuts, old pit areas or depressions, etc.), the Permittee shall collect at least one grab sample of the discharge from each point source identified on Page 1 of this Permit and described more fully in the Permittee's application each quarterly (three month) monitoring period if a discharge occurs at any time during the quarterly monitoring period which results from direct pumped drainage. Each sample collected shall be analyzed for each parameter specified in Part I.A. of this Permit.

c. The Permittee may increase the frequency of sampling listed in Parts I.C.1.a and I.C.1.b; however, all sampling results must be reported to the Department and included in any calculated results submitted to the Department in accordance with this Permit.

2. Measurement Frequency

Measurement frequency requirements found in Part I.A. shall mean:

a. A measurement frequency of one day per week shall mean sample collection on any day of discharge which occurs every calendar week.

b. A measurement frequency of two days per month shall mean sample collection on any day of discharge which occurs every other week, but need not exceed two sample days per month.

c. A measurement frequency of one day per month shall mean sample collection on any day of discharge which occurs during each calendar month.

d. A measurement frequency of one day per quarter shall mean sample collection on any day of discharge which occurs during each calendar quarter.

e. A measurement frequency of one day per six months shall mean sample collection on any day of discharge which occurs during the period of January through June and during the period of July through December.

f. A measurement frequency of one day per year shall mean sample collection on any day of discharge which occurs during each calendar year.

3. Monitoring Schedule

The Permittee shall conduct the monitoring required by Part I.A. in accordance with the following schedule:

a. MONITORING REQUIRED MORE FREQUENTLY THAN MONTHLY AND MONTHLY shall be conducted during the first full month following the effective date of coverage under this Permit and every month thereafter. More frequently than monthly and monthly monitoring may be done anytime during the month, unless restricted elsewhere in this Permit, but the results should be reported on the last Discharge Monitoring Report (DMR) due for the quarter (i.e., with the March, June, September, and December DMRs).

b. QUARTERLY MONITORING shall be conducted at least once during each calendar quarter. Calendar quarters are the periods of January through March, April through June,

July through September, and October through December. The Permittee shall conduct the quarterly monitoring during the first complete calendar quarter following the effective date of this Permit and is then required to monitor once during each quarter thereafter. Quarterly monitoring may be done anytime during the quarter, unless restricted elsewhere in this Permit, but the results should be reported on the last DMR due for the quarter (i.e., with the March, June, September, and December DMRs).

c. SEMIANNUAL MONITORING shall be conducted at least once during the period of January through June and at least once during the period of July through December. The Permittee shall conduct the semiannual monitoring during the first complete semiannual calendar period following the effective date of this Permit and is then required to monitor once during each semiannual period thereafter. Semiannual monitoring may be done anytime during the semiannual period, unless restricted elsewhere in this Permit, but it should be reported on the last DMR due for the month of the semiannual period (i.e., with the June and December DMRs).

d. ANNUAL MONITORING shall be conducted at least once during the period of January through December. The Permittee shall conduct the annual monitoring during the first complete calendar annual period following the effective date of this Permit and is then required to monitor once during each annual period thereafter. Annual monitoring may be done anytime during the year, unless restricted elsewhere in this Permit, but it should be reported on the December DMR.

4. Sampling Location

Unless restricted elsewhere in this Permit, samples collected to comply with the monitoring requirements specified in Part I.A. shall be collected at the nearest accessible location just prior to discharge and after final treatment, or at an alternate location approved in writing by the Department.

5. Representative Sampling

Sample collection and measurement actions taken as required herein shall be representative of the volume and nature of the monitored discharge and shall be in accordance with the provisions of this Permit.

6. Test Procedures

For the purpose of reporting and compliance, Permittees shall use one of the following procedures:

a. For parameters with an EPA established Minimum Level (ML), report the measured value if the analytical result is at or above the ML and report "0" for values below the ML. Test procedures for the analysis of pollutants shall conform to 40 CFR Part 136, guidelines published pursuant to Section 304(h) of the FWPCA, 33 U.S.C. Section 1314(h), and ADEM Standard Operating Procedures. If more than one method for analysis of a substance is approved for use, a method having a minimum level lower than the permit limit shall be used. If the minimum level of all methods is higher than the permit limit, the method having the lowest minimum level shall be used and a report of less than the minimum level shall be reported as zero and will constitute compliance, however should EPA approve a method with a lower minimum level during the term of this Permit the Permittee shall use the newly approved method.

b. For pollutant parameters without an established ML, an interim ML may be utilized. The interim ML shall be calculated as 3.18 times the Method Detection Level (MDL) calculated pursuant to 40 CFR Part 136, Appendix B.

Permittees may develop an effluent matrix-specific ML, where an effluent matrix prevents attainment of the established ML. However, a matrix specific ML shall be based upon proper laboratory method and technique. Matrix-specific MLs must be approved by the Department, and may be developed by the Permittee during permit issuance, reissuance, modification, or during compliance schedule.

In either case the measured value should be reported if the analytical result is at or above the ML and "0" reported for values below the ML.

c. For parameters without an EPA established ML, interim ML, or matrix-specific ML, a report of less than the detection limit shall constitute compliance if the detection limit of all analytical methods is higher than the permit limit using the most sensitive EPA approved method. For the purpose of calculating a monthly average, "0" shall be used for values reported less than the detection limit.

The Minimum Level utilized for procedures identified in Parts I.C.6.a. and b. shall be reported on the Permittee's DMR. When an EPA approved test procedure for analysis of a pollutant does not exist, the Director shall approve the procedure to be used.

7. Recording of Results

For each measurement or sample taken pursuant to the requirements of this Permit, the Permittee shall record the following information:

a. The facility name and location, point source number, date, time, and exact place of sampling or measurements;

b. The name(s) of person(s) who obtained the samples or measurements;

c. The dates and times the analyses were performed;

d. The name(s) of the person(s) who performed the analyses;

e. The analytical techniques or methods used including source of method and method number; and

f. The results of all required analyses.

8. Routine Inspection by Permittee

a. The Permittee shall inspect all point sources identified on Page 1 of this Permit and described more fully in the Permittee's application and all treatment or control facilities or systems used by the Permittee to achieve compliance with the terms and conditions of this Permit at least as often as the applicable sampling frequency specified in Part I.C.1 of this Permit.

b. The Permittee shall maintain a written log for each point source identified on Page 1 of this Permit and described more fully in the Permittee's application in which the Permittee shall record the following information:

(1) The date and time the point source and any associated treatment or control facilities or systems were inspected by the Permittee;

(2) Whether there was a discharge from the point source at the time of inspection by the Permittee;

(3) Whether a sample of the discharge from the point source was collected at the time of inspection by the Permittee;

(4) Whether all associated treatment or control facilities or systems appeared to be in good working order and operating as efficiently as possible, and if not, a description of the problems or deficiencies; and

(5) The name and signature of the person performing the inspection of the point source and associated treatment or control facilities or systems.

9. Records Retention and Production

a. The Permittee shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this Permit, and records of all data used to complete the above reports or the application for this Permit, for a period of at least three (3) years from the date of the sample collection, measurement, report, or application. This period may be extended by request of the Director at any time. If litigation or other enforcement action, under the AWPCA, AEMA, and/or the FWPCA, is ongoing which involves any of the above records, the records shall be kept until the litigation is resolved. Upon the written request of the Director, the Permittee shall provide the Director with a copy of any record required to be retained by this paragraph. Copies of these records should not be submitted unless requested.

b. All records required to be kept for a period of three (3) years shall be kept at the permitted facility or an alternate location approved by the Department in writing and shall be available for inspection.

10. Monitoring Equipment and Instrumentation

All equipment and instrumentation used to determine compliance with the requirements of this Permit shall be installed, maintained, and calibrated in accordance with the manufacturer's instructions or, in the absence of manufacturer's instructions, in accordance with accepted practices. The Permittee shall develop and maintain quality assurance procedures to ensure proper operation and maintenance of all equipment and instrumentation. The quality assurance procedures shall include the proper use, maintenance, and installation, when appropriate, of monitoring equipment at the plant site.

D. DISCHARGE REPORTING REQUIREMENTS

1. Requirements for Reporting of Monitoring

a. Monitoring results obtained during the previous three (3) months shall be summarized for each month on a Discharge Monitoring Report (DMR) Form approved by the Department, and submitted to the Department so that it is received by the Director no later than the 28th day of the month following the quarterly reporting period (i.e., on the 28th day of January, April, July, and October of each year).

b. The Department utilizes a web-based electronic reporting system for submittal of DMRs. **Except as allowed by Part I.D.1.c. or d., the Permittee shall submit all DMRs required by Part I.D.1.a. by utilizing the Department's current electronic reporting system.** The Department's current reporting system, Alabama Environmental Permitting and

Compliance System (AEPACS), can be found online at https://aepacs.adem.alabama.gov/nviro/ncore/external/home.

c. If the electronic reporting system is down (i.e. electronic submittal of DMR data is unable to be completed due to technical problems originating with the Department's system; this could include entry/submittal issues with an entire set of DMRs or individual parameters), permittees are not relieved of their obligation to submit DMR data to the Department by the required submittal date. However, if the electronic reporting system is down on the 28th day of the month or is down for an extended period of time as determined by the Department when a DMR is required to be submitted, the facility may submit the data in an alternate manner and format acceptable to the Department. Preapproved alternate acceptable methods include faxing, e-mailing, mailing, or hand-delivery of data such that they are received by the required reporting date. Within five calendar days of the electronic reporting system resuming operation, the Permittee shall enter the data into the reporting system unless an alternate timeframe is approved by the Department. An attachment should be included with the electronic DMR submittal verifying the original submittal date (date of the fax, copy of dated e-mail, or hand-delivery stamped date).

d. The permittee may submit a request to the Department for a temporary electronic reporting waiver for DMR submittals. The waiver request should include the permit number; permittee name; facility/site name; facility address; name, address, and contact information for the responsible official or duly authorized representative; a detailed statement regarding the basis for requesting such a waiver; and the duration for which the waiver is requested. Approved electronic reporting waivers are not transferrable. Permittees with an approved electronic reporting waiver for DMRs may submit hard copy DMRs for the period that the approved electronic reporting waiver request is effective. The Permittee shall submit the Department-approved DMR forms to the address listed in Part I.D.1.i.

e. If the Permittee, using approved analytical methods as specified in Part I.C.6., monitors any discharge from a point source identified on Page 1 of this Permit and describe more fully in the Permittee's application more frequently than required by this Permit; the results of such monitoring shall be included in the calculation and reporting of values on the DMR Form, and the increased frequency shall be indicated on the DMR Form.

f. In the event no discharge from a point source identified on Page 1 of this Permit and described more fully in the Permittee's application occurs during a monitoring period, the Permittee shall report "No Discharge" for such period on the appropriate DMR Form.

g. Each DMR Form submitted by the Permittee to the Department in accordance with Part I.D.1. must be legible and bear an original signature or electronic signature. Photo and electronic copies of the signature are not acceptable and shall not satisfy the reporting requirements of this Permit.

h. All reports and forms required to be submitted by this Permit, the AWPCA, and the Department's rules and regulations, shall be signed by a "responsible official" of the Permittee as defined in ADEM Admin. Code r. 335-6-6-.09 or a "duly authorized representative" of such official as defined in ADEM Admin. Code r. 335-6-6-.09 and shall bear the following certification:

> "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."

i. All DMRs, reports, and forms required to be submitted by this Permit, the AWPCA and the Department's rules and regulations, shall be submitted through the Department's electronic reporting system, AEPACS, or, if in hardcopy, shall be addressed to:

Alabama Department of Environmental Management
Water Division, Mining and Natural Resource Section
Post Office Box 301463
Montgomery, Alabama 36130-1463

Certified and Registered Mail shall be addressed to:

Alabama Department of Environmental Management
Water Division, Mining and Natural Resource Section
1400 Coliseum Boulevard
Montgomery, Alabama 36110-2059

j. Unless authorized in writing by the Department, approved reporting forms required by this Permit or the Department are not to be altered, and if copied or reproduced, must be consistent in format and identical in content to the ADEM approved form. Unauthorized alteration, falsification, or use of incorrectly reproduced forms constitutes noncompliance with the requirements of this Permit and may significantly delay processing of any request, result in denial of the request, result in permit termination, revocation, suspension, modification, or denial of a permit renewal application, or result in other enforcement action.

k. If this Permit is a reissuance, then the Permittee shall continue to submit DMRs in accordance with the requirements of their previous permit until such time as DMRs are due as discussed in Part I.D.1.

2. Noncompliance Notification

a. The Permittee must notify the Department if, for any reason, the Permittee's discharge:

(1) Potentially threatens human health or welfare;

(2) Potentially threatens fish or aquatic life;

(3) Causes an in-stream water quality criterion to be exceeded;

(4) Does not comply with an applicable toxic pollutant effluent standard or prohibition established under Section 307(a) of the FWPCA, 33 U.S.C. §1317(a);

(5) Contains a quantity of a hazardous substance which has been determined may be harmful to the public health or welfare under Section 311(b)(4) of the FWPCA, 33 U.S.C. §1321(b)(4); or

(6) Exceeds any discharge limitation for an effluent parameter as a result of an unanticipated bypass or upset.

The Permittee shall orally or electronically report any of the above occurrences, describing the circumstances and potential effects of such discharge to the Director within 24-hours after the Permittee becomes aware of the occurrence of such discharge. In addition to the oral or electronic report, the Permittee shall submit to the Director a written report as provided in Part I.D.2.c., no later than five (5) days after becoming aware of the occurrence of such discharge.

b. If for any reason, the Permittee's discharge does not comply with any limitation of this Permit, the Permittee shall submit a written report to the Director as provided in Part I.D.2.c. This report must be submitted with the next Discharge Monitoring Report required to be submitted by Part I.D.1. of this Permit after becoming aware of the occurrence of such noncompliance.

c. An electronic Noncompliance Notification Form in a Department-approved format must be submitted to the Director in accordance with Parts I.D.2.a. and b. The completed form must document the following information:

(1) A description of the discharge and cause of noncompliance;

(2) The period of noncompliance, including exact dates and times, or if not corrected, the anticipated time the noncompliance is expected to continue; and

(3) A description of the steps taken and/or being taken to reduce or eliminate the noncomplying discharge and to prevent its recurrence.

3. Reduction, Suspension, or Termination of Monitoring and/or Reporting

a. The Director may, with respect to any point source identified on Page 1 of this Permit and described more fully in the Permittee's application, authorize the Permittee to reduce, suspend, or terminate the monitoring and/or reporting required by this Permit upon the submission of a written request for such reduction, suspension, or termination by the Permittee provided:

(1) All mining, processing, or disturbance in the drainage basin(s) associated with the discharge has ceased and site access is adequately restricted or controlled to preclude unpermitted and unauthorized mining, processing, transportation, or associated operations/activity;

(2) Permanent, perennial vegetation has been re-established on all areas mined or disturbed for at least one year since mining has ceased in the drainage basin(s) associated with the surface discharge, or all areas have been permanently graded such that all drainage is directed back into the mined pit to preclude all surface discharges;

(3) Unless waived in writing by the Department, the Permittee has been granted, in writing, a 100% Bond Release, if applicable, by the Alabama Department of Industrial Relations and, if applicable, by the Surface Mining Commission for all areas mined or disturbed in the drainage basin(s) associated with the discharge;

(4) Unless waived in writing by the Department, the Permittee has submitted inspection reports prepared and certified by a Professional Engineer (PE) registered in the State of Alabama or a qualified professional under the PE's direction which certify that the facility has been fully reclaimed or that water quality remediation has been achieved. The first inspection must be conducted approximately one year prior to and the second inspection must be conducted

within thirty days of the Permittee's request for termination of monitoring and reporting requirements;

(5) All surface effects of the mining activity such as fuel or chemical tanks, preparation plants or equipment, old tools or equipment, junk or debris, etc., must be removed and disposed of according to applicable state and federal regulations;

(6) The Permittee's request for termination of monitoring and reporting requirements contained in this Permit has been supported by monitoring data covering a period of at least six consecutive months or such longer period as is necessary to assure that the data reflect discharges occurring during varying seasonal climatological conditions;

(7) The Permittee has stated in its request that the samples collected and reported in the monitoring data submitted in support of the Permittee's request for monitoring termination or suspension are representative of the discharge and were collected in accordance with all Permit terms and conditions respecting sampling times (e.g., rainfall events) and methods and were analyzed in accordance with all Permit terms and conditions respecting analytical methods and procedures;

(8) The Permittee has certified that during the entire period covered by the monitoring data submitted, no chemical treatment of the discharge was provided;

(9) The Permittee's request has included the certification required by Part I.D.1.e. of this Permit; and

(10) The Permittee has certified to the Director in writing as part of the request, its compliance with (1) through (9) above.

b. It remains the responsibility of the Permittee to comply with the monitoring and reporting requirements of this Permit until written authorization to reduce, suspend, or terminate such monitoring and/or reporting is received by the Permittee from the Director.

E. OTHER REPORTING AND NOTIFICATION REQUIREMENTS

1. Anticipated Noncompliance

The Permittee shall give the Director written advance notice of any planned changes or other circumstances regarding a facility which may result in noncompliance with permit requirements.

2. Termination of Discharge

The Permittee shall notify the Director, in writing, when all discharges from any point source(s) identified on Page 1 of this Permit and described more fully in the Permittee's application have permanently ceased.

3. Updating Information

a. The Permittee shall inform the Director of any change in the Permittee's mailing address or telephone number or in the Permittee's designation of a facility contact or officer(s) having the authority and responsibility to prevent and abate violations of the AWPCA, the AEMA, the Department's rules and regulations, and the terms and conditions of this Permit,

in writing, no later than ten (10) days after such change. Upon request of the Director, the Permittee shall furnish the Director with an update of any information provided in the permit application.

b. If the Permittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or in any report to the Director, it shall promptly submit such facts or information with a written explanation for the mistake and/or omission.

4. Duty to Provide Information

a. The Permittee shall furnish to the Director, within a reasonable time, any information which the Director may request to determine whether cause exists for modifying, suspending, terminating, or revoking and reissuing this Permit, in whole or in part, or to determine compliance with this Permit. The Permittee shall also furnish to the Director upon request, copies of records required to be maintained by this Permit.

b. The Permittee shall furnish to the Director upon request, within a reasonable time, available information (name, phone number, address, and site location) which identifies offsite sources of material or natural resources (mineral, ore, or other material such as iron, coal, coke, dirt, chert, shale, clay, sand, gravel, bauxite, rock, stone, etc.) used in its operation or stored at the facility.

F. SCHEDULE OF COMPLIANCE

The Permittee shall achieve compliance with the discharge limitations specified in Part I.A. of this Permit in accordance with the following schedule:

Compliance must be achieved by the effective date of this Permit.

PART II OTHER REQUIREMENTS, RESPONSIBILITIES, AND DUTIES

A. OPERATIONAL AND MANAGEMENT REQUIREMENTS

1. Facilities Operation and Management

The Permittee shall at all times operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the Permittee to achieve compliance with the conditions of this Permit. Proper operation and maintenance includes effective performance, adequate funding, adequate operator staffing and training, and adequate laboratory and process controls, including appropriate quality assurance procedures. This provision requires the operation of backup or auxiliary facilities only when necessary to achieve compliance with the conditions of this Permit.

2. Pollution Abatement and/or Prevention Plan

a. The Pollution Abatement and/or Prevention (PAP) Plan shall be prepared and certified by a registered Professional Engineer (PE), licensed to practice in the State of Alabama, and shall include at a minimum:

(1) The information indicated in ADEM Admin Code r. 335-6-9-.03 and ADEM Admin. Code ch. 335-6-9 and its Appendices A and B;

(2) A description of methods which will be implemented to prevent offsite vehicle tracking onto roadways and/or into ditches at the entrances and/or exits of the Permittee's operations;

(3) A description of setbacks from waters of the State in units of linear feet on the horizontal plane; a description of the methods taken to visibly delineate setbacks from waters of the State; and a description of any other actions taken to prevent encroachment upon setbacks;

(4) A description of the methods used to delineate the boundaries of coverage under this Permit such that the boundaries are readily visible during the life of the operation;

(5) A description of any other Best Management Practices (BMPs) which will be implemented to provide control of all nonpoint source pollution that is or may be associated with the Permittee's operations;

b. The PAP Plan shall become a part of this Permit and all requirements of the PAP Plan shall become requirements of this Permit pursuant to ADEM Admin Code r. 335-6-9-.05(2). The PAP Plan shall be amended if the Department determines that the existing sediment control measures, erosion control measures, or other site management practices are ineffective or do not meet the requirements of this Permit.

c. For existing sources, the PAP Plan shall be updated to include all requirements of this section within 180 days of the effective date of this permit. New sources shall submit the PAP plan with the NPDES Individual Permit application prior to coverage under this Permit.

3. Best Management Practices (BMPs)

a. Unless otherwise authorized in writing by the Director, the Permittee shall provide a means of subsurface withdrawal for any discharge from each point source identified on Page 1 of this Permit and described more fully in the Permittee's application. Notwithstanding the above provision, a means of subsurface withdrawal need not be provided for any discharge caused by a 24-hour precipitation event greater than a 10-year, 24-hour precipitation event.

b. Dilution water shall not be added to achieve compliance with discharge limitations except when the Director has granted prior written authorization for dilution to meet water quality requirements.

c. The Permittee shall minimize the contact of water with overburden, including but not limited to stabilizing disturbed areas through grading, diverting runoff, achieving quick growing stands of temporary vegetation, sealing acid-forming and toxic-forming materials, and maximizing placement of waste materials in back-fill areas.

d. The Permittee shall prepare, submit to the Department for approval, and implement a Best Management Practices (BMPs) Plan for containment of any or all process liquids or solids, in a manner such that these materials do not present a potential for discharge, if so required by the Director. When submitted and approved, the BMP Plan shall become a part of this Permit and all requirements of the BMP Plan shall become requirements of this Permit.

e. Spill Prevention, Control, and Management

The Permittee shall prepare, implement, and maintain a Spill Prevention, Control and Countermeasures (SPCC) Plan acceptable to the Department that is prepared and certified by a Professional Engineer (PE), registered in the State of Alabama, for all onsite petroleum product or other pollutant storage tanks or containers as provided by ADEM Admin. Code r. 335-6-6-.08(j)5. The Plan shall describe and the Permittee shall implement appropriate structural and/or non-structural spill prevention, control, and/or management pursuant to ADEM Admin. Code r. 335-6-6-.12 (r) sufficient to prevent any spills of pollutants from entering a ground or surface water of the State or a publicly or privately owned treatment works. The Plan shall include at a minimum, the engineering requirements provided in 40 C.F.R. §§112.1. Any containment system used to implement this requirement shall be constructed of materials compatible with the substance(s) contained and shall prevent the contamination of groundwater. Such containment systems shall be capable of retaining a volume equal to 110 percent of the capacity of the largest tank for which containment is provided. The Plan shall list any materials which the Permittee may utilize to contain and to absorb fuel and chemical spills and leaks. The Permittee shall maintain sufficient amounts of such materials onsite or have sufficient amounts of such materials readily available to contain and/or absorb fuel and chemical spills and leaks. Soil contaminated by chemical spills, oil spills, etc., must be immediately cleaned up or be removed and disposed of in a manner consistent with all State and federal regulations.

f. All surface drainage and storm water runoff which originate within or enters the Permittee's premises and which contains any pollutants or other wastes shall be discharged, if at all, from a point source identified on Page 1 of this Permit and described more fully in the Permittee's application.

g. The Permittee shall take all reasonable precautions to prevent any surface drainage or storm water runoff which originates outside the Permittee's premises and which contains any pollutants or other wastes from entering the Permittee's premises. At no time shall the Permittee discharge any such surface drainage or storm water runoff which enters the Permittee's premises if, either alone or in combination with the Permittee's effluent, the discharge would exceed any applicable discharge limitation specified in Part I.A. of this Permit.

4. Biocide Additives

a. The Permittee shall notify the Director in writing not later than sixty (60) days prior to instituting the use of any biocide corrosion inhibitor or chemical additive in any cooling or boiler system(s) regulated by this Permit. Notification is not required for additives that should not reasonably be expected to cause the cooling water or boiler water to exhibit toxicity as determined by analysis of manufacturer's data or testing by the Permittee. Such notification shall include:

(a) Name and general composition of biocide or chemical;

(b) 96-hour median tolerance limit data for organisms representative of the biota of the water(s) which the discharge(s) enter(s);

(c) Quantities to be used;

(d) Frequencies of use;

(e) Proposed discharge concentrations; and

(f) EPA registration number, if applicable.

b. The use of any biocide or chemical additive containing tributyl tin, tributyl tin oxide, zinc, chromium, or related compounds in any cooling or boiler system(s) regulated by the Permit is prohibited except as exempted below. The use of a biocide or additive containing zinc, chromium or related compounds may be used in special circumstances if (1) the permit contains limits for these substances, or (2) the applicant demonstrates during the application process that the use of zinc, chromium or related compounds as a biocide or additive will not pose a reasonable potential to violate the applicable State water quality standards for these substances. The use of any additive, not identified in this Permit or in the application for this Permit or not exempted from notification under this Permit is prohibited, prior to a determination by the Department that permit modification to control discharge of the additive is not required or prior to issuance of a permit modification controlling discharge of the additive.

5. Facility Identification

The Permittee shall clearly display prior to commencement of any regulated activity and until permit coverage is properly terminated, the name of the Permittee, entire NPDES permit number, facility or site name, and other descriptive information deemed appropriate by the Permittee at an easily accessible location(s) to adequately identify the site, unless approved otherwise in writing by the Department. The Permittee shall repair or replace the sign(s) as necessary upon becoming aware that the identification is missing or is unreadable due to age, vandalism, theft, weather, or other reason.

6. Removed Substances

Solids, sludges, filter backwash, or any other pollutants or other wastes removed in the course of treatment or control of wastewaters shall be disposed of in a manner that complies with all applicable Department rules and regulations.

7. Loss or Failure of Treatment Facilities

Upon the loss or failure of any treatment facility, including but not limited to the loss or failure of the primary source of power of the treatment facility, the Permittee shall, where necessary to maintain compliance with the discharge limitations specified in Part I.A. of this Permit or any other terms or conditions of this Permit, cease, reduce, or otherwise control production and/or discharges until treatment is restored.

8. Duty to Mitigate

The Permittee shall promptly take all reasonable steps to minimize or prevent any violation of this Permit or to mitigate and minimize any adverse impact to waters resulting from noncompliance with any discharge limitation specified in Part I.A. of this Permit, including such accelerated or additional monitoring of the discharge and/or the receiving waterbody as is necessary to determine the nature and impact of the noncomplying discharge.

B. BYPASS AND UPSET

1. Bypass

a. Any bypass is prohibited except as provided in Parts II.B.1.b. and c.

b. A bypass is not prohibited if:

(1) It does not cause any applicable discharge limitation specified in Part I.A. of this Permit to be exceeded;

(2) The discharge resulting from such bypass enters the same receiving water as the discharge from the permitted outfall;

(3) It is necessary for essential maintenance of a treatment or control facility or system to assure efficient operation of such facility or system; and

(4) The Permittee monitors the discharge resulting from such bypass at a frequency, at least daily, sufficient to prove compliance with the discharge limitations specified in Part I.A. of this Permit.

c. A bypass is not prohibited and need not meet the discharge limitations specified in Part I.A. of this Permit if:

(1) It is unavoidable to prevent loss of life, personal injury, or severe property damage;

(2) There are no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if the Permittee could have installed adequate backup equipment to prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance; and

(3) The Permittee submits a written request for authorization to bypass to the Director at least ten (10) days, if possible, prior to the anticipated bypass or within 24 hours of an unanticipated bypass, the Permittee is granted such authorization, and Permittee complies with any conditions imposed by the Director to minimize any adverse impact to waters resulting from the bypass.

d. The Permittee has the burden of establishing that each of the conditions of Parts II.B.1.b. or c. have been met to qualify for an exception to the general prohibition against bypassing contained in Part II.B.1.a. and an exemption, where applicable, from the discharge limitations specified in Part I.A. of this Permit.

2. Upset

a. The Permittee may seek to demonstrate that noncompliance with technology-based effluent limits occurred as a result of an upset if the conditions of Part II.B.2.b are met and if the Permittee complies with the conditions provided in Part II.B.2.c.

b. If the Permittee wishes to establish the affirmative defense of an upset for technology-based effluent limit noncompliance, the Permittee must demonstrate through properly signed, contemporaneous operating logs, or other relevant evidence that:

(1) An upset occurred and that the Permittee can identify the specific cause(s) of the upset;

(2) The wastewater treatment facility was at the time being properly operated in accordance with Part II.B.d.

(3) The Permittee submitted notice of the noncompliance during the upset as required by Part II.B.2.c; and

(4) The Permittee complied with any remedial measures required under Part II.A.7. of this Permit.

c. If the Permittee wishes to establish the affirmative defense of an upset for technology-based effluent limit noncompliance, the Permittee shall:

(1) No later than 24-hours after becoming aware of the occurrence of the upset, orally report the occurrence and circumstances of the upset to the Director in accordance with Part I.G.2.; and

(2) No later than five (5) days after becoming aware of the occurrence of the upset, furnish the Director with evidence, including properly signed, contemporaneous operating logs, design drawings, construction certification, maintenance records, weir flow measurements, dated photographs, rain gauge measurements, or other relevant evidence, demonstrating that:

(i) An upset occurred;

(ii) The Permittee can identify the specific cause(s) of the upset;

(iii) The Permittee's treatment facility was being properly operated at the time of the upset; and

(iv) The Permittee promptly took all reasonable steps to minimize any adverse impact to waters resulting from the upset.

d. A discharge which is an overflow from a treatment facility or system, or an excess discharge from a point source associated with a treatment facility or system and which results from a 24-hour precipitation event larger than a 10-year, 24-hour precipitation event is not eligible to be considered as a result of an upset unless:

(1) The treatment facility or system is designed, constructed, and maintained to contain the maximum volume of wastewater which would be generated by the facility during a 24-hour period without an increase in volume from precipitation and the maximum volume of wastewater resulting from a 10-year, 24-hour precipitation event or to treat the maximum flow associated with these volumes. In computing the maximum volume of wastewater which would result from a 10-year, 24-hour precipitation event, the volume which would result from all areas contributing runoff to the individual treatment facility must be included (i.e., all runoff that is not diverted from the mining area and runoff which is not diverted from the preparation plant area); and

(2) The Permittee takes all reasonable steps to maintain treatment of the wastewater and minimize the amount of overflow or excess discharge..

e. The Permittee has the burden of proof in defense of any enforcement action as a result of noncompliance of technology-based effluent limits the Permittee proposes to attribute to an upset.

C. PERMIT CONDITIONS AND RESTRICTIONS

1. Prohibition against Discharge from Facilities Not Certified

a. Notwithstanding any other provisions of this Permit, if the permitted facility has not obtained or is not required to obtain a permit from the Alabama Surface Mining Commission, any discharge(s) from any point or nonpoint source(s) from the permitted facility which was not certified to the Department on a form approved by the Department by a professional engineer, registered in the State of Alabama, as being designed, constructed, and in accordance with plans and specifications reviewed by the Department is prohibited; or

b. Notwithstanding any other provisions of this Permit, if the permitted facility has obtained or is required to obtain a permit from the Alabama Surface Mining Commission, any discharge(s) from any point or nonpoint source(s) from the permitted facility which is associated with a treatment facility which was not constructed and certified to the Alabama Surface Mining Commission pursuant to applicable provisions of said Commission's regulations, is prohibited until the Permittee submits to the Alabama Surface Mining Commission, certification by a professional engineer, registered in the State of Alabama, certifying that such facility has been constructed in accordance with plans and specifications approved by the Alabama Surface Mining Commission. This requirement shall not apply to pumped discharges from the underground works of underground coal mines where no surface structure is required by the Alabama Surface Mining Commission, provided the Department is notified in writing of the completion or installation of such facilities, and the pumped discharges will meet permit effluent limits without treatment.

2. Permit Modification, Suspension, Termination, and Revocation

a. This Permit may be modified, suspended, terminated, or revoked and reissued, in whole or in part, during its term for cause, including but not limited to, the following:

(1) The violation of any term or condition of this Permit;

(2) The obtaining of this Permit by misrepresentation or the failure to disclose fully all relevant facts;

(3) The submission of materially false or inaccurate statements or information in the permit application or reports required by the Permit;

(4) The need for a change in any condition that requires either a temporary or permanent reduction or elimination of the permitted discharge;

(5) The existence of any typographical or clerical errors or of any errors in the calculation of discharge limitations;

(6) The existence of material and substantial alterations or additions to the facility or activity generating wastewater which occurred after permit issuance which justify the application of permit conditions that are different or absent in the existing permit;

(7) The threat of the Permittee's discharge on human health or welfare; or

(8) Any other cause allowed by ADEM Admin. Code ch. 335-6-6.

b. The filing of a request by the Permittee for modification, suspension, termination, or revocation and reissuance of this Permit, in whole or in part, does not stay any Permit term or condition of this Permit.

3. Requirements for Metals, Cyanide, and Phenols Monitoring and Reporting

a. For all outfalls, the Permittee shall collect a sample of the discharge to be analyzed for antimony, arsenic, beryllium, cadmium, chromium, copper, lead, mercury, nickel, selenium, silver, thallium, zinc, cyanide, and phenols no later six months following the effective date of the Permit. The analyses shall be submitted on EPA Form 2C and received by the Department no later than 28 days following six months after the effective date of the Permit.

b. For all outfalls, should a discharge not occur within the first six months following the effective date of this Permit, the Permittee shall collect a sample of the discharge to be analyzed for antimony, arsenic, beryllium, cadmium, chromium, copper, lead, mercury, nickel, selenium, silver, thallium, zinc, cyanide, and phenols no later than six months following the date of the first discharge. The analyses shall be submitted on EPA Form 2C and received by the Department no later than 28 days following six months after the first discharge.

c. Parts II.C.3.a. and b. do not apply for any outfall that is represented by analyses conducted at a substantially similar outfall as indicated on EPA Form 2C or 2D.

d. The Permit shall be reopened, if required, to address any new information resulting from the completion and submittal of the data referenced in Parts II.C.3.a. and b.

4. Automatic Expiration of Permits for New or Increased Discharges

a. Except as provided by ADEM Admin. Code r. 335-6-6-.02(h) and 335-6-6-.05, if this Permit was issued for a new discharger or new source, it shall expire eighteen months after the issuance date if construction has not begun during that eighteen month period.

b. Except as provided by ADEM Admin. Code r. 335-6-6-.02(h) and 335-6-6-.05, if any portion of this Permit was issued or modified to authorize the discharge of increased quantities of pollutants to accommodate the modification of an existing facility, that portion of this Permit shall expire eighteen months after this Permit's issuance if construction of the modification has not begun within eighteen month period.

c. Construction has begun when the owner or operator has:

(1) Begun, or caused to begin as part of a continuous on-site construction program:

(i) Any placement, assembly, or installation of facilities or equipment; or

(ii) Significant site preparation work including clearing, excavation, or removal of existing buildings, structures, or facilities which is necessary for the placement, assembly, or installation of new source facilities or equipment; or

(2) Entered into a binding contractual obligation for the purpose of placement, assembly, or installation of facilities or equipment which are intended to be used in its operation within a reasonable time. Options to purchase or contracts which can be terminated or modified without substantial loss, and contracts for feasibility, engineering, and design studies do not constitute a contractual obligation under the paragraph. The entering into a lease with the State of Alabama for exploration and production of hydrocarbons shall also be considered beginning construction.

d. The automatic expiration of this Permit for new or increased discharges if construction has not begun within the eighteen month period after the issuance of this Permit may be tolled by administrative or judicial stay.

5. Transfer of Permit

This Permit may not be transferred or the name of the Permittee changed without notice to the Director and subsequent modification or revocation and reissuance of this Permit to identify the new Permittee and to incorporate any other changes as may be required under the FWPCA or AWPCA. In the case of a change in name, ownership, or control of the Permittee's premises only, a request for permit modification in a format acceptable to the Director is required at least 30 days prior to the change. In the case of a change in name, ownership, or control of the Permittee's premises accompanied by a change or proposed change in effluent characteristics, a complete permit application is required to be submitted to the Director at least 180 days prior to the change. Whenever the Director is notified of a change in name, ownership, or control, he may decide not to modify the existing Permit and require the submission of a new permit application.

6. Groundwater

Unless authorized on page 1 of this Permit, this Permit does not authorize any discharge to groundwater. Should a threat of groundwater contamination occur, the Director may require groundwater monitoring to properly assess the degree of the problem, and the Director may require that the Permittee undertake measures to abate any such discharge and/or contamination.

7. Property and Other Rights

This Permit does not convey any property rights in either real or personal property, or any exclusive privileges, nor does it authorize any injury to persons or property or invasion of other private rights, trespass, or any infringement of Federal, State, or local laws or regulations, nor does it authorize or

approve the construction of any physical structures or facilities or the undertaking of any work in any waters of the State or of the United States.

D. RESPONSIBILITIES

1. Duty to Comply

a. The Permittee must comply with all terms and conditions of this Permit. Any permit noncompliance constitutes a violation of the AWPCA, AEMA, and the FWPCA and is grounds for enforcement action, for permit termination, revocation and reissuance, suspension, modification, or denial of a permit renewal application.

b. The Permittee shall comply with effluent standards or prohibitions established under Section 307(a) of the FWPCA for toxic pollutants within the time provided in the regulations that establish these standards or prohibitions, even if this Permit has not yet been modified to incorporate the effluent standard, prohibition or requirement.

c. For any violation(s) of this Permit, the Permittee is subject to a civil penalty as authorized by the AWPCA, the AEMA, the FWPCA, and Code of Alabama 1975, §§22-22A-1 et. seq., as amended, and/or a criminal penalty as authorized by Code of Alabama 1975, §22-22-1 et. seq., as amended.

d. The necessity to halt or reduce production or other activities in order to maintain compliance with the conditions of this Permit shall not be a defense for a Permittee in an enforcement action.

e. Nothing in this Permit shall be construed to preclude or negate the Permittee's responsibility or liability to apply for, obtain, or comply with other ADEM, federal, state, or local government permits, certifications, licenses, or other approvals.

f. The discharge of a pollutant from a source not specifically identified in the permit application for this Permit and not specifically included in the description of an outfall in this Permit is not authorized and shall constitute noncompliance with this Permit.

g. The Permittee shall take all reasonable steps, including cessation of production or other activities, to minimize or prevent any violation of this Permit or to minimize or prevent any adverse impact of any permit violation.

2. Change in Discharge

a. The Permittee shall apply for a permit modification at least 180 days in advance of any facility expansion, production increase, process change, or other action that could result in the discharge of additional pollutants, increase the quantity of a discharged pollutant, or that could result in an additional discharge point. This requirement also applies to pollutants that are not subject to discharge limitations in this Permit. No new or increased discharge may begin until the Director has authorized it by issuance of a permit modification or a reissued permit.

b. The Permittee shall notify the Director as soon as it knows or has reason to believe that it has begun or expects to begin to discharge any pollutant listed as a toxic pollutant pursuant to Section 307(a) of the FWPCA, 33 U.S.C. §1317(a), any substance designated as a hazardous substance pursuant to Section 311(b)(2) of the FWPCA, 33 U.S.C. §1321(b)(2), any waste listed as a hazardous waste pursuant to Code of Alabama 1975, §22-30-10, or any other pollutants or other wastes which is not subject to any discharge limitations

specified in Part I.A. of this Permit and was not reported in the Permittee's application, was reported in the Permittee's application in concentrations or mass rates lower than that which the Permittee expects to begin to be discharged, or has reason to believe has begun to be discharged.

3. **Compliance with Toxic or Other Pollutant Effluent Standard or Prohibition**

If any applicable effluent standard or prohibition (including any schedule of compliance specified in such effluent standard or prohibition) is established under Sections 301(b)(2)(C),(D),(E) and (F) of the FWPCA, 33 U.S.C. §1311(b)(2)(C),(D),(E), and (F); 304(b)(2) of the FWPCA, 33 U.S.C. §1314(b)(2); or 307(a) of the FWPCA, 33 U.S.C. §1317(a), for a toxic or other pollutant discharged by the Permittee, and such standard or prohibition is more stringent than any discharge limitation on the pollutant specified in Part I.A. of this Permit or controls a pollutant not limited in Part I.A. of this Permit, this Permit shall be modified to conform to the toxic or other pollutant effluent standard or prohibition and the Permittee shall be notified of such modification. If this Permit has not been modified to conform to the toxic or other pollutant effluent standard or prohibition before the effective date of such standard or prohibition, the authorization to discharge in this Permit shall be void to the extent that any discharge limitation on such pollutant in Part I.A. of this Permit exceeds or is inconsistent with the established toxic or other pollutant effluent standard or prohibition.

4. **Compliance with Water Quality Standards and Other Provisions**

a. On the basis of the Permittee's application, plans, or other available information, the Department has determined that compliance with the terms and conditions of this Permit will assure compliance with applicable water quality standards. However, this Permit does not relieve the Permittee from compliance with applicable State water quality standards established in ADEM Admin. Code ch. 335-6-10, and does not preclude the Department from taking action as appropriate to address the potential for contravention of applicable State water quality standards which could result from discharges of pollutants from the permitted facility.

b. Compliance with Permit terms and conditions notwithstanding, if the Permittee's discharge(s) from point source(s) identified on Page 1 of this Permit cause(s) or contribute(s) to a condition in contravention of State water quality standards, the Department may require abatement action to be taken by the Permittee, modify the Permit pursuant to the Department's rules and regulations, or both.

c. If the Department determines, on the basis of a notice provided pursuant to Part II.C.2. of this Permit or any investigation, inspection, or sampling, that a modification of this Permit is necessary to assure maintenance of water quality standards or compliance with other provisions of the AWPCA or FWPCA, the Department may require such modification and, in cases of emergency, the Director may prohibit the noticed act until the Permit has been modified.

5. **Compliance with Statutes and Rules**

a. This Permit has been issued under ADEM Admin. Code div. 335-6. All provisions of this division, that are applicable to this Permit, are hereby made a part of this Permit. A copy of this division may be obtained for a small charge from the Office of General Counsel, Alabama Department of Environmental Management, 1400 Coliseum Blvd., Montgomery, AL 36110-2059.

b. This Permit does not authorize the noncompliance with or violation of any Laws of the State of Alabama or the United States of America or any regulations or rules implementing such laws. FWPCA, 33 U.S.C. Section 1319, and Code of Alabama 1975, Section 22-22-14.

6. **Right of Entry and Inspection**

The Permittee shall allow the Director, or an authorized representative, upon the presentation of credentials and other documents as may be required by law to:

a. Enter upon the Permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of the Permit;

b. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this Permit;

c. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this Permit; and

d. Sample or monitor at reasonable times, for the purposes of assuring Permit compliance or as otherwise authorized by the AWPCA, any substances or parameters at any location.

7. **Duty to Reapply or Notify of Intent to Cease Discharge**

a. If the Permittee intends to continue to discharge beyond the expiration date of this Permit, the Permittee shall file with the Department a complete permit application for reissuance of this Permit at least 180 days prior to its expiration. **Applications must be submitted electronically via the Department's current electronic permitting system. The Department's current online permitting system, Alabama Environmental Permitting and Compliance System (AEPACS), can be found online at https://aepacs.adem.alabama.gov/nviro/ncore/external/home.**

b. If the Permittee does not desire to continue the discharge(s) allowed by this Permit, the Permittee shall notify the Department at least 180 days prior to expiration of this Permit of the Permittee's intention not to request reissuance of this Permit. This notification must include the information required in Part I.D.4.a. and be signed by an individual meeting the signatory requirements for a permit application as set forth in ADEM Admin. Code r. 335-6-6-.09.

c. Failure of the Permittee to submit to the Department a complete application for reissuance of this Permit at least 180 days prior to the expiration date of this Permit will void the automatic continuation of this Permit provided by ADEM Admin. Code r. 335-6-6-.06; and should this Permit not be reissued for any reason, any discharge after the expiration of this Permit will be an unpermitted discharge.

PART III ADDITIONAL REQUIREMENTS, CONDITIONS, AND LIMITATIONS

A. CIVIL AND CRIMINAL LIABILITY

1. Tampering

Any person who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained or performed under this Permit shall, upon conviction, be subject to penalties and/or imprisonment as provided by the AWPCA and/or the AEMA.

2. False Statements

Any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this Permit, including monitoring reports or reports of compliance or noncompliance shall, upon conviction, be punished as provided by applicable State and Federal law.

3. Permit Enforcement

This NPDES Permit is a Permit for the purpose of the AWPCA, the AEMA, and the FWPCA, and as such all terms, conditions, or limitations of this Permit are enforceable under State and Federal law.

4. Relief From Liability

Except as provided in Part II.B.1. (Bypass) and Part II.B.2. (Upset), nothing in this Permit shall be construed to relieve the Permittee of civil or criminal liability under the AWPCA, AEMA, or FWPCA for noncompliance with any term or condition of this Permit.

B. OIL AND HAZARDOUS SUBSTANCE LIABILITY

Nothing in this Permit shall be construed to preclude the institution of any legal action or relieve the Permittee from any responsibilities, liabilities, or penalties to which the Permittee is or may be subject to under Section 311 of the FWPCA, 33 U.S.C. §1321.

C. AVAILABILITY OF REPORTS

Except for data determined to be confidential under Code of Alabama 1975, §22-22-9(c), all reports prepared in accordance with the terms of this Permit shall be available for public inspection at the offices of the Department. Effluent data shall not be considered confidential. Knowingly making any false statement in any such report may result in the imposition of criminal penalties as provided for in Section 309 of the FWPCA, 33 U.S.C. §1319, and Code of Alabama 1975, §22-22-14.

D. DEFINITIONS

1. Alabama Environmental Management Act (AEMA) - means Code of Alabama 1975, §§22-22A-1 et. seq., as amended.

2. Alabama Water Pollution Control Act (AWPCA) - means Code of Alabama 1975, §§22-22-1 et. seq., as amended.

3. Average monthly discharge limitation - means the highest allowable average of "daily discharges" over a calendar month, calculated as the sum of all "daily discharges" measured during a calendar

month divided by the number of "daily discharges" measured during that month (zero discharge days shall not be included in the number of "daily discharges" measured and a less than detectable test result shall be treated as a concentration of zero if the most sensitive EPA approved method was used).

4. Arithmetic Mean - means the summation of the individual values of any set of values divided by the number of individual values.

5. BOD - means the five-day measure of the pollutant parameter biochemical oxygen demand

6. Bypass - means the intentional diversion of waste streams from any portion of a treatment facility.

7. CBOD - means the five-day measure of the pollutant parameter carbonaceous biochemical oxygen demand.

8. Controlled Surface Mine Drainage – means any surface mine drainage that is pumped or siphoned from the active mining area.

9. Daily discharge - means the discharge of a pollutant measured during any consecutive 24-hour period in accordance with the sample type and analytical methodology specified by the discharge permit.

10. Daily maximum - means the highest value of any individual sample result obtained during a day.

11. Daily minimum - means the lowest value of any individual sample result obtained during a day.

12. Day - means any consecutive 24-hour period.

13. Department - means the Alabama Department of Environmental Management.

14. Director - means the Director of the Department or his authorized representative or designee.

15. Discharge - means "[t]he addition, introduction, leaking, spilling or emitting of any sewage, industrial waste, pollutant or other waste into waters of the state." Code of Alabama 1975, §22-22-1(b)(8).

16. Discharge monitoring report (DMR) - means the form approved by the Director to accomplish monitoring report requirements of an NPDES Permit.

17. DO - means dissolved oxygen.

18. E. coli – means the pollutant parameter Escherichia coli.

19. 8HC - means 8-hour composite sample, including any of the following:

    a. The mixing of at least 5 equal volume samples collected at constant time intervals of not more than 2 hours over a period of not less than 8 hours between the hours of 6:00 a.m. and 6:00 p.m. If the sampling period exceeds 8 hours, sampling may be conducted beyond the 6:00 a.m. to 6:00 p.m. period.

    b. A sample continuously collected at a constant rate over period of not less than 8 hours between the hours of 6:00 a.m. and 6:00 p.m. If the sampling period exceeds 8 hours, sampling may be conducted beyond the 6:00 a.m. to 6:00 p.m. period.

20. EPA - means the United States Environmental Protection Agency.

21. Federal Water Pollution Control Act (FWPCA) - means 33 U.S.C. §§1251 et. seq., as amended.

22. Flow – means the total volume of discharge in a 24-hour period.

23. Geometric Mean - means the Nth root of the product of the individual values of any set of values where N is equal to the number of individual values. The geometric mean is equivalent to the antilog of the arithmetic mean of the logarithms of the individual values. For purposes of calculating the geometric mean, values of zero (0) shall be considered one (1).

24. Grab Sample - means a single influent or effluent portion which is not a composite sample. The sample(s) shall be collected at the period(s) most representative of the discharge.

25. Indirect Discharger - means a nondomestic discharger who discharges pollutants to a publicly owned treatment works or a privately owned treatment facility operated by another person.

26. Industrial User - means those industries identified in the Standard Industrial Classification manual, Bureau of the Budget 1967, as amended and supplemented, under the category "Division D – Manufacturing" and such other classes of significant waste producers as, by regulation, the Director deems appropriate.

27. mg/L - means milligrams per liter of discharge.

28. MGD - means million gallons per day.

29. Monthly Average - means, other than for E. coli bacteria, the arithmetic mean of all the composite or grab samples taken for the daily discharges collected in one month period. The monthly average for E. coli bacteria is the geometric mean of daily discharge samples collected in a one month period. The monthly average for flow is the arithmetic mean of all flow measurements taken in a one month period. (Zero discharges shall not be included in the calculation of monthly averages.)

30. New Discharger - means a person owning or operating any building, structure, facility or installation:

    a. From which there is or may be a discharge of pollutants;

    b. From which the discharge of pollutants did not commence prior to August 13, 1979, and which is not a new source; and

    c. Which has never received a final effective NPDES Permit for dischargers at that site.

31. New Source - means:

    a. A new source as defined for coal mines by 40 CFR Part 434.11 (1994); and

    b. Any building, structure, facility, or installation from which there is or may be a discharge of pollutants, the construction of which commenced:

        (1) After promulgation of standards of performance under Section 306 of FWPCA which are applicable to such source; or

        (2) After proposal of standards of performance in accordance with Section 306 of the FWPCA which are applicable to such source, but only if the standards are promulgated in accordance with Section 206 within 120 days of their proposal.

32. NH3-N - means the pollutant parameter ammonia, measured as nitrogen.

33. 1-year, 24-hour precipitation event - means the maximum 24-hour precipitation event with a probable recurrence interval of once in one year as defined by the National Weather Service and Technical Paper No. 40, "Rainfall Frequency Atlas of the U.S.," May 1961, or equivalent regional or rainfall probability information developed therefrom.

34. Permit application - means forms and additional information that are required by ADEM Admin. Code r. 335-6-6-.08 and applicable permit fees.

35. Point Source - means "any discernible, confined and discrete conveyance, including but not limited to any pipe, channel, ditch, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, or vessel or other floating craft from which pollutants are or may be discharged." Section 502(14) of the FWPCA, 33 U.S.C. §1362(14).

36. Pollutant - includes for purposes of this Permit, but is not limited to, those pollutants specified in Code of Alabama 1975, §22-22-1(b)(3) and those effluent characteristics, excluding flow, specified in Part I.A. of this Permit.

37. Pollutant of Concern - means those pollutants for which a water body is listed as impaired or which contribute to the listed impairment.

38. Pollution Abatement and/or Prevention Plan (PAP Plan) – mining operations plan developed to minimize impacts on water quality to avoid a contravention of the applicable water quality standards as defined in ADEM Admin. Code r. 335-6-9-.03

39. Preparation, Dry - means a dry preparation facility within which the mineral/material is cleaned, separated, or otherwise processed without use of water or chemical additives before it is shipped to the customer or otherwise utilized. A dry preparation plant includes all ancillary operations and structures necessary to clean, separate, or otherwise process the mineral/material, such as storage areas and loading facilities. Dry preparation also includes minor water spray(s) used solely for dust suppression on equipment and roads to minimize dust emissions.

40. Preparation, Wet - means a wet preparation facility within which the mineral/material is cleaned, separated, or otherwise processed using water or chemical additives before it is shipped to the customer or otherwise utilized. A wet preparation plant includes all ancillary operations and structures necessary to clean, separate, or otherwise process the mineral/material, such as storage areas and loading facilities. Wet preparation also includes mineral extraction/processing by dredging, slurry pumping, etc.

41. Privately Owned Treatment Works - means any devices or system which is used to treat wastes from any facility whose operator is not the operator of the treatment works, and which is not a "POTW".

42. Publicly Owned Treatment Works (POTW) - means a wastewater collection and treatment facility owned by the State, municipality, regional entity composed of two or more municipalities, or another entity created by the State or local authority for the purpose of collecting and treating municipal wastewater.

43. Receiving Stream - means the "waters" receiving a "discharge" from a "point source".

44. Severe property damage - means substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.

45. 10-year, 24-hour precipitation event - means that amount of precipitation which occurs during the maximum 24-hour precipitation event with a probable recurrence interval of once in ten years as

defined by the National Weather Service and Technical Paper No. 40, "Rainfall Frequency Atlas of the U.S.," May 1961, or equivalent regional or rainfall probability information developed therefrom.

46. TKN - means the pollutant parameter Total Kjeldahl Nitrogen.

47. TON - means the pollutant parameter Total Organic Nitrogen.

48. TRC - means Total Residual Chlorine.

49. TSS – means the pollutant parameter Total Suspended Solids

50. Treatment facility and treatment system - means all structures which contain, convey, and as necessary, chemically or physically treat mine and/or associated preparation plant drainage, which remove pollutants limited by this Permit from such drainage or wastewater. This includes all pipes, channels, ponds, tanks, and all other equipment serving such structures.

51. 24HC - means 24-hour composite sample, including any of the following:

    a. The mixing of at least 12 equal volume samples collected at constant time intervals of not more than 2 hours over a period of 24 hours;

    b. A sample collected over a consecutive 24-hour period using an automatic sampler composite to one sample. As a minimum, samples shall be collected hourly and each shall be no more than one twenty-fourth (1/24) of the total sample volume collected; or

    c. A sample collected over a consecutive 24-hour period using an automatic composite sampler composited proportional to flow.

52. 24-hour precipitation event - means that amount of precipitation which occurs within any 24-hour period.

53. 2-year, 24-hour precipitation event - means the maximum 24-hour precipitation event with a probable recurrence interval of once in two years as defined by the National Weather Service and Technical Paper No. 40, "Rainfall Frequency Atlas of the U.S.," May 1961, or equivalent regional or rainfall probability information developed therefrom.

54. Upset - means an exceptional incident in which there is an unintentional and temporary noncompliance with technology-based permit discharge limitations because of factors beyond the control of the Permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate facilities, lack of preventive maintenance, or careless or improper operation.

55. Waters - means "[a]ll waters of any river, stream, watercourse, pond, lake, coastal, ground or surface water, wholly or partially within the State, natural or artificial. This does not include waters which are entirely confined and retained completely upon the property of a single individual, partnership, or corporation unless such waters are used in interstate commerce." Code of Alabama 1975, §22-22-1(b)(2). "Waters" include all "navigable waters" as defined in §502(7) of the FWPCA, 33 U.S.C. §1362(7), which are within the State of Alabama.

56. Week - means the period beginning at twelve midnight Saturday and ending at twelve midnight the following Saturday.

57. Weekly (7-day and calendar week) Average – is the arithmetic mean of all samples collected during a consecutive 7-day period or calendar week, whichever is applicable. The calendar week is defined as beginning on Sunday and ending on Saturday. Weekly averages shall be calculated for all calendar weeks with Saturdays in the month. If a calendar week overlaps two months (i.e., the

Sunday is in one month and the Saturday in the following month), the weekly average calculated for the calendar week shall be included in the data for the month that contains the Saturday.

E. SEVERABILITY

The provisions of this Permit are severable, and if any provision of this Permit or the application of any provision of this Permit to any circumstance, is held invalid, the application of such provision to other circumstances, and the remainder of this Permit, shall not be affected thereby.

F. PROHIBITIONS AND ACTIVIES NOT AUTHORIZED

1. Discharges from disposal or landfill activities as described in ADEM Admin. Code div. 335-13 are not authorized by this Permit unless specifically approved by the Department.

2. Relocation, diversion, or other alteration of a water of the State is not authorized by this Permit unless specifically approved by the Department.

3. Lime or cement manufacturing or production and discharge of process waters from such manufacturing or production is not authorized by this Permit unless specifically approved by the Department.

4. Concrete or asphalt manufacturing or production and discharge of process waters from such manufacturing or production is not authorized by this Permit unless specifically approved by the Department.

5. The discharge of wastewater, generated by any process, facility, or by any other means not under the operational control of the Permittee or not identified in the application for this Permit or not identified specifically in the description of an outfall in this Permit is not authorized by this Permit.

G. DISCHARGES TO IMPAIRED WATERS

1. This Permit does not authorize new sources or new discharges of pollutants of concern to impaired waters unless consistent with an EPA-approved or EPA-established Total Maximum Daily Load (TMDL) and applicable State law, or unless compliance with the limitations and requirements of the Permit ensure that the discharge will not contribute to further degradation of the receiving stream. Impaired waters are those that do not meet applicable water quality standards and are identified on the State of Alabama's §303(d) list or on an EPA-approved or EPA-established TMDL. Pollutants of concern are those pollutants for which the receiving water is listed as impaired or contribute to the listed impairment.

2. Facilities that discharge into a receiving stream which is listed on the State of Alabama's §303(d) list of impaired waters, and with discharges that contain the pollutant(s) for which the waters are impaired, must within six (6) months of the Final §303(d) list approval, document in its BMP plan how the BMPs will control the discharge of the pollutant(s) of concern, and must ensure that there will be no increase of the pollutants of concern. A monitoring plan to assess the effectiveness of the BMPs in achieving the allocations must also be included in the BMP plan.

3. If the facility discharges to impaired waters as described above, it must determine whether a TMDL has been developed and approved or established by EPA for the listed waters. If a TMDL is approved or established during this Permit cycle by EPA for any waters into which the facility discharges, the facility must review the applicable TMDL to see if it includes requirements for control of any water discharged by the Permittee. Within six (6) months of the date of TMDL approval or establishment, the facility must notify the Department on how it will modify its BMP plan to include best management practices specifically targeted to achieve the allocations prescribed

by the TMDL, if necessary. Any revised BMP plans must be submitted to the Department for review. The facility must include in the BMP plan a monitoring component to assess the effectiveness of the BMPs in achieving the allocations.

ALABAMA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
WATER DIVISION

ANTIDEGRADATION RATIONALE

Company Name:	Mineral Manufacturing Corporation
Facility Name:	MMC-Hutchinson Bauxite Mine
County:	Barbour
Permit Number:	AL0084506
Prepared by:	Skylar Wilson
Date:	February 25, 2025
Receiving Waters:	East Fork Choctawhatchee River
Stream Category:	Tier II as defined by ADEM Admin. Code 335-6-10-.12
Discharge Description:	This proposed permit covers a bauxitic clay mining facility, mineral loading, mineral storing, mineral transportation, and associated areas which discharge to surface waters.

The following preliminary determination was prepared in accordance with ADEM Admin. Code 335-6-10-.12 (7) (c):

The Department has reviewed the information submitted by applicant in accordance with ADEM Admin. Code 335-6-10-.12(9). The applicant has demonstrated that there are no technically or economically viable treatment options in its alternatives analysis that would completely eliminate a direct discharge.

The permit applicant has indicated that the following economic and social benefits will result from this project:

1. If the application is not approved, mining could not proceed, and the operations at the processing facility would be greatly reduced. Therefore, the company would be faced with laying off 6 workers directly associated with the mining activities, numerous supporting staff, and upwards of 50 workers employed at the processing facility.
2. The employment of the 6 workers at the mine site, and the approximately 50 workers at the processing facility, will continue to provide additional state, local, and sales taxes by ensuring that the revenue generated from this mine is spent in the local area.
3. The tax revenue generated by the operations of the mining facility will provide funds to ensure that the current public services are funded in the future.

The Department has determined that the discharge proposed by the permit applicant is necessary for important economic and social development in the area of the outfall location in the receiving water.

Reviewed By: William McClimans

Date: February 25, 2025

ALABAMA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
WATER DIVISION

NPDES INDIVIDUAL PERMIT RATIONALE

Company Name:	Mineral Manufacturing Corporation
Facility Name:	MMC-Hutchinson Bauxite Mine
County:	Barbour
Permit Number:	AL0084506
Prepared by:	Skylar Wilson
Date:	February 24, 2025
Receiving Waters:	**East Fork Choctawhatchee River**
Permit Coverage:	Bauxitic Clay Mining, Mineral Loading, Mineral Storage, Mineral Transportation, and Associate Areas
SIC Code:	1455

The Department has made a tentative determination that the available information is adequate to support initial issuance of this permit.

This proposed permit covers bauxitic clay mining, mineral loading, mineral storage, mineral transportation, and associated areas which discharge to surface waters of the state.

The proposed permit authorizes treated discharges into East Fork Choctawhatchee River classified as Swimming and Other Whole Body Water Contact Sports and Fish and Wildlife (S/F&W) per ADEM Admin. Code ch. 335-6-11. If the requirements of the proposed permit are fully implemented, the facility will not discharge pollutants at levels that will cause or contribute to a violation of the S/F&W classifications.

Full compliance with the proposed permit terms and conditions is expected to be protective of instream water quality and ensure consistency with applicable instream State water quality standards (WQS) for the receiving stream.

Technology Based Effluent Limits (TBELs) for bauxitic and/or kaolin clay mining facilities have not been developed by the EPA yet. The pollutants expected to be discharged from this facility are similar to those discharged from bauxite ore facilities. Therefore, the limitations for Total Suspended Solids (TSS), Total Iron (as Fe), and Total Aluminum (as Al) are based on best professional judgment with consideration given to the bauxitic ore limitations established by the EPA in 40 CFR Part 440.20.

The instream WQS for pH, for streams classified as S and F&W, are 6.0 - 8.5 s.u per ADEM Admin Code r. 335-6-10-.09; however, because discharges from Outfall 001-1 are expected only in response to rain events, it is the opinion of the Department that discharges with an allowable pH daily maximum of 9.0 will not adversely affect the instream pH based on the low discharge/stream flow ratio. The discharge

limitations for pH of 6.0 – 9.0 s.u. for Outfalls 001-1 is identical to the existing point source TBELs found in 40 CFR 440 Subpart B.

The applicant has requested, in accordance with 40 CFR Part 122.21 and their NPDES permit application, a waiver from testing for the Part A, B, and C pollutants listed in the EPA Form 2C and 2D that are not addressed in their application. Part II.C.3. requires submittal of metals, arsenic, cyanide, and phenols data within six months of the effective date of the Permit or within six months of the first discharge from each outfall. The Permit shall be reopened, if required, to address any new information resulting from the submittal of the new effluent data.

The Pollution Abatement/Prevention (PAP) plan for this facility has been prepared by a professional engineer (PE) registered in the State of Alabama and is designed to ensure reduction of pollutants in the waste stream to a level that, if operated properly, the discharge will not contribute to or cause a violation of applicable State WQS. The proposed permit terms and conditions are predicated on the basis of ensuring a reduction of pollutants in the discharge to a level that reduces the potential of contributing to or causing a violation of applicable State WQS.

In accordance with ADEM Admin. Code r. 335-6-3-.07 the design PE, as evidenced by their seal and/or signature on the application, has accepted full responsibility for the effectiveness of the waste treatment facility to treat the Permittee's effluent to meet NPDES permit limitations and requirements, and to fully comply with Alabama's WQS, when such treatment facilities are properly operated.

If there is a reasonable potential that a pollutant present in the treated discharges from a facility could cause or contribute to a contravention of applicable State WQS above numeric or narrative criteria, 40 CFR Part 122 requires the Department to establish effluent limits using calculated water quality criterion, establish effluent limits on a case-by-case basis using criteria established by EPA, or establish effluent limits based on an indicator parameter. Based on available information, potential pollutants discharged from this facility, if discharged within the concentrations allowed by this permit, would not have a reasonable potential to cause or contribute to a contravention of applicable State WQS.

Pursuant to ADEM Admin. Code r. 335-6-6-.12(r) this permit requires the Permittee to design and implement a Spill Prevention Control and Countermeasures (SPCC) plan for all stored chemicals, fuels and/or stored pollutants that have the potential to discharge to a water of the State. This plan must meet the minimum engineering requirements as defined in 40 CFR Part 112 and must provide for secondary containment adequate to control a potential spill.

The applicant is not proposing discharges of pollutants to a water of the State with an approved Total Maximum Daily Load (TMDL).

The applicant is not proposing discharges into a stream segment or other State water that is included on Alabama's current CWA §303(d) list.

The applicant is not proposing new discharges of pollutant(s) to an ADEM identified Tier I water.

The proposed permit action authorizes new discharges of pollutants to receiving waters determined by the Department to be waters where the quality exceeds levels necessary to support propagation of fish, shellfish, and wildlife and recreation in and on the water (Tier II). Pursuant to ADEM Admin. Code r. 335-6-10 (Antidegradation Policy and Implementation of the Antidegradation Policy), the applicant has submitted and the Department has reviewed and considered information regarding (1) demonstration of necessity/importance, (2) alternatives analysis, and (3) calculations of total annualized costs for technically feasible treatment alternatives regarding the proposed new discharges to Tier II waters. The Department

has determined, based on the applicant's demonstration, that the proposed new discharges to the Tier II waters are necessary for important economic or social development in the area in which the waters are located.

NPDES Individual Application - Mining (Form 315)

version 3.4

(Submission #: HQ9-1CWX-SS218, version 3)

Details

Submission ID HQ9-1CWX-SS218

Form Input

Processing Information

Is this a coalbed methane operation?
No

Please indicate the purpose of this application:
Initial Permit Application for New Facility

General Instructions

NPDES Individual Permit Application ◆ Mining Operations (Form 315)

This form should be used to submit an application for an NPDES individual permit to authorize discharges from surface & underground mineral, ore, or mineral product mining, quarrying, excavation, borrowing, hydraulic mining, storage, processing, preparation, recovery, handling, loading, storing, or disposing activities, and associated areas including pre-mining site development, construction, excavation, clearing, disturbance, and reclamation.

Incomplete or incorrect answers or missing signatures will delay processing. Attach additional comments or information as needed. Commencement of activities applied for as detailed in this application are not authorized until permit coverage has been issued by the Department.
For assistance, please click here to determine the permit staff responsible for the site or call (334) 394-4372.

Please click here for the Alabama 303(d) list of Impaired Waters

Please click here for Information on Alabama TMDLs

Permittee Information

Permittee

Permittee Name
Mineral Manufacturing Corporation

Mailing Address

10627 Hartslog Valley Rd

Huntingdon, PA 16652

Responsible Official

Prefix
Mr.

First Name	Last Name
T. Ryan	Reed

Title
Vice President

Organization Name
Mineral Manufacturing Corporation

Phone Type	Number	Extension
Mobile	8145992230	

Email
rreed@mm-c.us

Mailing Address

10627 Hartslog Valley Rd
Huntingdon, PA 16652

Facility/Operations Information

Facility/Operations Name
MMC-Hutchinson Bauxite Mine

Permittee Organization Type
Corporation

Parent Corporation and Subsidiary Corporations of Applicant, if any:
NONE PROVIDED

Landowner(s) Name, Address and Phone Number:
Hutchinson Dell Arthur Jr; 1017 Cottonhill Rd, Eufaula AL 36027

Sub-contractor(s)/Operator(s), if known:
NONE PROVIDED

Is the "Company/Permittee" properly registered and in good standing with the Alabama Secretary of State's office?
Yes

Facility/Operations Address or Location Description

Barbour County Road 75
0.6 Miles East of County Rd. 12, South side of the road
Bakerhill, AL 36027

Facility/Operations County (Front Gate)
Barbour

Do the operations span multiple counties?
No

Detailed Directions to the Facility/Operations
Go South out of Bakerhill on AL-131, left on CR-75, site is 4.0 miles down CR-75. South side of the road.

Please refer to the link below for Lat/Long map instruction help:
Map Instruction Help

Facility/Operations Front Gate Latitude and Longitude
31.708826741225803,-85.34161547284586

Township(s), Range(s), Section(s) (Note: If you are submitting multiple TRSs, please separate each TRS by a semicolon. Example: T19S,R1E,S15; T20S,R2E,S16)
T09N,R27E,S33

SIC Code(s) [Please select your primary SIC code first]:
1455-Kaolin and Ball Clay

NAICS Code(s) [Please select your primary NAICS code first]:
212323-Kaolin, Clay, And Ceramic And Refractory Minerals Mining

Facility/Operations Contact

Prefix
Mr.

First Name **Last Name**
Chris Dasinger

Title
Land Planner

Organization Name
Mineral Manufacturing Corporation

Phone Type **Number** **Extension**
Mobile 334-618-2713

Email
cdasinger@mm-c.us

Member Information

Identify the name, title/position, and unless waived in writing by the Department, the resident address of every officer (a PO Box is not acceptable), general partner, LLP partner, LLC member, investor, director, or person performing a function similar to a director, of the applicant, and each person who is the record or beneficial owner of 10 percent or more of any class of voting stock of the applicant, or any other responsible official(s) of the applicant with legal or decision making responsibility or authority for the facility/operations:

List of Names/Titles/Addresses, as described in the instructions above, will be entered by:
Manually Entering in Table

Name	Title/Position	Physical Address of Residence
Thomas J. Reed, Jr.	President	10625 Hartslog Valley Rd. Huntingdon PA 16652

Other than the "Company/Permittee", identify the name of each corporation, partnership, association, and single proprietorship for which any individual identified above is or was an officer, general partner, LLP partner, LLC member, investor, director, or individual performing a function similar to a director, or principal (10% or more) stockholder, that had an Alabama NPDES permit at any time during the five year (60 month) period immediately preceding the date on which this form is signed (if this does not apply, then enter N/A after selecting "Manually Enter in Table"):

List of Corporations/Partnerships/etc, Names and Titles, as described in the instructions above, will be entered by:
Manually Entering in Table

Name of Corporation, Partnership, Association, or Single Proprietorship	Name of Individual	Title/Position in Corporation, Partnership, Association, or Single Proprietorship
N/A	N/A	N/A

Additional Contacts (1 of 1)

ADDITIONAL CONTACTS: Consultant

Contact Type
Consultant

Contact

First Name Jeremy
Last Name Weant

Title
NONE PROVIDED

Organization Name
ECT, Inc.

Phone Type	Number	Extension
Mobile	3344884718	

Email
jweant@ectinc.com

Address

[NO STREET ADDRESS SPECIFIED]

[NO CITY SPECIFIED], [NO STATE SPECIFIED] [NO ZIP CODE SPECIFIED]

Compliance History

Has the applicant ever had any of the following:

Event	Apply?
An Alabama NPDES, SID, or UIC permit suspended or terminated	No
An Alabama or federal environmental permit suspended/terminated	No
An Alabama State Oil Gas Board permit or other approval suspended or terminated	No
An Alabama or federal performance/environmental bond, or similar security deposited in lieu of a bond, or portion thereof, forfeited	No

Has the applicant, parent corporation, subsidiary, general partner, LLP partner, or LLC Member had any Warning Letters, Notice of Violations (NOVs), Administrative Actions, or litigation filed by ADEM or EPA during the three year (36 month) period preceding the date on which this form is signed?
Yes

Identify every Warning Letter, Notice of Violation (NOV), Administrative Action, or litigation issued to the applicant, parent corporation, subsidiary, general partner, LLP partner, or LLC Member and filed by ADEM or EPA during the three year (36 month) period preceding the date on which this form is signed.

Date of Issuance	Type of Action	Briefly describe alleged violations:	Date of Final Resolution
12/03/2024	Consent Order	Draft Order: Commencing operations without an issued NPDES Permit. Proposed NPDES No. AL0084492	*NONE PROVIDED*

For this facility, list any other NPDES or other environmental permits (including permit numbers), authorizations, or certifications that have been applied for or issued within the State by ADEM, EPA, Alabama Department of Labor (ADOL), US Army Corp of Engineers (USACE), or other agency, to the applicant, parent corporation, subsidiary, or LLC member whether presently effective, expired, suspended, revoked, or terminated:
None; ADOL Permit has been applied for

For other facilities, list any other NPDES or other ADEM permits (including permit numbers), authorizations, or certifications that have been applied for or issued within the State by ADEM, EPA, ASMC, ADOL, or USACE, to the applicant, parent corporation, subsidiary, or LLC member whether presently effective, expired, suspended, revoked, or terminated:
Mineral Manufacturing Corporation - Air Major Source Operating Permit 601-0013
Mineral Manufacturing Corporation - Eufaula Plant NPDES No. AL0001848
Mineral Manufacturing Corporation - Proposed NPDES No. AL0084492
ADOL Permits have been applied for.

Anti-Degradation Evaluation

Pursuant to ADEM Admin. Code ch. 335-6-10-.12(9), responses to the following questions must be provided by the applicant requesting NPDES permit coverage for new or expanded discharges of pollutant(s) to Tier 2 waters (except discharges eligible for coverage under general permits). As part of the permit application review process, the Department is required to consider, based on the applicant's demonstration, whether the proposed new or increased discharge to Tier 2 waters is necessary for important economic or social development in the area in which the waters are located. Do you have new or increased discharges?
Yes

NOTE

If the discharge is to a Tier II waterbody as defined in ADEM Admin. Code r. 335-6-10-.12(4), complete questions below, ADEM Form 311-Alternatives Analysis, and either ADEM Form 312 or ADEM Form 313- Calculation of Total Annualized Project Costs (Public-Sector or Private-Sector Projects, whichever is applicable). ADEM Form 312 or ADEM Form 313, whichever is applicable, must be provided for each treatment discharge alternative considered technically viable.
ADEM forms can be found on the Department's website here.

What environmental or public health problem will the discharger be correcting?
None

How much will the discharger be increasing employment (at its existing facility or as the result of locating a new facility)?
This mine will employ approximately 6 local workers.

How much reduction in employment will the discharger be avoiding?
If the application is not approved, mining could not proceed, and the operations at the processing facility would be greatly reduced. Therefore, the company would be faced with laying off 6 workers directly associated with the mining activities, numerous supporting staff, and upwards of 50 workers employed at the processing facility.

How much additional state or local taxes will the discharger be paying?
The operation of this mine will ensure that Mineral Manufacturing continues to operate. Mineral Manufacturing will continue to pay all required state and local taxes. The employment of the 6 workers at the mine site, and the approximately 50 workers at the processing facility, will continue to provide additional state, local, and sales taxes by ensuring that the revenue generated from this mine is spent in the local area.

What public service to the community will the discharger be providing?
The operation of this mine will not directly provide public services, but the tax revenue generated will continue to provide funds to ensure the current public services are continually funded.

What economic or social benefit will the discharger be providing to the community?
The operation of this mine will employ local workers both at the mine site and the nearby processing facility. The payrolls will continue to cycle through the local economy.

Attach Form 311 (Alternative Analysis)
Form311 - MMC Hutchinson_Signed.pdf - 12/20/2024 08:49 PM
Comment
NONE PROVIDED

Please attach Form 312 (Public Sector Projects) or Form 313 (Private Sector Projects).
Form313 - MMC Hutchinson.pdf - 12/20/2024 08:50 PM
Comment
NONE PROVIDED

Activity Description & Information

Narrative description of activity(s):
This site will mine for bauxite clay. There will be an area for the mine pit, area for soil overburden, and an area of material stockpile. There will be one sediment pond to control stormwater runoff prior to discharge.

Total Facility/Operations Area (acres)
12.00

Total Disturbed Area (acres)
9.24

Anticipated Commencement Date
02/28/2025

Anticipated Completion Date
03/01/2026

Please identify which of the following apply to this operation:

Activity/Condition	Appy?
An existing facility/operation which currently results in discharges to State waters?	No
A proposed facility/operation which will result in a discharge to State waters?	Yes
Be located within any 100-year flood plain?	No
Discharge to Municipal Separate Storm Sewer?	No
Discharge to waters of or be located in the Coastal Zone?	No
Need/have ADEM UIC permit coverage?	No
Be located on Indian/historically significant lands?	No
Need/have ADEM SID permit coverage?	No
Need/have ASMC permit coverage?	No
Need/have State Oil & Gas Board permit coverage?	No
Need/have ADOL permit coverage?	Yes
Generate, treat, store, or dispose of hazardous or toxic waste?	No
Be located in or discharge to a Public Water Supply (PWS) watershed or be located within mile of any PWS well?	No
Incised pit	No

Does your facility/operation use cooling water?
No

Material to be Removed, Processed, or Transloaded

Material To Be Removed, Processed, Or Transloaded (Note: Sum must equal 100.)

Mineral(s)/Mineral product(s)	%
Bauxitic Clay	100
	Sum: 100

Proposed Activity To Be Conducted

Type(s) of activity presently conducted at applicant's existing facility or proposed to be conducted at facility (Select Yes or No)):

Activity	Apply?
Adjacent/associated asphalt/concrete plant(s)	No
Alternative fuels operation	No
Auger mining	No
Cement production	No
Chemical processing or leaching	No
Chemicals used in process or wastewater treatment (coagulant, biocide, etc.)	No
Construction related temporary borrow pits/areas	No
Creek/stream crossings	No
Dredging	No
Excavation	Yes
Grading, clearing, grubbing, etc.	Yes
Hydraulic mining	No
Hydraulic mining, dredging, instream or between stream-bank mining	No

Activity	Apply?
Lime production	No
Low volume sewage treatment package plant	No
Mineral dry processing (crushing & screening)	No
Mineral loading	Yes
Mineral storing	Yes
Mineral transportation	Yes
Mineral wet preparation	No
Onsite construction debris or equipment storage/disposal	Yes
Onsite mining debris or equipment storage/disposal	Yes
Other beneficiation & manufacturing operations	No
Pre-construction ponded water removal	No
Pre-mining logging or land clearing	Yes
Preparation plant waste recovery	No
Quarrying	No
Reclamation of disturbed areas	Yes
Solution mining	No
Surface mining	Yes
Synthetic fuel production	No
Underground mining	No
Waterbody relocation or other alteration	No
Within-bank mining	No

If the operation will include activities other than those listed above, please describe them below:
N/A

If the type of activity presently conducted or proposed is Mineral Transportation, please indicate which of the following apply:

Method	Apply?
Barge	No
Rail	No
Truck	Yes

Fuel - Chemical Handling, Storage, & Spill Prevention Control & Countermeasures (SPCC) Plan

Will fuels, chemicals, compounds, or liquid waste be used or stored onsite?
Yes

Please identify the fuel, chemicals, compounds, or liquid waste and indicate the volume of each:

Volume (gallons)	Contents
1,000	Diesel

SPCC Plan
MMC Hutchinson Pit SPCC Plan.pdf - 12/22/2024 02:46 PM
Comment
NONE PROVIDED

ASMC Regulated Entities

Is this a coal mining operation regulated by ASMC?
No

Topographic Map Submittal

Topographic Map

Attach to this application a 7.5 minute series U.S.G.S. topographic map(s) or equivalent map(s) no larger than, or folded to a size of 8.5 by 11 inches (several pages may be necessary), of the area extending to at least one mile beyond property boundaries. The topographic or equivalent map(s) must include a caption indicating the name of the topographic map, name of the applicant, facility name, county, and township, range, & section(s) where the facility are located. Unless approved in advance by the Department, the topographic or equivalent map(s), at a minimum, must show: a) An accurate outline of the area to be covered by the permit (b) An outline of the facility (c) All existing and proposed disturbed areas (d) Location of intake and discharge areas (e) Proposed and existing discharge points (f) Perennial, intermittent, and ephemeral streams (g) Lakes, springs, water wells, wetlands (h) All known facility dirt/improved access/haul roads (i) All surrounding unimproved/improved roads (j) High-tension power lines and railroad tracks (k) Contour lines, township-range-section lines (l) Drainage patterns, swales, washes (m) All drainage conveyance/treatment structures (ditches, berms, etc.) (n) Any other pertinent or significant feature.

Topographic Map

2025-02-26 HUTCHINSON-MINE.pdf - 02/26/2025 09:53 AM

Comment

NONE PROVIDED

Detailed Facility Map Submittal

Detailed Facility Map

2025-02-26 HUTCHINSON-MINE.pdf - 02/26/2025 09:54 AM

Comment

NONE PROVIDED

Outfalls (1 of 1)

Outfall Identifier: 001

Feature Type
Outfall (External)

Outfall Identifier
001

Outfall Status
Proposed

Please be aware that you should only mark an outfall status as existing if (1) the Department has been previously notified that it was constructed as proposed or (2) it began discharge prior to this application. A proposed outfall is one that is being newly added to the permit OR one that has never discharged or has never been authorized by the Department to discharge. Should you have any questions about which status to select, please contact the Department's permit engineer for this site.

Receiving Water
East Fork Choctawhatchee River

Check below if the discharge enters the receiving water via an unnamed tributary.

NONE PROVIDED

Location of Outfall
31.706708,-85.342763

303(d) Segment?
No

CORRECTION REQUEST *(APPROVED)*

303d List

East Fork Choctawhatchee isn't on the 303d list for pollutants
Created on 2/25/2025 11:49 AM by **Skylar Wilson**

TMDL Segment?
No

Discharge Characterization

EPA Form 2C, EPA Form 2D, and/or ADEM Form 567 Submittal
Yes, pursuant to 40 CFR 122.21, the applicant requests a waiver for completion of EPA Form 2C, EPA Form 2D, and ADEM Form 567 and certifies that the operating facility will discharge treated stormwater only; that chemical/compound additives are not used (unless waived in writing by the Department on a programmatic, categorical, or individual compound/chemical basis); that there are no process, manufacturing, or other industrial operations or wastewaters, including but not limited to lime or cement production and synfuel operations; and that coal and coal products are not mined nor stored onsite.

Please download the following Excel file to enter your information. Once complete, please attach to the below control.
Download spreadsheet here.

Required attachment:
Form315TableB.xlsx - 12/20/2024 09:03 PM
Comment
NONE PROVIDED

Please download the following Excel file to enter your information. Once complete, please attach to the below control.
Download spreadsheet here.

Required attachment:
Form315TableC.xlsx - 12/20/2024 09:03 PM
Comment
NONE PROVIDED

Discharge Structure Description & Pollutant Source

Please download the following Excel file to enter your information. Once complete, please attach to the below control.
Download spreadsheet here.

Required attachment:
Form315DischargeStructure.xlsx - 12/20/2024 09:04 PM
Comment
NONE PROVIDED

Variance Request

Do you intend to request or renew one or more of the CWA technology variances authorized at 40 CFR 122.21(m)?
No

Pollution Abatement & Prevention (PAP) Plan Summary (1 of 1)

Outfall(s):
001P

Outfall Questions:	Please select one:
Runoff from all areas of disturbance is controlled	Yes
Drainage from pit area, stockpiles, and spoil areas directed to a sedimentation pond	Yes
Sedimentation basin at least 0.25 acre/feet for every acre of disturbed drainage	Yes
Sedimentation basin cleaned out when sediment accumulation is 60% of design capacity	Yes

Outfall Questions:	Please select one:
Trees, boulders, and other obstructions removed from pond during initial construction	Yes
Width of top of dam greater than 12'	Yes
Side slopes of dam no steeper than 3:1	Yes
Cutoff trench at least 8' wide	Yes
Side slopes of cutoff trench no less than 1:1	Yes
Cutoff trench located along the centerline of the dam	Yes
Cutoff trench extends at least 2' into bedrock or impervious soil	Yes
Cutoff trench filled with impervious material	Yes
Embankments and cutoff trench 95% compaction standard proctor ASTM	Yes
Embankment free of roots, tree debris, stones >6" diameter, etc.	Yes
Embankment constructed in lifts no greater than 12"	Yes
Spillpipe sized to carry peak flow from a one year storm event	Yes
Spillpipe will not chemically react with effluent	Yes
Subsurface withdrawal	Yes
Anti-seep collars extend radially at least 2' from each joint in spillpipe	Yes
Splashpad at the end of the spillpipe	Yes
Emergency Spillway sized for peak flow from 25-yr 24-hr event if discharge not into PWS classified stream	Yes
Emergency spillway sized for peak flow from 50-yr 24-hr event if discharge is into PWS classified stream	N/A
Emergency overflow at least 20' long	Yes
Side slopes of emergency spillway no steeper than 2:1	Yes
Emergency spillway lined with riprap or concrete	Yes
Minimum of 1.5' of freeboard between normal overflow and emergency overflow	Yes
Minimum of 1.5' of freeboard between max. design flow of emergency spillway and top of dam	Yes
All emergency overflows are sized to handle entire drainage area for ponds in series	Yes
Dam stabilized with permanent vegetation	Yes
Sustained grade of haul road <10%	Yes
Maximum grade of haul road <15% for no more than 300'	Yes
Outer slopes of haul road no steeper than 2:1	Yes
Outer slopes of haul road vegetated or otherwise stabilized	Yes
Detail drawings supplied for all stream crossings	N/A
Short-Term Stabilization/Grading And Temporary Vegetative Cover Plans	Yes
Long-Term Stabilization/Grading And Permanent Reclamation or Water Quality Remediation Plans	Yes

Identify and provide detailed explanation for any ‘N’ or ‘N/A’ response(s):
No PWS
No Stream Crossings

Pollution Abatement & Prevention (PAP) Plan Review Checklist

General Information:	Please select one:
PE Seal with License #	Yes
Name and Address of Operator	Yes
Legal Description of Facility	Yes
Name of Company	Yes
Number of Employees	Yes
Products to be Mined	Yes
Hours of Operation	Yes
Water Supply and Disposition	Yes

Maps:	Please select one:
Topographic Map including Information from Part XIII (a) – (o) of this Application	Yes
1– – 500– or Equivalent Facility Map including Information from Part XIV of this Application	Yes

Detailed Design Diagrams:	Please select one:
Plan Views	Yes
Cross-section Views	Yes
Method of Diverting Runoff to Treatment Basins	Yes
Line Drawing of Water Flow through Facility with Water Balance or Pictorial Description of Water Flow	Yes

Narrative of Operations:	Please select one:
Raw Materials Defined	Yes
Processes Defined	Yes
Products Defined	Yes

Schematic Diagram:	Please select one:
Points of Waste Origin	Yes
Collection System	Yes
Disposal System	Yes

Post Treatment Quantity and Quality of Effluent:	Please select one:
Flow	Yes
Suspended Solids	Yes
Iron Concentration	Yes
pH	Yes

Description of Waste Treatment Facility:	Please select one:
Pre-Treatment Measures	Yes
Recovery System	Yes
Expected Life of Treatment Basin	Yes
Measures for Ensuring Access to All Treatment Structures and Related Appurtenances including Outfall Locations	Yes
Schedule of Cleaning and/or Abandonment	Yes

Other:	Please select one:
Precipitation/Volume Calculations/Diagram Attached	Yes
BMP Plan for Haul Roads	Yes
Measures for Minimizing Impacts to Adjacent Stream (e.g., Buffer Strips, Berms)	Yes
Measures for Ensuring Appropriate Setbacks are Maintained at All Times	Yes
Methods for Minimizing Nonpoint Source Discharges	Yes
If Chemical Treatment Used, Methods for Ensuring Appropriate Dosage	N/A
Facility Closure Plans	Yes
PE Rationale(s) For Alternate Standards, Designs or Plans	N/A

Identify and provide detailed explanation for any "N" or "N/A" response(s):
No chemical treatment
No alternative standards proposed

Pollution Abatement & Prevention (PAP) Plan

Is this a coal mining operation regulated by ASMC?
No

For non-coal mining facilities, has a PAP Plan in accordance with ADEM Admin. Code r. 335-6-9-.03 been completed?
Yes

PAP Plan (non-coal mining facilities)
MMC Hutchinson Pit PAP_Final_R1.pdf - 02/27/2025 09:51 AM
Comment
NONE PROVIDED

CORRECTION REQUEST *(CORRECTED)*
Needs Copy of PAP Plan

It looks like this is another copy of the facility maps, the revised PAP plan needs to be included
Created on 2/26/2025 4:05 PM by **Skylar Wilson**

Professional Engineer (PE)

Registration License Number
35672

Professional Engineer

Prefix
Mr.

First Name	Last Name
Jeremy	Weant

Title
Engineer II

Organization Name
ECT, Inc.

Phone Type	Number	Extension
Mobile	3344884718	

Email
jweant@ectinc.com

Address
7027 SW 24TH AVE
GAINESVILLE, FL 32607

Information for the Applicant

Please read the following information and acknowledge below:

Contact the Department prior to submittal with any questions or to request acceptable alternate content/format.

Be advised that you are not authorized to commence regulated activity until this application can be processed, publicly noticed, and approval to proceed is received in writing from the Department.

EPA Form(s) 1 and 2F need not be submitted unless specifically required by the Department. EPA Form(s) 2C and/or 2D are required to be submitted unless the
applicant is eligible for a waiver and the Department grants a waiver, or unless the relevant information required by EPA Form(s) 2C and/or 2D are submitted to the Department in an alternative format acceptable to the Department.

Planned/proposed mining sites that are greater than 5 acres, that mine/process coal or metallic mineral/ore, or that have wet or chemical processing, must apply for and obtain coverage under an Individual or General NPDES Permit prior to commencement of any land disturbance. Such Individual NPDES Permit coverage may be requested via this ADEM Form 315.

The applicant is advised to contact:
(1) The Alabama Surface Mining Commission (ASMC) if coal, coal fines, coal refuse, or other coal related materials are mined,

transloaded, processed, etc.;
(2) The Alabama Department of Labor (ADOL) if conducting non-coal mining operations;
(3) The Alabama Historical Commission for requirements related to any potential historic or culturally significant sites;
(4) The Alabama Department of Conservation and Natural Resources (ADCNR) for requirements related to potential presence of threatened/endangered species;
(5) The US Army Corps of Engineers, Mobile or Nashville Districts, if this project could cause fill to be placed in federal waters or could interfere with navigation.

The Department must be in receipt of a completed version of this form, including any supporting documentation, and the appropriate processing fee [including Greenfield Fee and Biomonitoring & Toxicity Limits fee(s), if applicable], prior to development of a draft NPDES permit.

Acknowledgement
I acknowledge I have read and understand the information above.

Additional Attachments

Additional Attachments
NONE PROVIDED
Comment
NONE PROVIDED

Application Preparer

Application Preparer

Prefix
NONE PROVIDED

First Name	Last Name
Jeremy	Weant

Title
NONE PROVIDED

Organization Name
ECT, Inc.

Phone Type	Number	Extension
Mobile	3344884718	

Email
jweant@ectinc.com

Address
7027 SW 24TH AVE
GAINESVILLE, FL 32607

Fees Assessed

The following itemized fees have been assessed in accordance with Fee Schedule D and 335-1-6-.04(a) of ADEM Admin. Code Division 1 regulations based on the information provided in this application.

Mineral/Resource Extraction Mining, Storage Transloading, Dry Processing:
5820

Greenfield Site Fee:
1610

Fee

Fee
7430

Revisions

Revision	Revision Date	Revision By
Revision 1	12/20/2024 8:29 PM	Jeremy Weant
Revision 2	2/26/2025 8:56 AM	Jeremy Weant
Revision 3	2/27/2025 9:50 AM	Jeremy Weant

Agreements and Signature(s)

SUBMISSION AGREEMENTS

- ☑ I am the owner of the account used to perform the electronic submission and signature.
- ☑ I have the authority to submit the data on behalf of the facility I am representing.
- ☑ I agree that providing the account credentials to sign the submission document constitutes an electronic signature equivalent to my written signature.
- ☑ I have reviewed the electronic form being submitted in its entirety, and agree to the validity and accuracy of the information contained within it to the best of my knowledge.

Professional Engineer

A detailed, comprehensive Pollution Abatement & Prevention (PAP) Plan must be prepared, signed, and certified by a professional engineer (PE), registered in the State of Alabama, and the PE must certify as follows: I certify on behalf of the applicant, that I have completed an evaluation of discharge alternatives for any proposed new or increased discharges of pollutant(s) to Tier 2 waters and reached the conclusions indicated. I certify under penalty of law that technical information and data contained in this application, and a comprehensive PAP Plan including any attached SPCC plan, maps, engineering designs, etc. acceptable to ADEM, for the prevention and minimization of all sources of pollution in stormwater and authorized related process wastewater runoff has been prepared under my supervision for this facility utilizing effective, good engineering and pollution control practices and in accordance with the provisions of ADEM Admin. Code Division 335-6 , including Chapter 335-6-9 and Appendices A & B. If the PAP Plan is properly implemented and maintained by the Permittee, discharges of pollutants can reasonably be expected to be effectively minimized to the maximum extent practicable and according to permit discharge limitations and other permit requirements. The applicant has been advised that appropriate pollution abatement/prevention facilities and structural & nonstructural management practices or Department approved equivalent management practices as detailed in the PAP Plan must be fully implemented and regularly maintained as needed at the facility in accordance with good sediment, erosion, and other pollution control practices, permit requirements, and other ADEM requirements to ensure protection of groundwater and surface water quality.

Signed By Jeremy Weant on 02/27/2025 at 9:52 AM

Responsible Official

This application must be signed and initialed by a Responsible Official of the applicant pursuant to ADEM Admin. Code Rule 335-6-6-.09 who has overall responsibility for the operation of the facility. I certify under penalty of law that this document, including technical information and data, the PAP Plan, including any SPCC plan, maps, engineering designs, and all other attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the PE and other person or persons under my supervision 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 or imprisonment for knowing violations. A comprehensive PAP Plan to prevent and minimize discharges of pollution to the maximum extent practicable has been prepared at my direction by a PE for this facility utilizing effective, good engineering and pollution control practices and in accordance with the provisions of ADEM Admin. Code Division 335-6, including Chapter 335-6-9 and Appendices A & B, and information contained in this application, including any attachments. I understand that regular inspections must be performed by, or under the direct supervision of, a PE and all appropriate pollution abatement/prevention facilities and structural & nonstructural management practices or Department approved equivalent management practices identified by the PE must be fully implemented prior to and concurrent with commencement of regulated activities and regularly maintained as needed at the facility in accordance with good sediment, erosion, and other pollution control practices and ADEM requirements. I understand that the PAP Plan must be fully implemented and regularly maintained so that discharges of pollutants can reasonably be expected to be effectively minimized to the maximum extent practicable and according to permit discharge limitations and other requirements to ensure protection of groundwater and surface water quality. I understand that failure to fully implement and regularly maintain required management practices for the protection of groundwater and surface water quality may subject the Permittee to appropriate enforcement action. I certify that this form has not been altered, and if copied or reproduced, is consistent in format and identical in content to the ADEM approved form. I further certify that the discharges described in this application have been tested or evaluated for the presence of non-stormwater discharges and any non-mining associated beneficiation/process pollutants and wastewaters have been fully identified. I acknowledge my understanding that if coal, coal fines, coal refuse, or other coal related materials are mined, transloaded, processed, etc., that I may be required to obtain a permit from the ASMC. I acknowledge my understanding that if non-coal, non-limestone materials are mined, transloaded, processed, etc., that I may be required to obtain a permit from the ADOL. I acknowledge my understanding that if the proposed activities will be conducted in or potentially impact waters of the state or waters of the US (including wetlands), that I may be required to obtain a permit from the USACE.

Signed By Thomas Reed on 02/27/2025 at 3:56 PM

Attachment 1 to Supplementary Form
ADEM Form 311

Alternatives Analysis

Applicant/Project: MMC / Hutchinson Bauxite Pit

All new or expanded discharges (except discharges eligible for coverage under general permits) covered by the NPDES permitting program are subject to the provisions of ADEM's antidegradation policy. Applicants for such discharges to Tier 2 waters are required to demonstrate " . . . that the proposed discharge is necessary for important economic or social development." As a part of this demonstration, the applicant must complete an evaluation of the discharge alternatives listed below, including a calculation of the total annualized project costs for each technically feasible alternative (using ADEM Form 312 for public-sector projects and ADEM Form 313 for private-sector projects). Alternatives with total annualized project costs that are less than 110% of the total annualized project costs for the Tier 2 discharge proposal are considered viable alternatives.

Alternative	Viable	Non-Viable	Comment
1 Land Application		X	
2 Pretreatment/Discharge to POTW		X	
3 Relocation of Discharge		X	
4 Reuse/Recycle		X	
5 Process/Treatment Alternatives		X	
6 On-site/Sub-surface Disposal		X	
(other project-specific alternatives considered by the applicant; attach additional sheets if necessary)			
7			
8			
9			

Pursuant to ADEM Administrative Code Rule 335-6-3-.04, I certify on behalf of the applicant that I have completed an evaluation of the discharge alternatives identified above, and reached the conclusions indicated.

Signature: Jeremy Weant

Digitally signed by Jeremy Weant
DN: CN=Jeremy Weant, E=jweant@wcbinc.com
Reason: I am the author of this document
Location: your signing location here
Date: 2024-12-20 20:49:06
Foxit PhantomPDF Version: 10.0.0

(Professional Engineer)

Date: 12-20-2024

(Supporting documentation to be attached, referenced, or otherwise handled as appropriate.)

Calculation of Total Annualized Project Costs
for Private-Sector Projects

Capital Costs to be Financed (Supplied by applicant)	$ 50,000 (1)
Interest rate for Financing (Expressed as a decimal)	.05 (i)
Time Period of Financing (Assume 10 years*)	10 years (n)
Annualization Factor = $\frac{i}{(1+i)^{10} - 1} + i$	0.13 (2)
Annualized Capital Cost [Calculate: (1) x (2)]	$ 6,500 (3)
Annual Cost of Operation and Maintenance (including but not limited to monitoring, inspection, permitting fees, waste disposal charges, repair, administration and replacement)**	$ 10,000 (4)
Total Annual Cost of Pollution Control Project [(3) + (4)]	$ 16,500 (5)

* While actual payback schedules may differ across projects and companies, assume equal annual payments over a 10-year period for consistency in comparing projects.

** For recurring costs that occur less frequently than once a year, pro rate the cost over the relevant number of years (e.g., for pumps replaced once every three years, include one-third of the cost in each year).

The applicant is required to supply the following information separately for every proposed (P) or existing (E) outfall. List expected average daily discharge flow rate in cfs and gpd; frequency of discharge in hours per day and days per month; average summer and winter temperature of discharge(s) in degrees centigrade; average pH in standard units; and average daily discharges in pounds per day of BOD5, Total Suspended Solids, Total Iron, Total Manganese, and Total Aluminum (if bauxite or bauxitic clay or if otherwise believed present):

Outfall E/P	Information Source - # of Samples	Flow (cfs)	Flow (gpd)	Frequency (hours/day)	Frequency (days/month)	Sum/Win Temp, (°C)	pH (s.u.)	BOD5 (lbs/day)	TSS (lbs/day)	Tot Fe (lbs/day)	Tot Mn (lbs/day)	Tot Al (lbs/day)
001P	1	0.025	16000	24/7 Precip. Driven	31/12 Precip. Driven	28/15	7.4	0.013	0.75	0.09	0.015	0.013

The applicant is required to supply outfall number(s) as it appears on the map(s) required by this application [if this application is for a modification to an existing permit do not change the numbering sequence of the permitted outfalls], describe each, (e.g., pipe, spillway, channel, tunnel, conduit, well, discrete fissure, or container), and identify the origin of pollutants. The response must be precise for each outfall. If the discharge of pollutants from any outfall is the result of commingling of waste streams from different origins, each origin must be completely described.

Description of Origin of Pollutants – typical examples: (1) Discharge of drainage from the underground workings of an underground coal mine, (2) Discharge of drainage from a coal surface mine, (3) Discharge of drainage from a coal preparation plant and associated areas, (4) Discharge of process wastewater from a gravel-washing plant, (5) Discharge of wastewater from an existing source coal preparation plant, (6) Discharge of drainage from a sand and gravel pit, (7) Pumped discharge from a limestone quarry, (8) Controlled surface mine drainage (pumped or siphoned), (9) Discharge of drainage from mine reclamation, (10) Other (please describe):

Outfall	Discharge structure Description	Description of Origin of pollutants	Surface Discharge	Groundwater Discharge	Wet Prep -Other Production Plant	Pumped or Controlled Discharge	Low Volume STP
001P	Pipe / Spillway	8, 9, 10	X	X	N/A	N/A	N/A
		10 - Bauxite Mining					

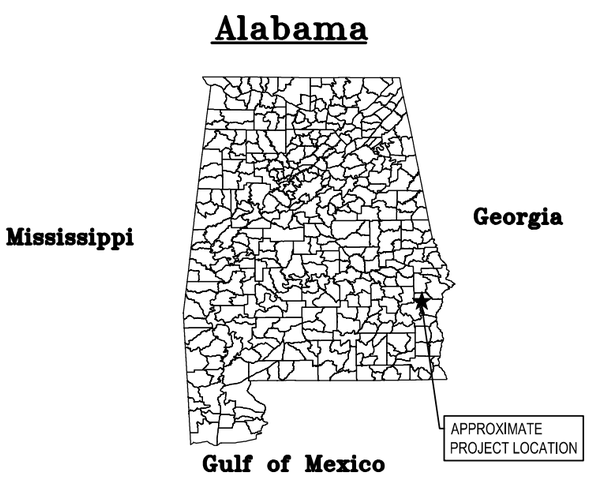
The applicant is required to supply the following information separately for every proposed or existing outfall. Identify and list expected average daily discharge of any other pollutant(s) listed in EPA Form 2C Tables A, B, C, D, and E that are not referenced in Part XVI.B. or otherwise submitted elsewhere, that you know is present or have reason to believe could be present in the discharge(s) at levels of concern:

Outfall E/P	Reason Believed Present	Information Source - # of Samples								
			lbs/day	mg/L	lbs/day	mg/L	lbs/day	mg/L	lbs/day	mg/L
001P	None Expected									

PREPARED FOR:
MINERAL MANUFACTURING

HUTCHINSON MINE

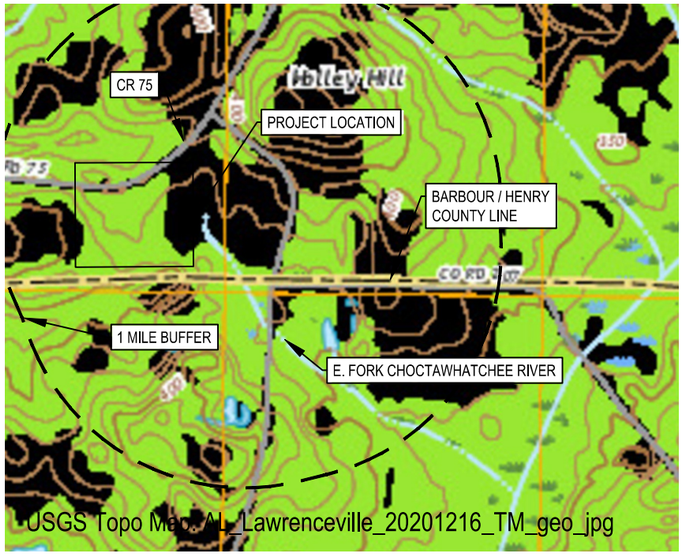
SECTION 33, T-9-N, R-27-E, BARBOUR COUNTY,



PROJECT LOCATION MAP

SOURCE:

SCALE: 1" =2000 @ 11" X 17"
0 500 1000 2000
N



PROJECT VICINITY MAP

SOURCE:

SCALE: 1" =2000 @ 11" X 17"
0 500 1000 2000
N

DRAWING INDEX

THIS ITEM HAS BEEN DIGITALLY SIGNED AND SEALED BY:

TBD

10/17/2024

Date

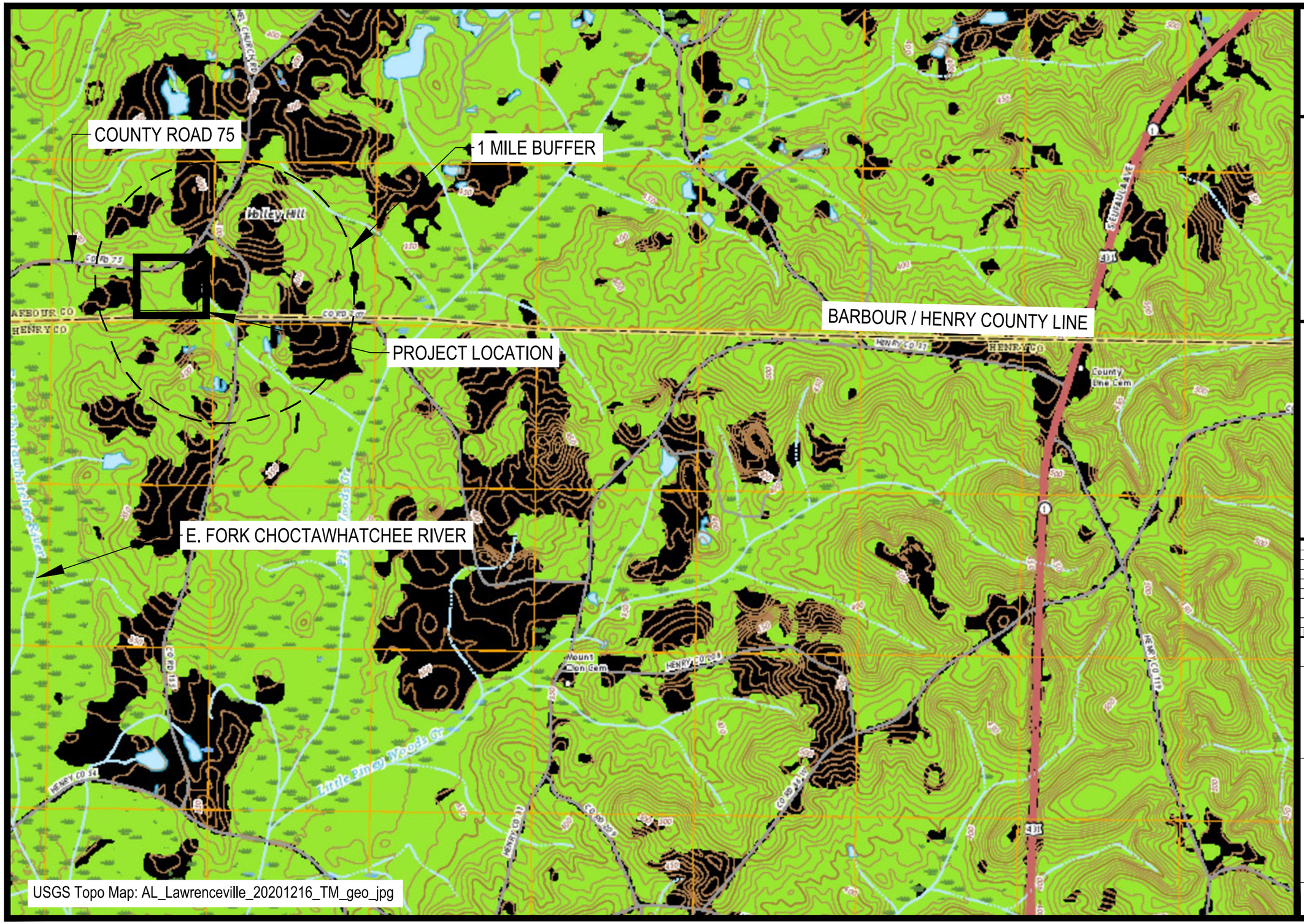
PRINTED COPIES OF THIS DOCUMENT ARE NOT CONSIDERED SIGNED AND SEALED AND THE SIGNATURE MUST BE VERIFIED ON ANY ELECTRONIC COPIES.

FOR INFORMATION REGARDING THIS PROJECT CONTACT: Jeremy Weant, jweant@ectinc.com

ADEM PERMIT PLANS

DECEMBER 12, 2024

ECT PROJECT # 240852
PREPARED BY:
ECT Environmental Consulting & Technology, Inc.
1715 N. WESTSHORE BLVD., STE 15
TAMPA, FL, 33607
TELEPHONE: 813 - 289 - 9338



ECT
1715 N, Westshore Blvd., Ste 15
Tampa, FL, 33607
Phone: (813) 289-9338
www.ectinc.com

MINERAL MANUFACTURING HUTCHINSON MINE

ECT PROJECT No.:	240852
DESIGNED BY:	JBW
DRAWN BY:	CBN
CHECKED BY:	JBW
APPROVED BY:	
STATUS: PRELIMINARY DESIGN	12-12-2024
REVISIONS: DESCRIPTION	XX-XX-XXXX

PROJECT LOCATION MAP

SCALE: 1" = 12000 @ 11" X 17"

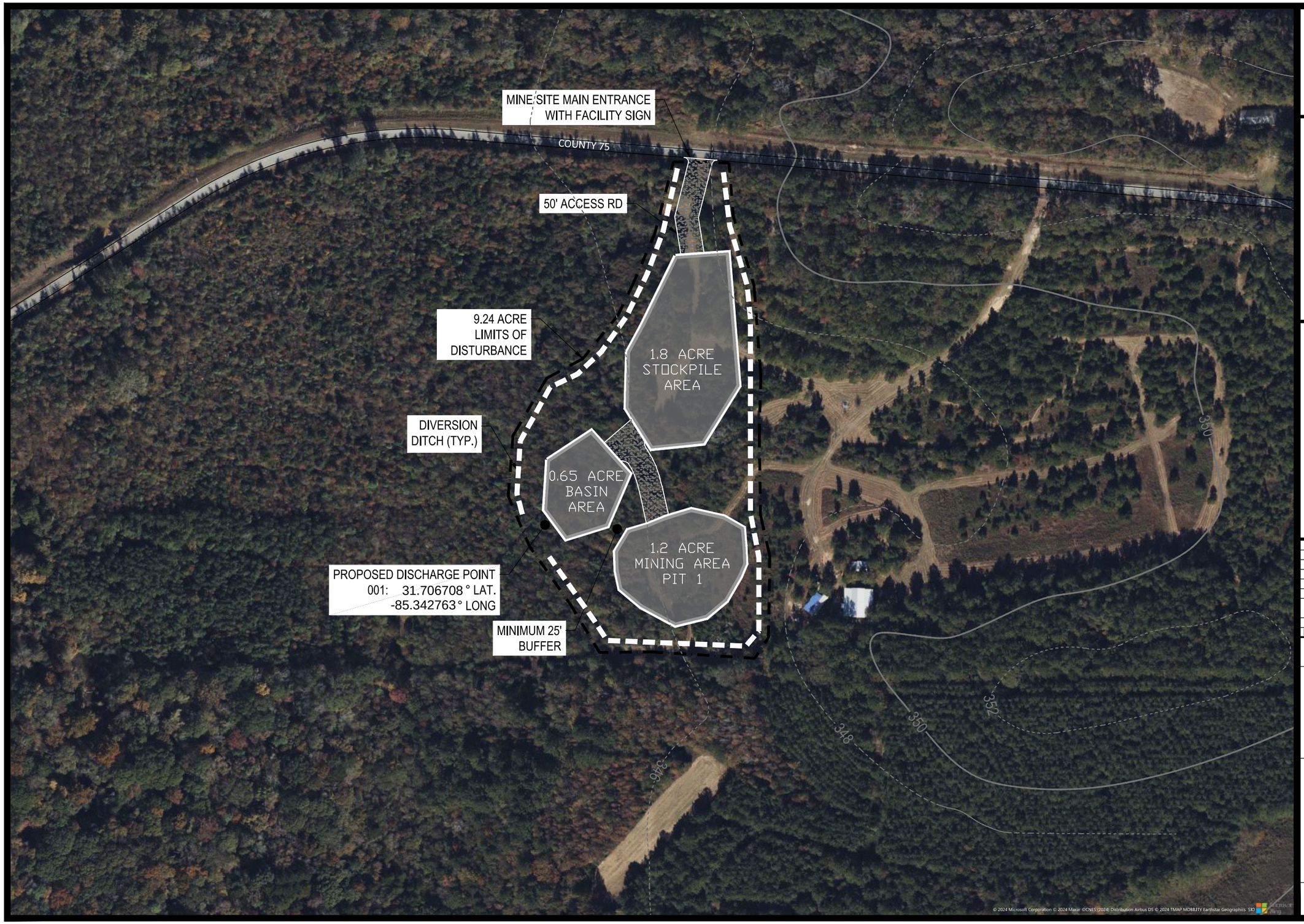
0 6000 12000

N

C1.01

12/13/2024 9:16 AM by Curtis Nordeman

C:\USERS\CNORDEMAN\ONEDRIVE - ECTINC.COM\DOCUMENTS\PROJECTS\240852-HUTCHINSON MINE\3_DATA\CAD\COVER.DWG



ECT
1715 N, Westshore Blvd., Ste 15
Tampa, FL, 33607
Phone: (813) 289-9338
www.ectinc.com

MINERAL MANUFACTURING HUTCHINSON MINE

ECT PROJECT No.:	240852
DESIGNED BY:	JBW
DRAWN BY:	CBN
CHECKED BY:	JBW
APPROVED BY:	
STATUS:	
PRELIMINARY DESIGN	12-12-2024
REVISIONS:	
DESCRIPTION	XX-XX-XXXX

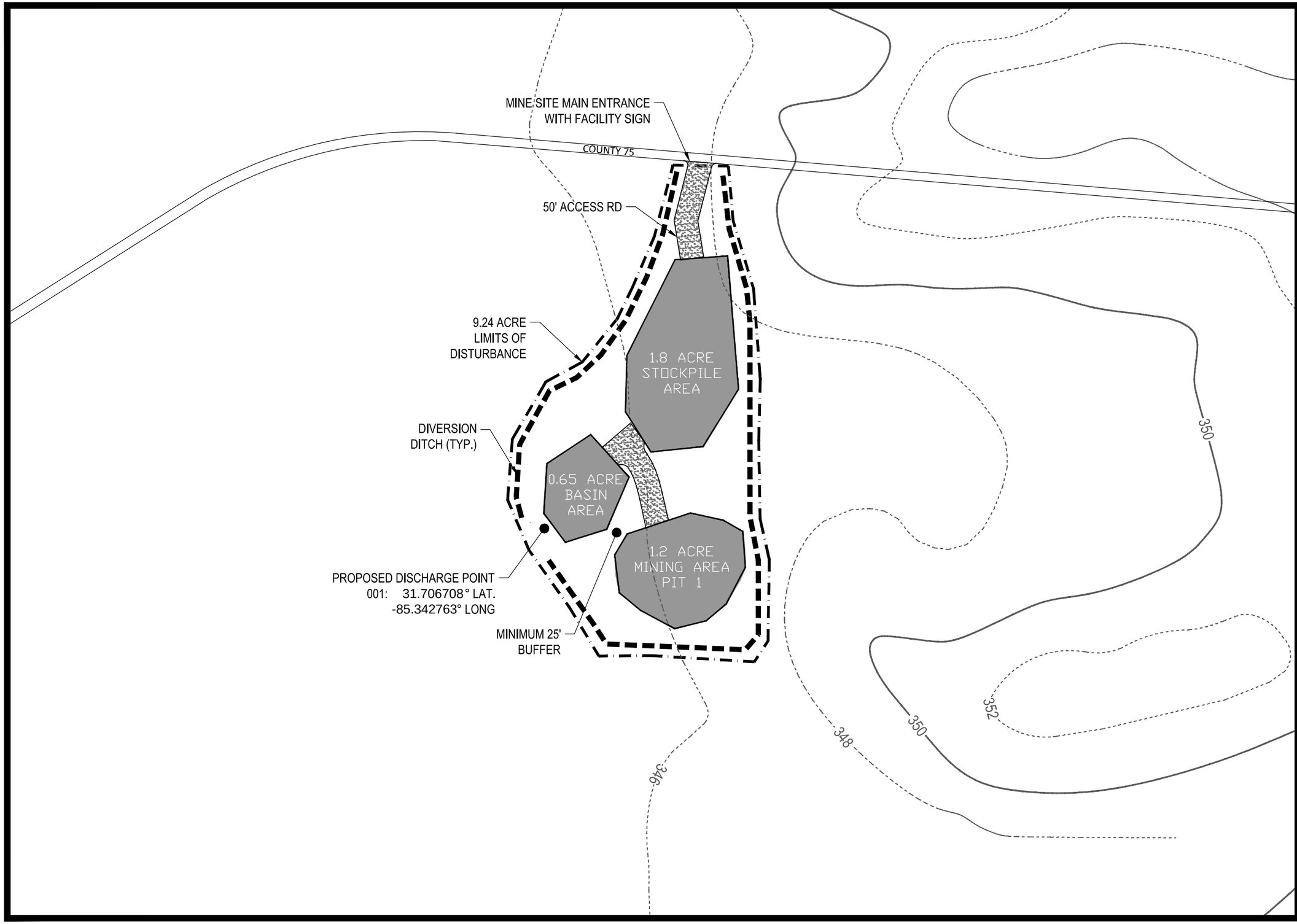
PROJECT OVERVIEW (AERIAL)

SCALE: 1" = 200
@ 11" X 17"
0 50 100 200

C1.02

12/12/2024 11:13 PM by Curtis Nordeman

C:\USERS\CNORDEMAN\ONEDRIVE - ECTINC.COM\DOCUMENTS\PROJECTS\240852-HUTCHINSON MINE\3_DATA\CAD\HUTCHINSON-MINE_SHEETS.DWG



ECT
1715 N, Westshore Blvd., Ste 15
Tampa, FL, 33607
Phone: (813) 289-9338
www.ectinc.com

MINERAL MANUFACTURING HUTCHINSON MINE

ECT PROJECT No.:	240852
DESIGNED BY:	JBW
DRAWN BY:	CBN
CHECKED BY:	JBW
APPROVED BY:	
STATUS:	
PRELIMINARY DESIGN	12-12-2024
REVISIONS:	
DESCRIPTION	XX-XX-XXXX

PROJECT OVERVIEW (PLAN)

SCALE: 1" = 200
@ 11" X 17"

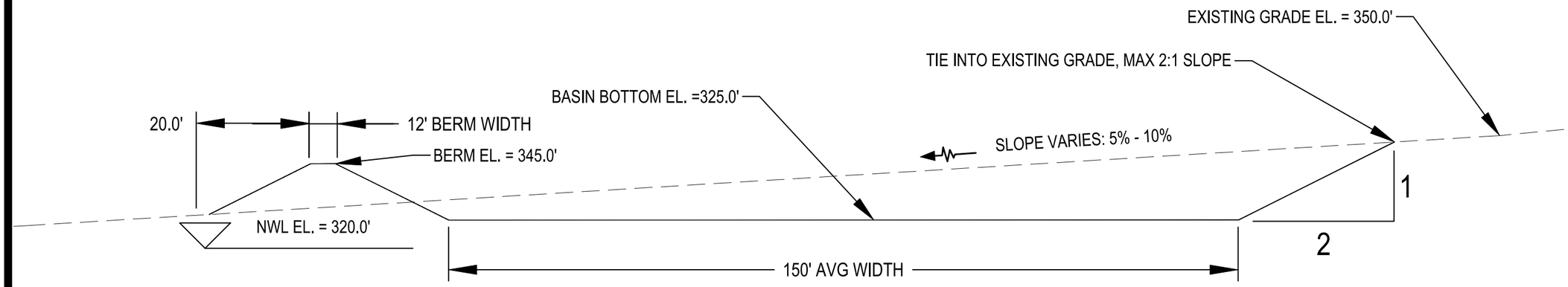
0 50 100 200

N

C1.03

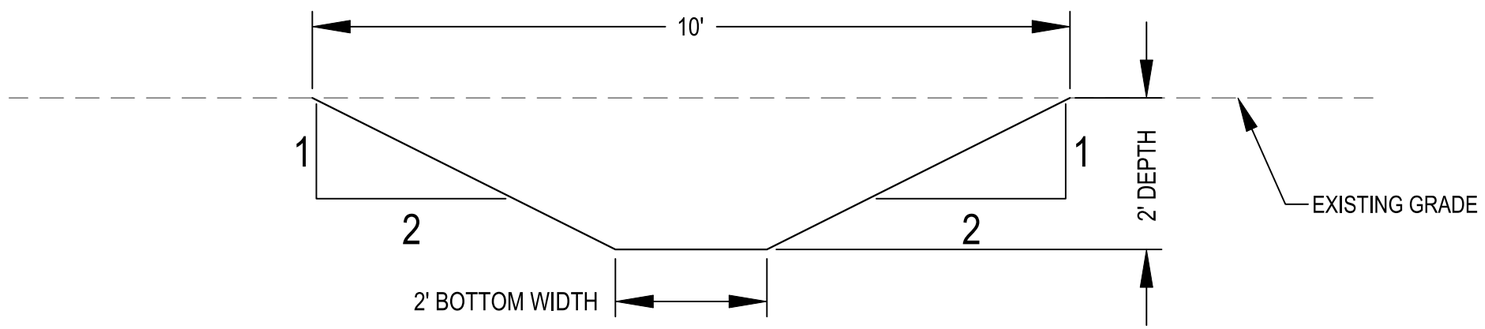
12/12/2024 11:13 PM by Curtis Nordeman

C:\USERS\CNORDEMAN\ONEDRIVE - ECTINC.COM\DOCUMENTS\PROJECTS\240852-HUTCHINSON MINE\3_DATA\CAD\HUTCHINSON-MINE_SHEETS.DWG



BASIN SECTION DETAIL

SCALE: 1" = 20'
@ 11" X 17"
0 10 20



TYPICAL DIVERSION DITCH SECTION

SCALE: 1" = 2'
@ 11" X 17"
0 1 2

ECT
1715 N, Westshore Blvd., Ste 15
Tampa, FL, 33607
Phone: (813) 289-9338
www.ectinc.com

MINERAL MANUFACTURING HUTCHINSON MINE

ECT PROJECT No.:	240852
DESIGNED BY:	JBW
DRAWN BY:	CBN
CHECKED BY:	JBW
APPROVED BY:	
STATUS:	
PRELIMINARY DESIGN	12-12-2024
REVISIONS:	
DESCRIPTION	XX-XX-XXXX

TYPICAL DETAILS

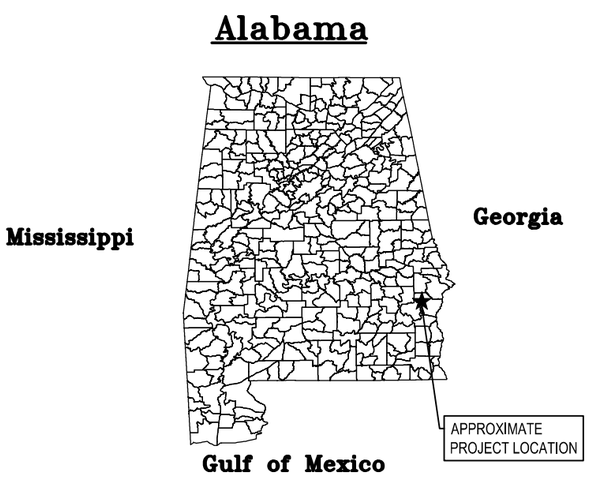
N

C1.04

PREPARED FOR:
MINERAL MANUFACTURING

HUTCHINSON MINE

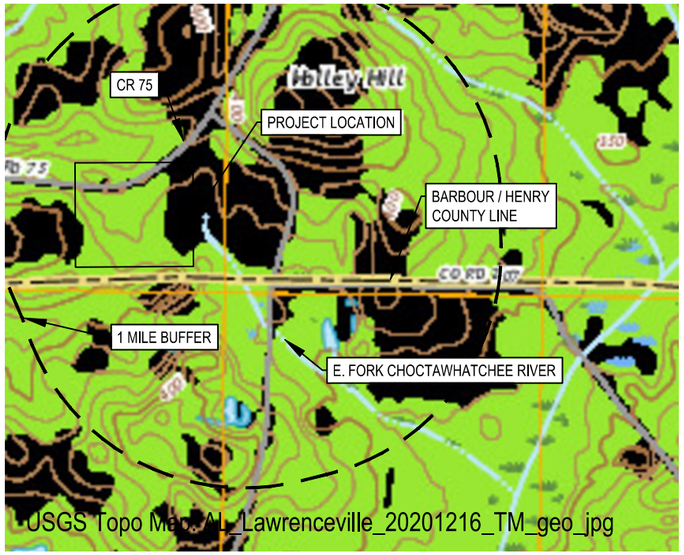
SECTION 33, T-9-N, R-27-E, BARBOUR COUNTY,



PROJECT LOCATION MAP

SOURCE:

SCALE: 1" =2000 @ 11" X 17"
0 500 1000 2000
N



PROJECT VICINITY MAP

SOURCE:

SCALE: 1" =2000 @ 11" X 17"
0 500 1000 2000
N

DRAWING INDEX

THIS ITEM HAS BEEN DIGITALLY SIGNED AND SEALED BY:

TBD

10/17/2024

Date

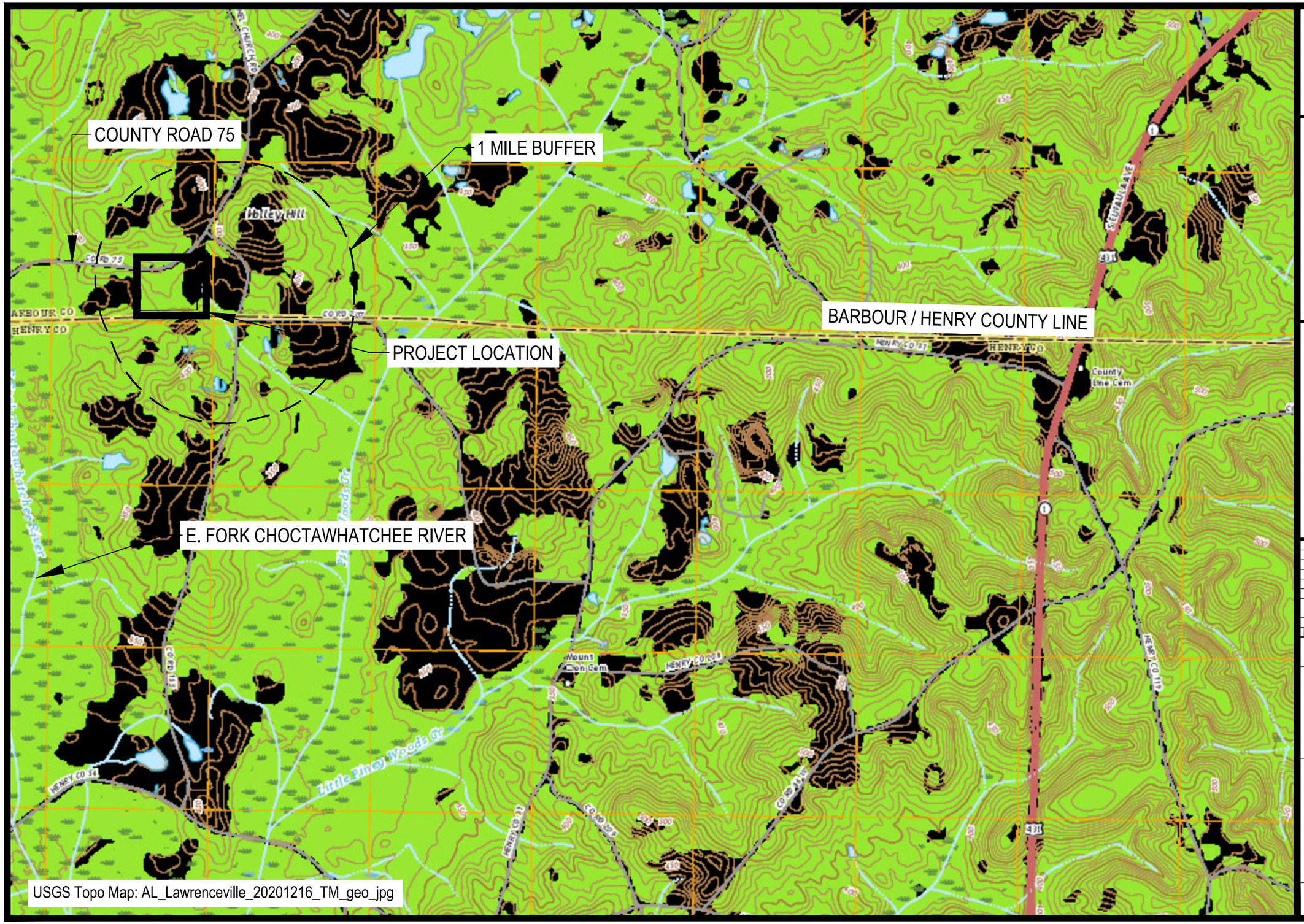
PRINTED COPIES OF THIS DOCUMENT ARE NOT CONSIDERED SIGNED AND SEALED AND THE SIGNATURE MUST BE VERIFIED ON ANY ELECTRONIC COPIES.

FOR INFORMATION REGARDING THIS PROJECT CONTACT: Jeremy Weant, jweant@ectinc.com

ADEM PERMIT PLANS

DECEMBER 12, 2024

ECT PROJECT # 240852
PREPARED BY:
ECT Environmental Consulting & Technology, Inc.
1715 N. WESTSHORE BLVD., STE 15
TAMPA, FL, 33607
TELEPHONE: 813 - 289 - 9338



ECT
1715 N, Westshore Blvd., Ste 15
Tampa, FL, 33607
Phone: (813) 289-9338
www.ectinc.com

MINERAL MANUFACTURING HUTCHINSON MINE

ECT PROJECT No.:	240852
DESIGNED BY:	JBW
DRAWN BY:	CBN
CHECKED BY:	JBW
APPROVED BY:	
STATUS: PRELIMINARY DESIGN	12-12-2024
REVISIONS: DESCRIPTION	XX-XX-XXXX

PROJECT LOCATION MAP

SCALE: 1" = 12000 @ 11" X 17"

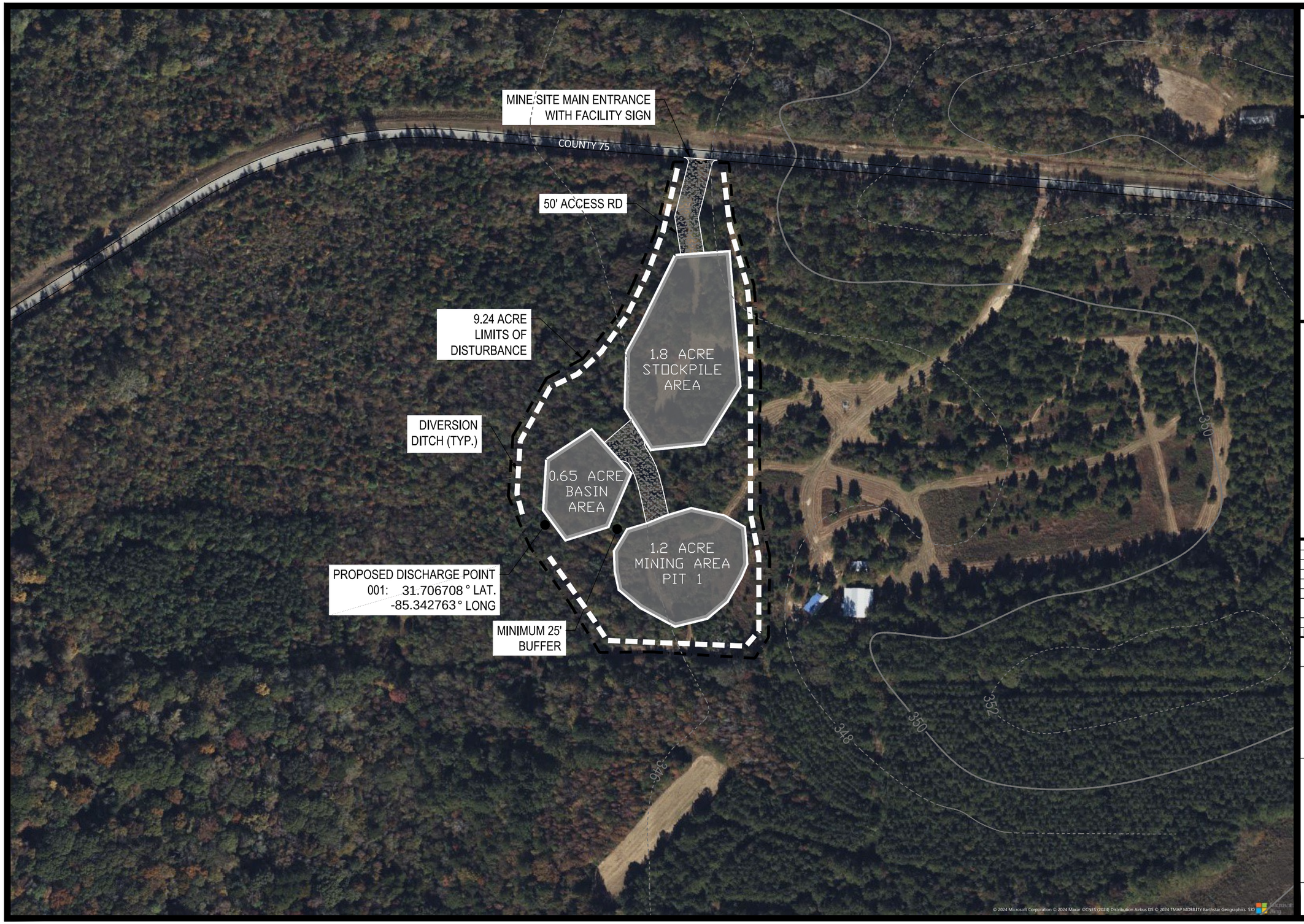
0 6000 12000

N

C1.01

12/13/2024 9:16 AM by Curtis Nordeman

C:\USERS\CNORDEMAN\ONEDRIVE - ECTINC.COM\DOCUMENTS\PROJECTS\240852-HUTCHINSON MINE\3_DATA\CAD\COVER.DWG



ECT
1715 N, Westshore Blvd., Ste 15
Tampa, FL, 33607
Phone: (813) 289-9338
www.ectinc.com

MINERAL MANUFACTURING HUTCHINSON MINE

ECT PROJECT No.:	240852
DESIGNED BY:	JBW
DRAWN BY:	CBN
CHECKED BY:	JBW
APPROVED BY:	
STATUS:	
PRELIMINARY DESIGN	12-12-2024
REVISIONS:	
DESCRIPTION	XX-XX-XXXX

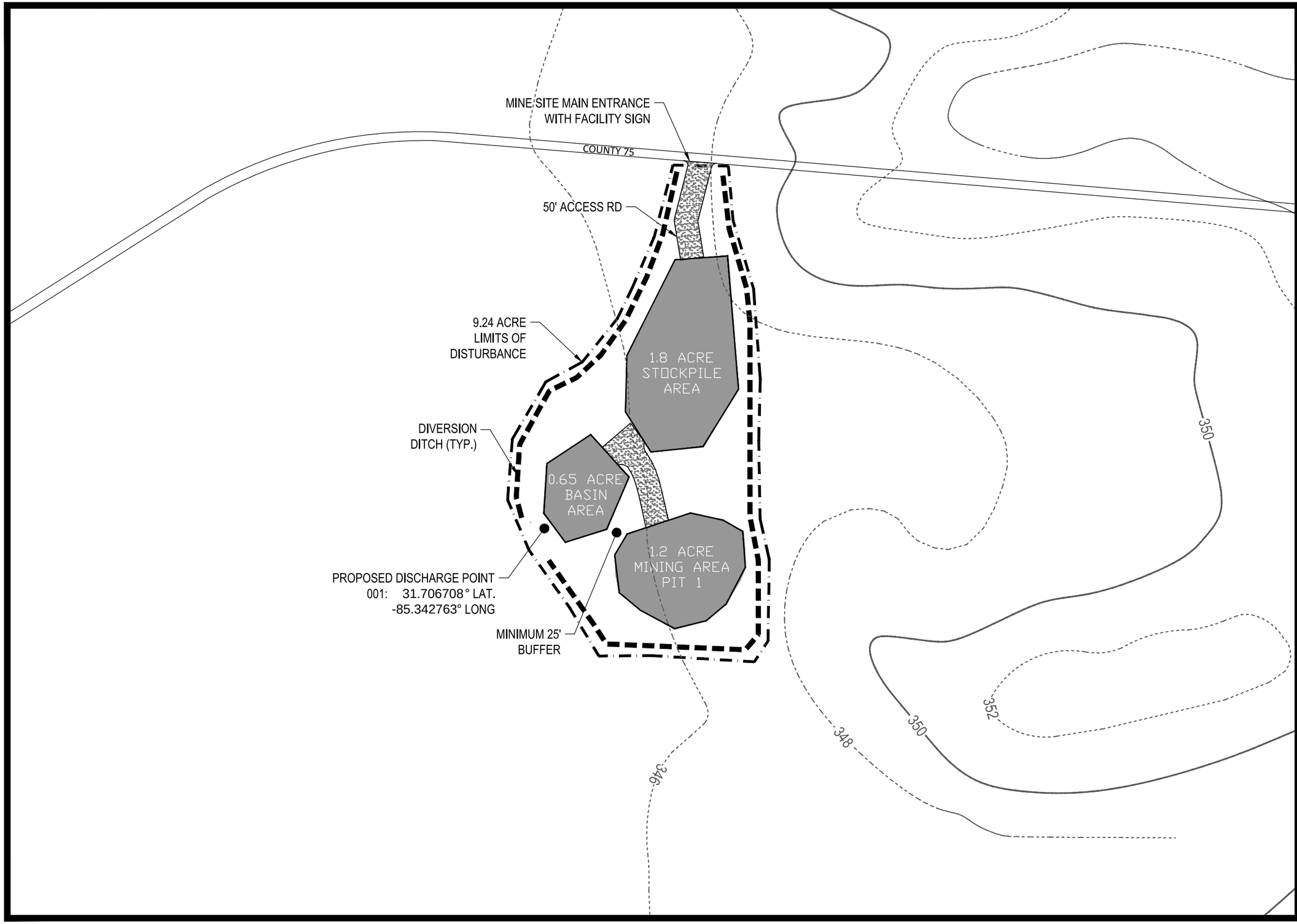
PROJECT OVERVIEW (AERIAL)

SCALE: 1" = 200
@ 11" X 17"
0 50 100 200

C1.02

12/12/2024 11:13 PM by Curtis Nordeman

C:\USERS\CNORDEMAN\ONEDRIVE - ECTINC.COM\DOCUMENTS\PROJECTS\240852-HUTCHINSON MINE\3_DATA\CAD\HUTCHINSON-MINE_SHEETS.DWG



ECT
1715 N, Westshore Blvd., Ste 15
Tampa, FL, 33607
Phone: (813) 289-9338
www.ectinc.com

MINERAL MANUFACTURING HUTCHINSON MINE

ECT PROJECT No.:	240852
DESIGNED BY:	JBW
DRAWN BY:	CBN
CHECKED BY:	JBW
APPROVED BY:	
STATUS:	
PRELIMINARY DESIGN	12-12-2024
REVISIONS:	
DESCRIPTION	XX-XX-XXXX

PROJECT OVERVIEW (PLAN)

SCALE: 1" = 200
@ 11" X 17"

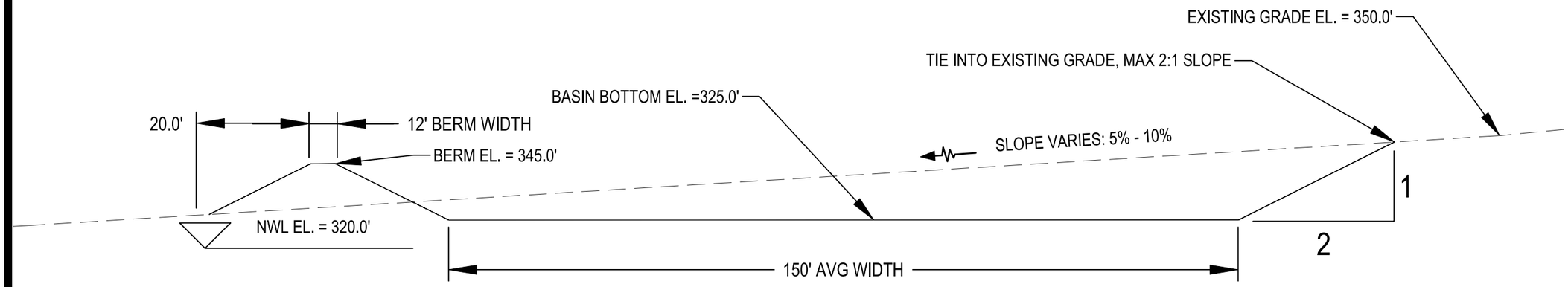
0 50 100 200

N

C1.03

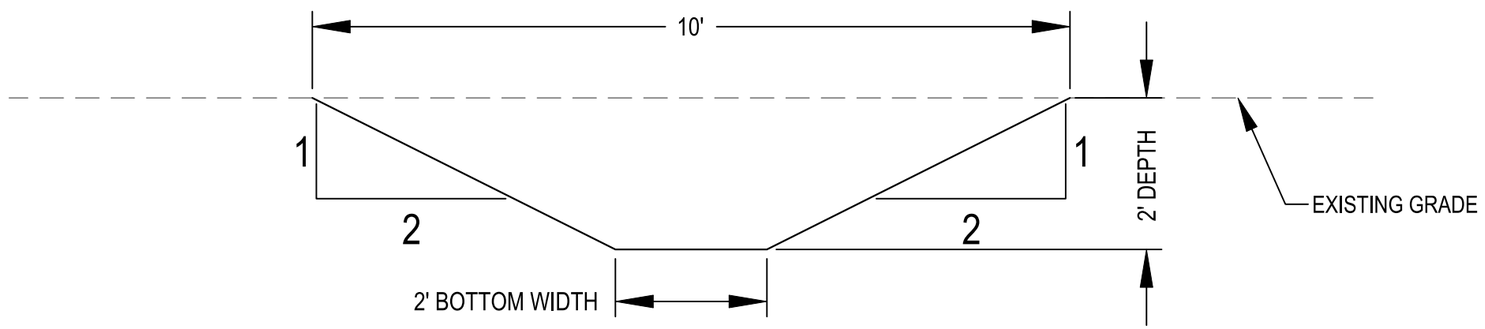
12/12/2024 11:13 PM by Curtis Nordeman

C:\USERS\CNORDEMAN\ONEDRIVE - ECTINC.COM\DOCUMENTS\PROJECTS\240852-HUTCHINSON MINE\3_DATA\CAD\HUTCHINSON-MINE_SHEETS.DWG



BASIN SECTION DETAIL

SCALE: 1" = 20'
@ 11" X 17"
0 10 20



TYPICAL DIVERSION DITCH SECTION

SCALE: 1" = 2'
@ 11" X 17"
0 1 2

ECT
1715 N, Westshore Blvd., Ste 15
Tampa, FL, 33607
Phone: (813) 289-9338
www.ectinc.com

MINERAL MANUFACTURING HUTCHINSON MINE

ECT PROJECT No.:	240852
DESIGNED BY:	JBW
DRAWN BY:	CBN
CHECKED BY:	JBW
APPROVED BY:	
STATUS:	
PRELIMINARY DESIGN	12-12-2024
REVISIONS:	
DESCRIPTION	XX-XX-XXXX

TYPICAL DETAILS

N

C1.04

Appendix C
SPCC Plan

Spill Prevention Control and Countermeasure Plan
Mineral Manufacturing Corporation – Hutchinson Pit
Located in Section 33, T-9-N, R-27-E, Barbour County, Alabama

This is to certify that I, Jeremy B. Weant, a Registered Professional Engineer in the State of Alabama, am familiar with the Mineral Manufacturing Corporation, Hutchinson Pit, located in Barbour County, Alabama, and, to the best of my knowledge, all information herein is true and accurate, and the Spill Prevention Control and Countermeasure Plan has been prepared in accordance with good engineering practices.

Jeremy B. Weant, P.E.
Name of Professional Engineer

35672
Alabama Professional Engineer License Number

This plan has been reviewed by the management of Mineral Manufacturing Corporation, and hereby adopt this SPCC Plan into the operation of the facility and the Hutchinson Pit, in Barbour County, Alabama.

_____ _____

T. Ryan Reed
Vice President

Date

Spill Prevention Control and Countermeasure Plan
Mineral Manufacturing Corporation – Hutchinson Pit
Located in Section 33, T-9-N, R-27-E, Barbour County, Alabama

This is to certify that I, Jeremy B. Weant, a Registered Professional Engineer in the State of Alabama, am familiar with the Mineral Manufacturing Corporation, Hutchinson Pit, located in Barbour County, Alabama, and, to the best of my knowledge, all information herein is true and accurate, and the Spill Prevention Control and Countermeasure Plan has been prepared in accordance with good engineering practices.

Jeremy B. Weant, P.E.
Name of Professional Engineer

35672
Alabama Professional Engineer License Number

This plan has been reviewed by the management of Mineral Manufacturing Corporation, and hereby adopt this SPCC Plan into the operation of the facility and the Hutchinson Pit, in Barbour County, Alabama.

T. Ryan Reed
Vice President

Dec. 21, 2024
Date

Spill Prevention Control and Countermeasure Plan
Mineral Manufacturing Corporation – Hutchinson Pit
Located in Section 33, T-9-N, R-27-E, Barbour County, Alabama

Responsible Official:

T. Ryan Reed
50 Harbison Walker Rd.
Eufaula, AL 36027
814-599-2230

Mining Manager & Facility Contact:

Chris Dasinger
334-618-2713

1. This facility has never experienced a spill from the fuel tank.

2. The only fuel onsite is a portable 1,000-gallon diesel fuel tank. The tank is trailer-mounted and is transported to different locations. The tank will not be stored onsite and will only be onsite during times of fueling equipment. If any spill should occur, ADEM and other agencies would be notified immediately, and the contaminated soils will be treated according to ADEM regulations.

3. The receiving water is an Unnamed Tributary to the East Fork Choctawhatchee River. The distance to this waterway varies depending on the location of the tank within the site.

4. Should a spill occur, the polluted soil in the area would be excavated and disposed of in accordance with State and Federal regulations.

5. A written record shall be maintained by the Site Supervisor, or any spills that occur, the actions taken to dispose of all spilled material and the cleanup procedures.

6. The Site Supervisor will make periodic inspections of the refueling area to detect signs of minor spills. If evidence of spills is noted, the polluted soil will be disposed of properly.

7. All personnel involved in the use of fuel, maintenance of the facility, or responsible for storm water drainage and spill cleanup will be familiar with this Plan.

8. Potential Sources of Spills:

    a. Tank or Tank Valve Rupture:
    Prevention: Properly maintain tanks and keep in good condition. Visually inspect tanks periodically for leaks

    b. Tank Overfill:
    Prevention: Personnel should follow correct operating procedures when refueling tanks with diesel fuel and always stay with equipment during refueling operations. Key personnel should always know when the tank is onsite.
    c. Hose rupture during refueling and spillage from hoses after disconnection:
    Prevention: Periodic inspection of transport unloading hoses, the replacement of hoses as necessary, and the use of the proper hose drainage procedure.

In the event of a fuel spill, notification should be made to the following:

Emergency Management Agency	1-800-843-0699
National Response Center	1-800-424-8802
ADEM	1-334-271-7700

The following information should be included in the initial notification:

1. Name, address, and phone number of person reporting.
2. Exact location of facility and spill.
3. Company name, phone number, and location.
4. Material spilled.
5. Estimated amount spilled.
6. Source of spill.
7. Cause of spill.
8. Nearest down-stream body of water to receive spill.
9. Actions taken for containment and cleanup.

The employees of Mineral Manufacturing recognize that this Plan is to minimize contamination of public water by the spills of diesel fuel in or adjacent to public water, and to provide a reporting procedure to be followed by site personnel in reporting such spills.

Pollution Abatement & Prevention (PAP) Plan

December 2024
ECT No. 240852

Mineral Manufacturing Corporation (MMC)
MMC-Hutchinson Bauxite Pit
Barbour County, AL

ECT
7027 Southwest 24th Avenue
Gainesville, Florida 32607
www.ectinc.com

Document Review

The dual signatory process is an integral part of Environmental Consulting & Technology, Inc.'s (ECT's) Document Review Policy. All ECT documents undergo technical/peer review prior to dispatching these documents to any outside entity.

This document has been authored and reviewed by the following employees:

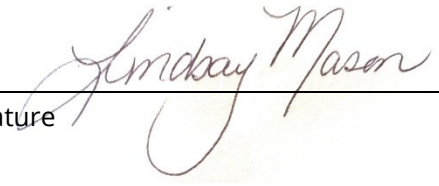
Jeremy Weant	Lindsay Mason
Author	Peer Review
	
Signature	Signature
12-22-2024	12-22-2024
Date	Date

Table of Contents

1.0 Introduction

Environmental Consulting & Technology, Inc. (ECT) was contracted by Mineral Manufacturing Corporation (MMC) to prepare an application and associated documentation required for a National Pollutant Discharge Elimination System (NPDES) Individual Permit from the Alabama Department of Environmental Management (ADEM) to discharge storm water to Water of the State of Alabama for a proposed bauxite clay mine to be located in Barbour County, Alabama. In accordance with ADEM Admin. Code r. 335-6-9-.03 and ADEM Form 315 – NPDES Individual Permit Application, a detailed, comprehensive Pollution Abatement & Prevention (PAP) Plan must be prepared, signed, and certified by a professional engineer registered in the State of Alabama.

This PAP Plan is associated with the application for the initial NPDES Permit for the MMC-Hutchinson Bauxite Pit, which will be located in Section 33, T-9-N, R-27-E, Barbour County, Alabama. This application is being prepared in accordance with the rules and regulations of the ADEM.

The PAP Plan is presented in two parts, which includes a brief narrative presented herein and the Pollution Abatement plans which are attached hereto. The narrative description is intended to address the format as outlined in ADEM Admin. Code r. 335-6-9-.03, as well as present the basis for the designs as further detailed in the PAP Plan. Drawings as presented in the PAP Plan were derived from rules and regulations of the ADEM, as well as from other generally accepted design data sources, primarily from the Natural Resource Conservation Service (NRCS).

2.0 Operator

The operator of the MMC-Hutchinson Mine will be Mineral Manufacturing Corporation. Their local business address is:

50 Harbison Walker Rd.
Eufaula, AL 36027

The proposed mine will lie within the following parcels of property:

Hutchingson Dell Arthur Jr
Parcel No. 06-27-08-33-0-000-006.000
Section 33, T-9-N, R-27-E, Barbour County, Alabama

Permit boundaries are shown on the attached figures and will be delineated and readily visible during the life of the operation. Boundaries will be clearly demarcated by surveying indicators, fence lines, perennial waterways, and other readily visible, semi-permanent features. The permittee and on-site personnel must be knowledgeable of the location of the permitted boundaries and will maintain them to be readily visible.

3.0 General Information

The facility will employ approximately six individuals from the local area. The hours of operations are generally 7:00 A.M. to 4:00 P.M., Monday through Friday.

The facility will mine bauxite clay. There will be no mining or processing of coal. The material will be stockpiled on site and hauled via truck to the company's processing facility in Eufaula, AL, where it will be further processed to make various products.

4.0 Topographic Map

A site drainage map including topography, areas of excavation, proposed material and topsoil stockpile areas, drainage diversionary structures, treatment ponds, and discharge points is provided in Appendix A of this Plan.

5.0 Method of Diverting Surface Water Runoff

The site drainage map, located in Appendix A, shows the topography and all diversionary structures. The treatment is located using natural topography to minimize the construction of diversionary structures. Drainage from all spoil, stockpile areas, excavation areas, loading areas, equipment storage areas, and any other areas of disturbance related to the mining site will be directed to a permitted treatment structure prior to discharging. Stormwater from these areas which cannot drain naturally to the treatment pond will be pumped to the treatment pond.

Any minor areas of disturbance that drainage cannot feasibly be routed to a treatment pond will be graded and will be vegetated with annual and perennial grasses and will have effective Best Management Practices (BMP's) for the control of non-point source pollution fully implemented and maintained at all times.

6.0 Raw Materials, Processes and Products

The material that will be mined is bauxite clay. There will be no washing or screening of any raw material at the site. The material is hauled either directly from the site or stockpiled onsite and later hauled from the site. A schematic diagram showing each process that creates wastewater and the wastewater collection system is included as part of this Plan.

7.0 Post Treatment Quantity and Quality of Effluent

Runoff calculations have been provided as part of this plan to determine flow and to size the discharge structure. The treatment pond has been designed to allow adequate settling times for the expected particles sizes to reduce suspended solids concentrations to meet effluent limits. The treatment pond

is designed to provide adequate oxidation for the removal of iron and other metals to a concentration within the permit requirements. The pH of the effluent will be between 6.0 and 8.5, or as otherwise allowed by the permit.

8.0 Waste Treatment Facilities

The primary method of treatment for the removal of expected pollutants will be settling. The site will utilize an existing sediment pond from previous mining operations. The sediment pond has adequate capacity to detain all surface runoff for a 24-hour 25-year storm event, with provisions to route the 100-year storm event. The sediment pond will allow sedimentation to ensure that silt does not leave the site. All aspects of the proposed sediment pond shall be in accordance with the requirements of the PAP Plan checklist.

The sediment pond, at a minimum, will provide 0.25 acre-feet of storage for every acre of disturbed land draining to the pond. All trees, brush, boulders, and other objects that would impair compaction will be removed from the pond prior to construction. The minimum width at the top of the dam will be at least 12 feet. The side slopes of the dam will be no steeper than 3:1. At least 80% coverage of annual and perennial grasses will be established on the embankments of the dam. A cutoff trench will be constructed along the center of the dam and will extend at least 2 feet into the bedrock. The cutoff trench will be at least 8 feet wide, the side slopes will no less than 1:1, and it will be filled with impervious material compacted to 95% compaction standard proctor ASTM. The dam will also be compacted 95% compaction standard proctor ASTM. The embankments will be constructed in lifts less than 12 inches.

The spill-pipe is sized to carry peak flow from the 25-year, 1-hour storm event, and is constructed of material that will not chemically react with the effluent. Anti-seep collars will extend radially at least 2 feet from each joint in the spill-pipes. A splash pad constructed of riprap will be installed at the discharge pipe to prevent erosion from the discharge.

The dam will be equipped with an emergency spillway sized for the peak flow from 25-year, 24-hour storm event. The emergency overflow will be at least 20 feet long, lined with riprap, and the side slopes will be no steeper than 2:1. There will be at least 1.5 feet of freeboard between the normal overflow and the emergency overflow, and there will be at least 1.5 feet of freeboard between the maximum design flow of the emergency spillway and the top of the dam.

The treatment pond shall be maintained until mining has ceased, the site has been completely reclaimed, and the operator has received written permission from ADEM to remove the treatment pond. Accumulated sediments/sludge in the treatment pond will be removed when the pond has lost 60% of their liquid storage capacity due to sedimentation.

9.0 Sediment Control for Haul Roads

The access and haul roads will have a sustained grade of no greater than 10%, with a maximum grade no greater than 15% for 300 feet. The outer slope will be no steeper than 2:1 and will maintain 80% coverage of annual and perennial grasses. Effective BMP's will be installed and maintained at all times.

The roads will be graded with a crown and properly ditched. Also, water bars and wing ditches will be installed where appropriate. Typical designs for these structures are included as part of this plan. There will be no stream crossing at this facility. If it becomes necessary to construct a stream crossing the certified design plans will be submitted to ADEM for their review.

10.0 Location of all Streams Adjacent to Mining Area

The topographic map submitted as part of this plan shows all water bodies. The mining operation will provide a 50-foot minimum buffer zone around streams. Buffer zones will be clearly identified with bright flagging or paint so areas to avoid are visible. Equipment operators are to be educated as to the reason and location of the buffers. If a buffer zone cannot be maintained, ADEM will be contacted regarding construction of a designed berm to protect the stream. There will be no new stream crossings for this permit.

11.0 Non-Point Source Pollution

By virtue of the fact that all disturbed areas are graded such that the drainage will carry sediment to the ponds, non-point sources of pollution are not expected for this project. If any non-point sources arise due to changes in the mining plan or other reasons not known at the time of the plan, and these minor areas of disturbance cannot feasibly be routed to the active pit or sedimentation ponds, then the area will be graded and vegetated with annual and perennial grasses and have effective best management practices installed for the control of the non-point source pollution.

12.0 Public Water Supply Impoundment

This facility will not discharge to a stream segment classified as a Public Water Supply.

13.0 Spill Prevention Control & Countermeasures (SPCC) Plan

Although fuel will be used onsite, it will not be stored on-site; therefore, a SPCC Plan has been developed and is included in Appendix C to the Plan.

14.0 Design Data

Runoff calculations were performed to ensure that the sediment basin provides adequate volume for the proposed mine site while meeting a minimum requirement of 0.25 acre-feet for every acre of disturbed acre. The calculations for the basin volume is summarized in the table below.

Basin No.	Outfall	Disturbed Acres	Minimum Basin Size (ac-ft)	Designed Basin Size (acre)	Designed Basin Average Depth (ft)	Designed Basin Size (ac-ft)
1	001P	9.24	2.31	0.65	10	6.5

The calculations for the treatment structures, outfall pipe and spillway, were performed using the Modified Rational Method. Where Q=C*I*A, and Q = Flow (cubic feet / second); C = Runoff Coefficient (0.30); I = Rainfall Intensity (inches/hr) (3.08 in/hr for a 25-year, 1-hr storm event); and A = Area (acres).

Basin No.	Outfall	Disturbed Acres	C	I (in/hr)	Q (CFS)	Primary Spillway	Secondary Spillway
1	001P	9.24	0.30	3.08	8.538	18"	10' x 1'

15.0 Reclamation Procedure

As mining is completed in an area, the area shall be dressed to eliminate any piles of dirt, or low areas which will hold water, with terraces to keep erosion to a minimum, and grassed. A sump shall be maintained at the low end of all reclamation work until a satisfactory stand of grass is obtained.

During construction and reclamation, erosion control measures such as hay bales, riprap, cleared trees, and other acceptable methods will be utilized as needed to minimize erosion. Disturbed areas without mining activity for more than 21 days are to be temporarily seeded and fertilized.

16.0 Chemicals / Compounds and Potential Toxicity Sources

Other than the use of chemical stabilization (hydro-seeding), which uses non-toxic soil binders to help stabilize disturbed areas of soil, no chemicals, flocculants, or other compounds will be used on this project which could contaminate any nearby watersheds.

17.0 Alabama Surface Mining Commission (ASMC)

No information pertaining to the ASMC is attached or included in this Plan, as this project is only for non-coal mining operations. The ASMC regulates coal mining operations.

18.0 Professional Engineer Certification

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision for this facility utilizing effective, good engineering and pollution control practices and in accordance with the provisions of ADEM Admin Code r. 335-6. If this PAP Plan is properly implemented and maintained by the Permittee, discharges of pollutants can reasonably be expected to be effectively minimized to the maximum extent practicable and according to permit discharge limitations and other permit requirements. The applicant has been advised that appropriate pollution abatement/prevention facilities and structural and nonstructural management practices of Department approved equivalent management practices as detailed in the PAP Plan must be fully implemented and regularly maintained as needed at the facility in accordance with good sediment, erosion , and other pollution control practices, permit requirements, and other ADEM requirements to ensure protection of groundwater and surface water quality.

This certification in no way relieves the owner or operator of the facility of his/her duty to prepare and fully implement this PAP Plan in accordance with the requirements of the ADEM.

Jeremy B. Weant, P.E. _____
Name of Professional Engineer

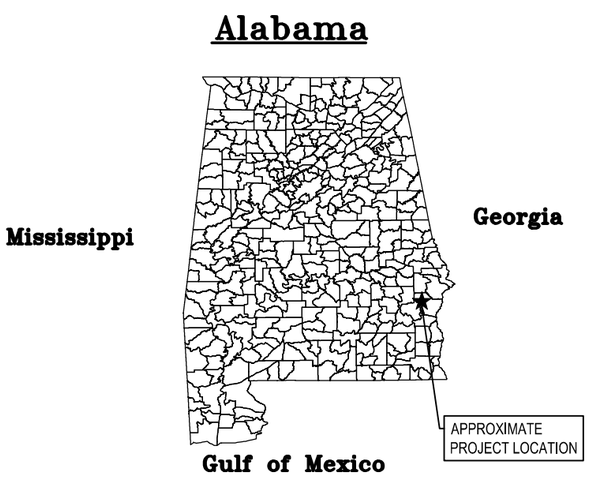
35672
Alabama Professional Engineer License Number

Appendix A
Figures

PREPARED FOR:
MINERAL MANUFACTURING

HUTCHINSON MINE

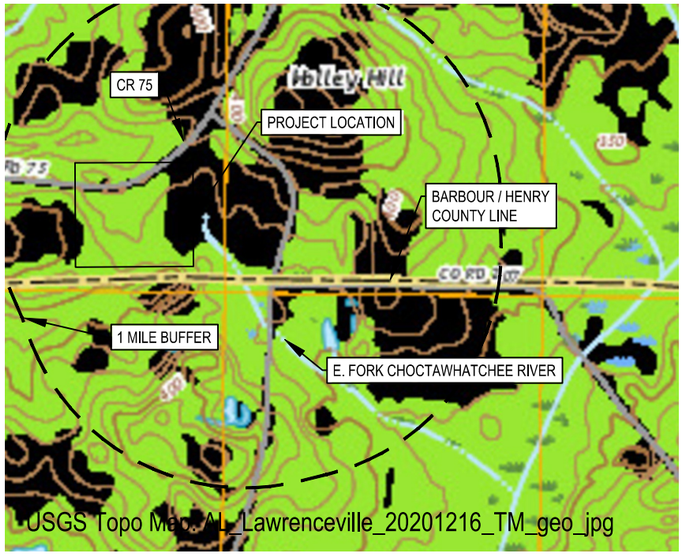
SECTION 33, T-9-N, R-27-E, BARBOUR COUNTY,



PROJECT LOCATION MAP

SOURCE:

SCALE: 1" =2000 @ 11" X 17"
0 500 1000 2000
N



PROJECT VICINITY MAP

SOURCE:

SCALE: 1" =2000 @ 11" X 17"
0 500 1000 2000
N

DRAWING INDEX

THIS ITEM HAS BEEN DIGITALLY SIGNED AND SEALED BY:

TBD

10/17/2024

Date

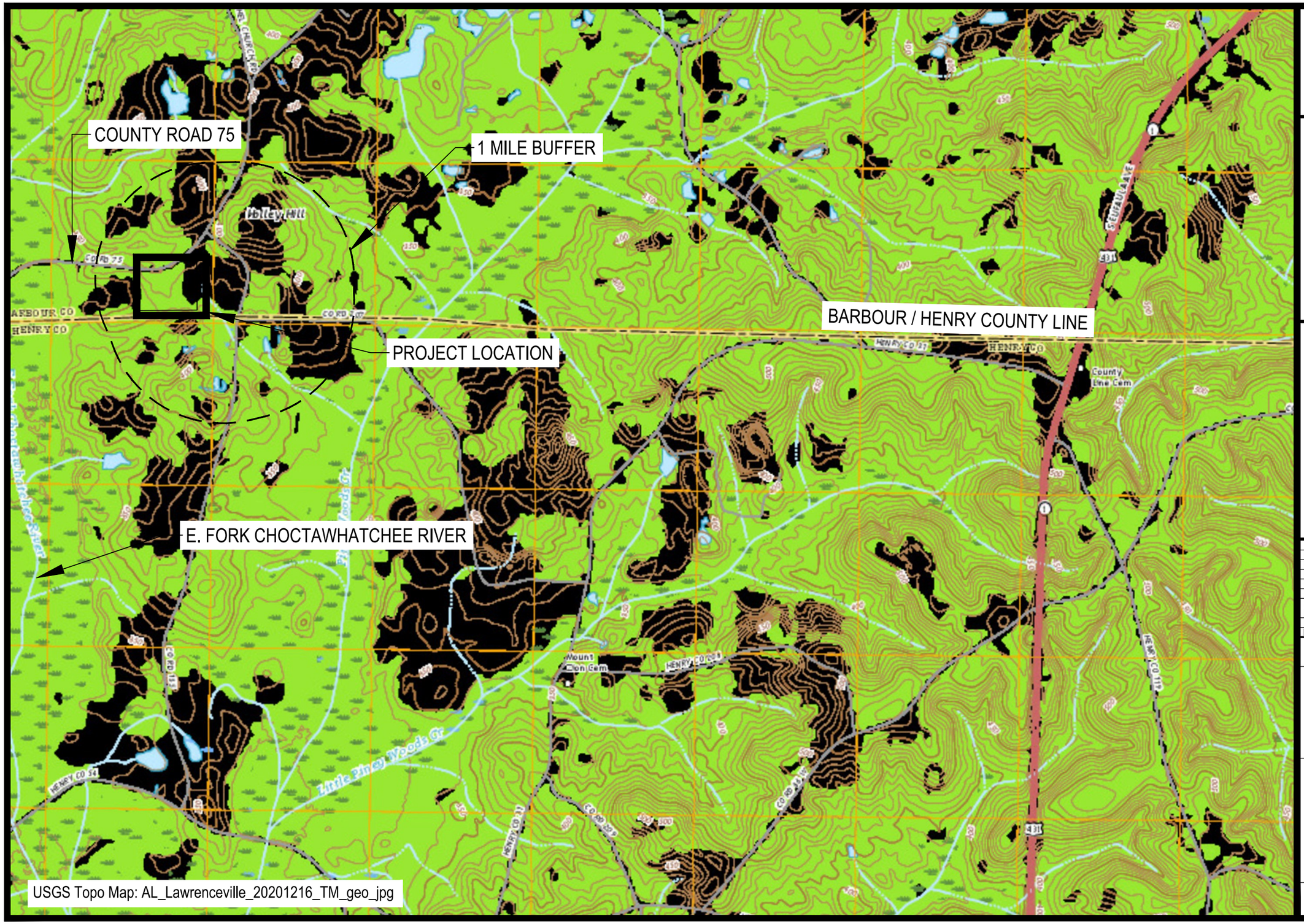
PRINTED COPIES OF THIS DOCUMENT ARE NOT CONSIDERED SIGNED AND SEALED AND THE SIGNATURE MUST BE VERIFIED ON ANY ELECTRONIC COPIES.

FOR INFORMATION REGARDING THIS PROJECT CONTACT: Jeremy Weant, jweant@ectinc.com

ADEM PERMIT PLANS

DECEMBER 12, 2024

ECT PROJECT # 240852
PREPARED BY:
ECT Environmental Consulting & Technology, Inc.
1715 N. WESTSHORE BLVD., STE 15
TAMPA, FL, 33607
TELEPHONE: 813 - 289 - 9338



ECT
1715 N, Westshore Blvd., Ste 15
Tampa, FL, 33607
Phone: (813) 289-9338
www.ectinc.com

MINERAL MANUFACTURING HUTCHINSON MINE

ECT PROJECT No.:	240852
DESIGNED BY:	JBW
DRAWN BY:	CBN
CHECKED BY:	JBW
APPROVED BY:	
STATUS: PRELIMINARY DESIGN	12-12-2024
REVISIONS: DESCRIPTION	XX-XX-XXXX

PROJECT LOCATION MAP

SCALE: 1" = 12000 @ 11" X 17"

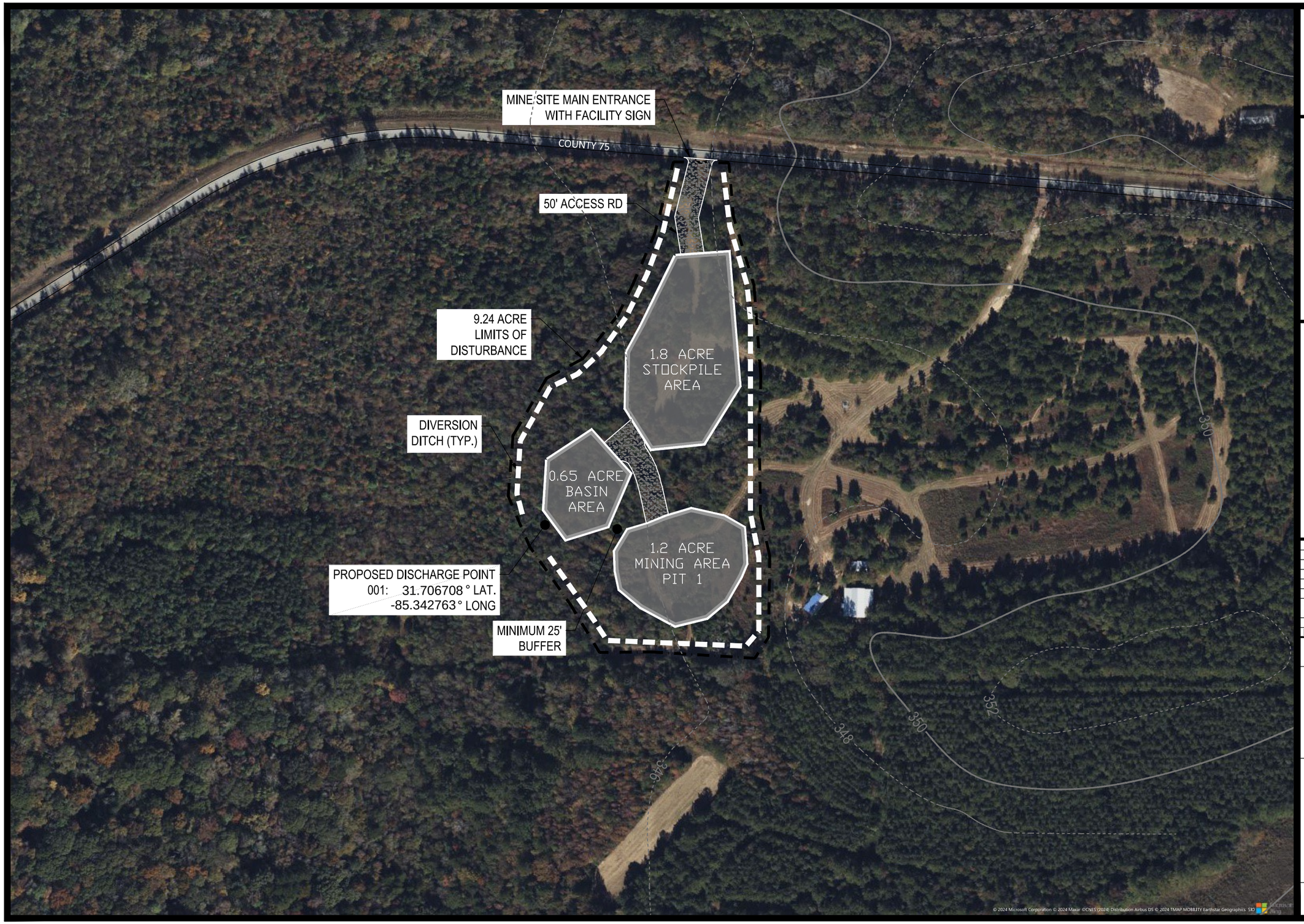
0 6000 12000

N

C1.01

12/13/2024 9:16 AM by Curtis Nordeman

C:\USERS\CNORDEMAN\ONEDRIVE - ECTINC.COM\DOCUMENTS\PROJECTS\240852-HUTCHINSON MINE\3_DATA\CAD\COVER.DWG



ECT
1715 N, Westshore Blvd., Ste 15
Tampa, FL, 33607
Phone: (813) 289-9338
www.ectinc.com

MINERAL MANUFACTURING HUTCHINSON MINE

ECT PROJECT No.:	240852
DESIGNED BY:	JBW
DRAWN BY:	CBN
CHECKED BY:	JBW
APPROVED BY:	
STATUS:	
PRELIMINARY DESIGN	12-12-2024
REVISIONS:	
DESCRIPTION	XX-XX-XXXX

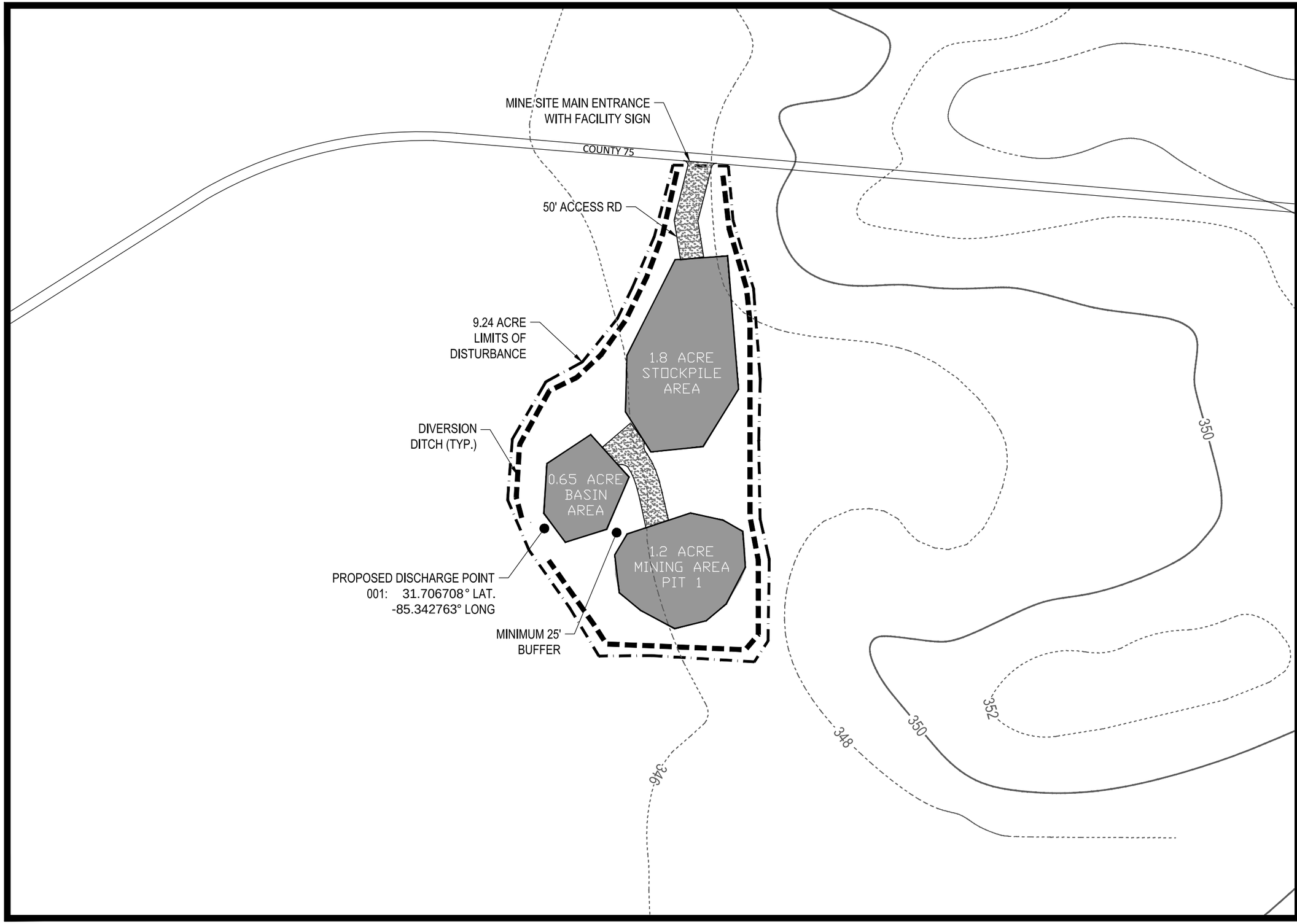
PROJECT OVERVIEW (AERIAL)

SCALE: 1" = 200
@ 11" X 17"
0 50 100 200

C1.02

12/12/2024 11:13 PM by Curtis Nordeman

C:\USERS\CNORDEMAN\ONEDRIVE - ECTINC.COM\DOCUMENTS\PROJECTS\240852-HUTCHINSON MINE\3_DATA\CAD\HUTCHINSON-MINE_SHEETS.DWG



ECT
1715 N, Westshore Blvd., Ste 15
Tampa, FL, 33607
Phone: (813) 289-9338
www.ectinc.com

MINERAL MANUFACTURING HUTCHINSON MINE

ECT PROJECT No.:	240852
DESIGNED BY:	JBW
DRAWN BY:	CBN
CHECKED BY:	JBW
APPROVED BY:	
STATUS:	
PRELIMINARY DESIGN	12-12-2024
REVISIONS:	
DESCRIPTION	XX-XX-XXXX

PROJECT OVERVIEW (PLAN)

SCALE: 1" = 200
@ 11" X 17"

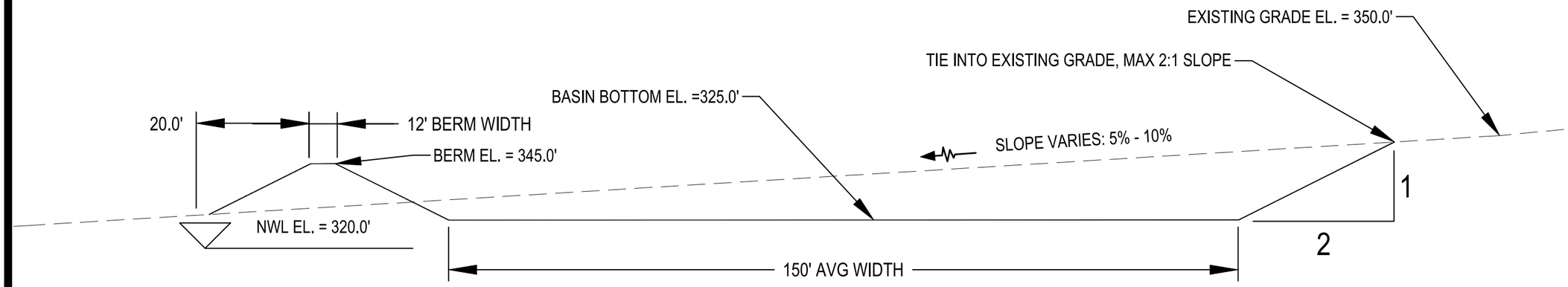
0 50 100 200

N

C1.03

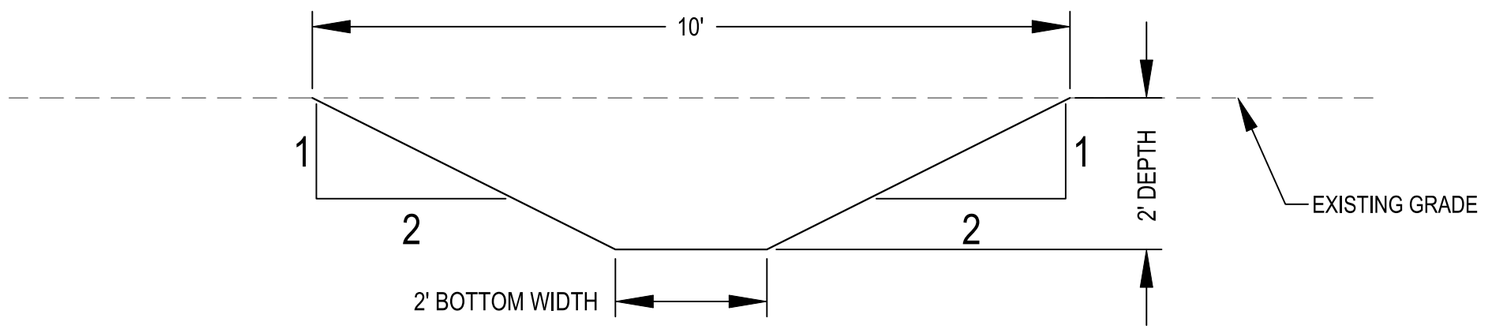
12/12/2024 11:13 PM by Curtis Nordeman

C:\USERS\CNORDEMAN\ONEDRIVE - ECTINC.COM\DOCUMENTS\PROJECTS\240852-HUTCHINSON MINE\3_DATA\CAD\HUTCHINSON-MINE_SHEETS.DWG



BASIN SECTION DETAIL

SCALE: 1" = 20'
@ 11" X 17"
0 10 20



TYPICAL DIVERSION DITCH SECTION

SCALE: 1" = 2'
@ 11" X 17"
0 1 2

ECT
1715 N, Westshore Blvd., Ste 15
Tampa, FL, 33607
Phone: (813) 289-9338
www.ectinc.com

MINERAL MANUFACTURING HUTCHINSON MINE

ECT PROJECT No.:	240852
DESIGNED BY:	JBW
DRAWN BY:	CBN
CHECKED BY:	JBW
APPROVED BY:	
STATUS:	
PRELIMINARY DESIGN	12-12-2024
REVISIONS:	
DESCRIPTION	XX-XX-XXXX

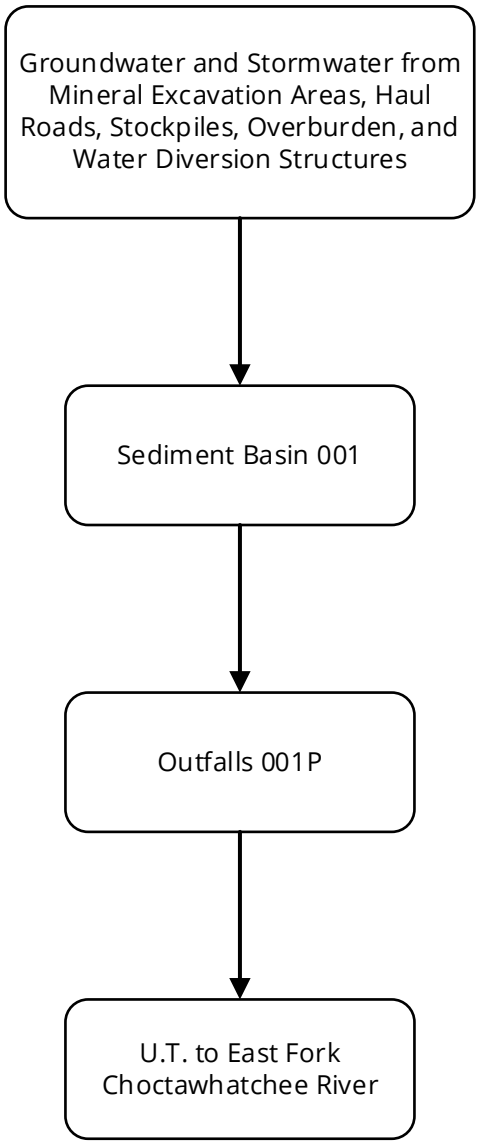
TYPICAL DETAILS

N

C1.04

Appendix B
Schematic Flow Diagram

SCHEMATIC DIAGRAM FOR MMC-HUTCHINSON PIT BAUXITE CLAY MINING OPERATION



Appendix C
SPCC Plan

Spill Prevention Control and Countermeasure Plan
Mineral Manufacturing Corporation – Hutchinson Pit
Located in Section 33, T-9-N, R-27-E, Barbour County, Alabama

This is to certify that I, Jeremy B. Weant, a Registered Professional Engineer in the State of Alabama, am familiar with the Mineral Manufacturing Corporation, Hutchinson Pit, located in Barbour County, Alabama, and, to the best of my knowledge, all information herein is true and accurate, and the Spill Prevention Control and Countermeasure Plan has been prepared in accordance with good engineering practices.

Jeremy B. Weant, P.E.
Name of Professional Engineer

35672
Alabama Professional Engineer License Number

This plan has been reviewed by the management of Mineral Manufacturing Corporation, and hereby adopt this SPCC Plan into the operation of the facility and the Hutchinson Pit, in Barbour County, Alabama.

_____ _____

T. Ryan Reed
Vice President

Date

Spill Prevention Control and Countermeasure Plan
Mineral Manufacturing Corporation – Hutchinson Pit
Located in Section 33, T-9-N, R-27-E, Barbour County, Alabama

This is to certify that I, Jeremy B. Weant, a Registered Professional Engineer in the State of Alabama, am familiar with the Mineral Manufacturing Corporation, Hutchinson Pit, located in Barbour County, Alabama, and, to the best of my knowledge, all information herein is true and accurate, and the Spill Prevention Control and Countermeasure Plan has been prepared in accordance with good engineering practices.

Jeremy B. Weant, P.E.
Name of Professional Engineer

35672
Alabama Professional Engineer License Number

This plan has been reviewed by the management of Mineral Manufacturing Corporation, and hereby adopt this SPCC Plan into the operation of the facility and the Hutchinson Pit, in Barbour County, Alabama.

T. Ryan Reed
Vice President

Dec. 21, 2024
Date

Spill Prevention Control and Countermeasure Plan
Mineral Manufacturing Corporation – Hutchinson Pit
Located in Section 33, T-9-N, R-27-E, Barbour County, Alabama

Responsible Official:

T. Ryan Reed
50 Harbison Walker Rd.
Eufaula, AL 36027
814-599-2230

Mining Manager & Facility Contact:

Chris Dasinger
334-618-2713

1. This facility has never experienced a spill from the fuel tank.

2. The only fuel onsite is a portable 1,000-gallon diesel fuel tank. The tank is trailer-mounted and is transported to different locations. The tank will not be stored onsite and will only be onsite during times of fueling equipment. If any spill should occur, ADEM and other agencies would be notified immediately, and the contaminated soils will be treated according to ADEM regulations.

3. The receiving water is an Unnamed Tributary to the East Fork Choctawhatchee River. The distance to this waterway varies depending on the location of the tank within the site.

4. Should a spill occur, the polluted soil in the area would be excavated and disposed of in accordance with State and Federal regulations.

5. A written record shall be maintained by the Site Supervisor, or any spills that occur, the actions taken to dispose of all spilled material and the cleanup procedures.

6. The Site Supervisor will make periodic inspections of the refueling area to detect signs of minor spills. If evidence of spills is noted, the polluted soil will be disposed of properly.

7. All personnel involved in the use of fuel, maintenance of the facility, or responsible for storm water drainage and spill cleanup will be familiar with this Plan.

8. Potential Sources of Spills:

    a. Tank or Tank Valve Rupture:
    Prevention: Properly maintain tanks and keep in good condition. Visually inspect tanks periodically for leaks

    b. Tank Overfill:
    Prevention: Personnel should follow correct operating procedures when refueling tanks with diesel fuel and always stay with equipment during refueling operations. Key personnel should always know when the tank is onsite.
    c. Hose rupture during refueling and spillage from hoses after disconnection:
    Prevention: Periodic inspection of transport unloading hoses, the replacement of hoses as necessary, and the use of the proper hose drainage procedure.

In the event of a fuel spill, notification should be made to the following:

Emergency Management Agency	1-800-843-0699
National Response Center	1-800-424-8802
ADEM	1-334-271-7700

The following information should be included in the initial notification:

1. Name, address, and phone number of person reporting.
2. Exact location of facility and spill.
3. Company name, phone number, and location.
4. Material spilled.
5. Estimated amount spilled.
6. Source of spill.
7. Cause of spill.
8. Nearest down-stream body of water to receive spill.
9. Actions taken for containment and cleanup.

The employees of Mineral Manufacturing recognize that this Plan is to minimize contamination of public water by the spills of diesel fuel in or adjacent to public water, and to provide a reporting procedure to be followed by site personnel in reporting such spills.

Appendix D
Typical BMPs

Table of Contents

Construction Exit Pad (CEP)

Practice Description

A construction exit pad is a stone base pad or manufactured product designed to provide a buffer area where mud and caked soil can be removed from the tires of construction vehicles to avoid transporting it onto public roads. This practice applies anywhere traffic will be leaving a construction site and move directly onto a public road or street.

Planning Considerations

Roads and streets adjacent to construction sites should be kept clean for the general safety and welfare of the public. A construction exit pad (Figure CEP-1) should be provided where mud can be removed from construction vehicle tires before they enter a public road.

Where possible the construction exit pad should be located and constructed at a site where surface runoff from the pad will not transport sediment from the pad off the site. If the pad slope toward the road exceeds 2%, a diversion ridge 6” to 8” high with 3:1 side slopes should be constructed across the foundation approximately 15 feet from the entrance. This diversion ridge should divert surface runoff from the pad away from the road and into a sediment trap or basin.

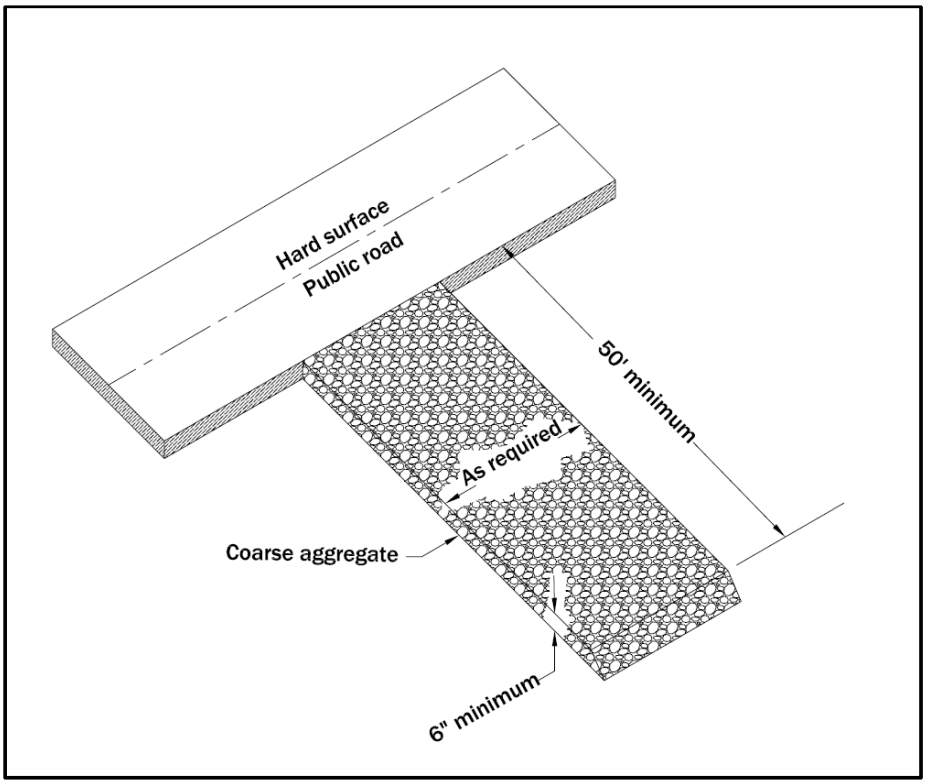


Figure CEP-1 Gravel Construction Exit

If the action of the vehicle traveling over the gravel pad does not sufficiently remove the mud or if the site is in a particularly sensitive area, a washing facility should be included with the pad (Figure CEP-2). When a washing facility is required all wash water shall be diverted to a sediment trap or basin.

If the construction exit pad is located in an area with soils that will not support traffic when wet, an under liner of geotextile will be required to provide stability to the pad.

Construction of stabilized roads throughout the development site should be considered to lessen the amount of mud transported by vehicular traffic. The construction exit pad should be located to provide for maximum use by construction vehicles.

Consideration should be given to limiting construction vehicles to only one ingress and egress point. Measures may be necessary to make existing traffic use the construction exit pad.

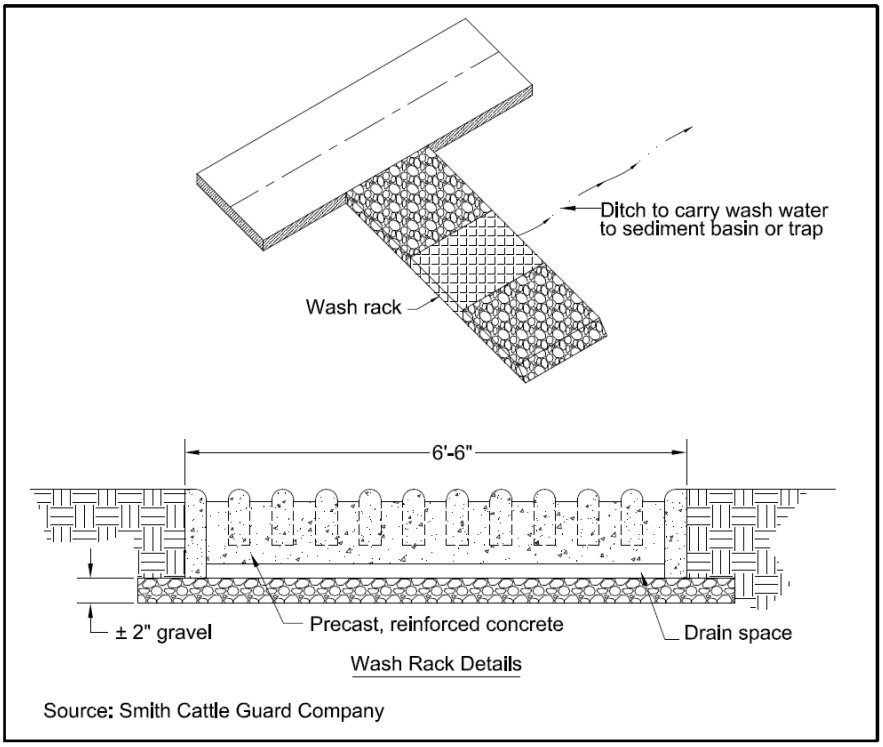


Figure CEP-2 Construction Exit with Wash Rack

Design Criteria

Aggregate size

Aggregate should be Alabama Department of Transportation coarse aggregate gradation No.1.

Pad Thickness

The exit pad shall have a minimum aggregate thickness of 6”.

Geotextiles

A non-woven geotextile shall be placed underneath the aggregate. The geotextile shall be of the strength and durability required for the project to ensure the aggregate and soil base are stable. Generally, the non-woven geotextile should meet the requirements for a Class 2 geotextile used for separation that is found in the current version of AASHTO M288.

Pad Length

The exit pad should provide for entering and parking the longest anticipated construction vehicles. A pad is typically 50 feet long, but the required length may be longer or shorter.

Pad Width

The exit pad width is typically 20 feet but may be narrower or wider to equal the full width of the vehicular egress.

Washing

A washing facility shall be provided if necessary to prevent mud and caked soil from being transported to public streets and highways. It shall be constructed of concrete, stone, and/or other durable materials. Provisions shall be provided for the mud and other material to be carried away from the washing facility to a sediment trap or basin to allow for settlement of the sediment from the runoff before it is released from the site.

Chemical Stabilization (CHS)

Photo courtesy of Sunshine Supplies, Inc.

Practice Description

Chemical Stabilization erosion control involves the use of products, including soil binders that help to hold the soil in place, thereby reducing soil particle detachment and short-term erosion caused by water and wind. Water-soluble polyacrylamide (PAM) is often used for this purpose. Other products may also provide this benefit. The products are typically applied with temporary seeding and or mulching on areas where the timely establishment of temporary erosion control is so critical that seeding and mulching need additional reinforcement.

Planning Considerations

Chemical Stabilization products for surface stabilization are available in different formulations and should be used in combination with other Best Management Practices. The use of seed and mulch should be considered for providing erosion protection beyond the life of the chemical or soil binder. If the area where Chemical Stabilization products have been applied is disturbed, the application will need to be repeated.

Following are additional considerations to enhance the use of or avoid problems:

- Use recommended setbacks (Buffer Zone) when applying near natural water bodies.
- Application delays between product mixing and application as well as ultraviolent light exposure may decrease the performance of some products.

- Products are generally not effective in concentrated flow areas.
- Seeded areas will also need mulch.
- It is important to closely follow manufacturer's recommendations on application procedures.
- Do not use products in a way that will be toxic to aquatic organisms.
- Requests to use products not approved for Chemical Stabilization on permitted sites should be made to the state environmental agency.
- Erosion control effectiveness decreases with rainfall/runoff events.

Design Criteria

Application rates shall conform to manufacturer's guidelines for application.

The following specific criteria shall be followed:

- Chemical mixtures shall be environmentally benign, harmless to fish, wildlife, and plants, and shall be non-combustible.
- Users of chemical stabilization products shall follow all Material Safety Data Sheet requirements and manufacturer's recommendations. In the case of PAM, the use of a specific product should be based on the jar test with soil from the site and there should be appropriate measures at the site to ensure that PAM is not carried in stormwater emptying directly into natural waterbodies. This means that runoff should be flowing to settling sites such as sediment basins or sediment traps or be flowing over sites such as filter strips, straw or matting that serves as a collection site for the sediments.
- Additives such as fertilizers, solubility promoters or inhibitors, etc. to chemical stabilization products shall be non-toxic.
- The manufacturer or supplier shall provide written application methods. The application method shall ensure uniform coverage to the target and avoid drift to non-target areas including waters of the state. The manufacturer or supplier shall also provide written instructions to ensure proper safety, storage, and mixing of the product.

Erosion Control Blanket (ECB)

Photo courtesy of Sunshine Supplies, Inc.

Practice Description

Erosion Control Blanket is a practice using a rolled erosion control product (RECP) composed of processed natural or polymer fibers (straw, jute, wood paper or cotton, plastic, nylon) mechanically, structurally, or chemically bound together to form a continuous matrix used to provide erosion control and most often facilitates vegetation establishment. This practice is best utilized on slopes and channels where the erosion hazard is high, and plant growth is likely to be too slow to provide adequate protective cover. Erosion control blankets are typically used as an alternative to mulching but can also be used to provide structural erosion protection.

Planning Considerations

Care must be taken to choose the type of blanket that is most appropriate for the specific project needs. Some important factors in the choice of a blanket are soil conditions, steepness of slope, length of slope, type and duration of protection required to establish desired vegetation, and probable sheer stress. Eighteen types of erosion control blankets are included in this practice and the type names and related information are from the materials developed by the Erosion Control Technology Council (ECTC). Manufacturer's instructions and recommendations, as well as a site visit by the qualified design professional and site plan reviewer are highly recommended to determine a product's appropriateness. When possible, consider the use of wildlife friendly netting.

Note: The Alabama Department of Transportation (ALDOT) identifies Rolled and Hydraulic Erosion Control Products based on performance. Description of ALDOT types can be found in Section 659 of their Standard Specifications for Highway Construction. ALDOT recognizes some Hydraulic Erosion Control Products equal in performance to Rolled Products.

Temporary Erosion Control Blankets

Benefits of using temporary erosion control blankets include the following:

- Protection of the seed and soil from raindrop impact and subsequent displacement.
- Thermal consistency and moisture retention for the seedbed area.
- Stronger and faster germination of grasses and legumes.
- Spreading stormwater runoff to prevent rill erosion of slopes.
- Prevention of sloughing of topsoil added to steeper slopes.

Because temporary blankets will deteriorate in a short period of time, they provide no enduring reduction in erosion potential.

Permanent Erosion Control Blankets

Permanent erosion control blankets are also known as permanent soil reinforcing mats or turf reinforcement mats (TRMs). Roots penetrate and become entangled in the matrix, forming a continuous anchorage for surface growth, and promoting enhanced energy dissipation.

Benefits of using permanent erosion control blankets, in addition to the benefits gained from using a temporary blanket include the following:

- Sediment from stormwater flows is deposited in the matrix providing a fine soil growth medium for the development of roots.
- In stormwater channels, blankets and the vegetative root system form an erosion resistant cover which resists hydraulic uplift and shear forces of channel flows.

Design Criteria

General

All blankets shall be nontoxic to vegetation and to the germination of seed and shall not be injurious to the unprotected skin of humans. Erosion control products shall be of sufficient strength to hold the prepared ground and, if applicable, cover material (mulch, sod, etc.) in place until an acceptable growth of natural or planted material is established. Erosion control products shall be identified by a type designation (Type 1.A, 2.B, 3.A, etc.) where the type is based on the functional

longevity and physical properties of the product. Type 1 products have a 3-month functional longevity, Type 2 a 12-month, Type 3 a 24-month, Type 4 a 36-month, and Type 5 are Turf Reinforcement Mats for long-term erosion protection.

Tables ECB-1 and ECB-2 give typical applications of the different types of erosion control blankets. ECTC's recommended installation guide and standard specifications can be found on their website and at the following link: https://www.ectc.org/toolbox

Table ECB-1 Temporary Erosion Control Blanket Types and Applications

Functional Longevity	Type	Application
3-Month	1.A	A Netting / Open Weave Textile for use on a maximum slope steepness of 5:1 and provides a shear stress of at least 1.0 lbs/ft^2.
3-Month	1.B	A Netless Rolled Erosion Control Blanket for use on a maximum slope steepness of 3:1 and provides a shear stress of at least 1.0 lbs/ft^2.
3-Month	1.C	A Single-Net Erosion Control Blanket for use on a maximum slope steepness of 3:1 and provides a shear stress of at least 1.5 lbs/ft^2.
3-Month	1.D	A Double-Net Erosion Control Blanket for use on a maximum slope steepness of 2:1 and provides a shear stress of at least 1.75 lbs/ft^2.
12-Month	2.A	A Netting / Open Weave Textile for use on a maximum slope steepness of 5:1 and provides a shear stress of at least 1.0 lbs/ft^2.
12-Month	2.B	A Netless Rolled Erosion Control Blanket for use on a maximum slope steepness of 3:1 and provides a shear stress of at least 1.0 lbs/ft^2.
12-Month	2.C	A Single-Net Erosion Control Blanket for use on a maximum slope steepness of 3:1 and provides a shear stress of at least 1.5 lbs/ft^2.
12-Month	2.D	A Double-Net Erosion Control Blanket for use on a maximum slope steepness of 2:1 and provides a shear stress of at least 1.75 lbs/ft^2.
24-Month	3.A	An Open Weave Textile for use on a maximum slope steepness of 2:1 and provides a shear stress of at least 2.0 lbs/ft^2.
24-Month	3.B	An Erosion Control Blanket for use on a maximum slope steepness of 1.5:1 and provides a shear stress of at least 2.0 lbs/ft^2.
36-Month	4.A	An Open Weave Textile for use on a maximum slope steepness of 1:1 and provides a shear stress of at least 2.25 lbs/ft^2.
36-Month	4.B	An Erosion Control Blanket for use on a maximum slope steepness of 1:1 and provides a shear stress of at least 2.25 lbs/ft^2.

Table ECB-2 Turf Reinforcement Mats (TRMs) Types and Applications

Type	Application
5.A	A TRM designed for use on geotechnically stable slopes up to 1:1, provide an unvegetated shear stress of at least 2.0 lbs/ft^2, and a vegetated shear stress of at least 6.0 lbs/ft^2.
5.B	A TRM designed for use on geotechnically stable slopes up to 1:1, provide an unvegetated shear stress of at least 2.0 lbs/ft^2, and a vegetated shear stress of at least 8.0 lbs/ft^2.
5.C	A TRM designed for use on geotechnically stable slopes up to 0.5:1, provide an unvegetated shear stress of at least 2.0 lbs/ft^2, and a vegetated shear stress of at least 10.0 lbs/ft^2.
5.D	A TRM designed for use on geotechnically stable slopes up to 0.5:1, provide an unvegetated shear stress of at least 2.0 lbs/ft^2, and a vegetated shear stress of at least 12.0 lbs/ft^2.
5.E	A TRM designed for use on geotechnically stable slopes up to 0.5:1, provide an unvegetated shear stress of at least 2.0 lbs/ft^2, and a vegetated shear stress of at least 12.0 lbs/ft^2.
5.F	A High Performance TRM designed for use on geotechnically stable slopes up to 1:1, provide an unvegetated shear stress of at least 2.0 lbs/ft^2, and a vegetated shear stress of at least 14.0 lbs/ft^2.

Type Designations and Materials

Erosion control products shall be composed of the materials shown in Tables ECB-3 and ECB-4.

Table ECB-3 Material Composition of Temporary Erosion Control Blankets

Type	Material Composition
1.A	A photodegradable synthetic mesh or woven biodegradable natural fiber netting.
1.B	Natural and/or polymer fibers mechanically interlocked and/or chemically adhered together to form an RECP.
1.C	Processed degradable natural and/or polymer fibers mechanically bound together by a single rapidly degrading, synthetic or natural fiber netting.
1.D	Processed degradable natural and/or polymer fibers mechanically bound together between two rapidly degrading, synthetic or natural fiber nettings.
2.A	A photodegradable synthetic mesh or woven biodegradable natural fiber netting.
2.B	Natural and/or polymer fibers mechanically interlocked and/or chemically adhered together to form an RECP.
2.C	Processed degradable natural and/or polymer fibers mechanically bound together by a single degrading, synthetic or natural fiber netting.
2.D	Processed degradable natural and/or polymer fibers mechanically bound together between two degradable, synthetic, or natural fiber nettings.
3.A	An open weave textile composed of processed slow degrading natural or polymer yarns or twines woven into a continuous matrix.
3.B	An erosion control blanket composed of processed slow degrading natural or polymer fibers mechanically bound together between two slow degrading synthetic or natural fiber nettings to form a continuous matrix.
4.A	An open weave textile composed of processed slow degrading natural or polymer yarns or twines woven into a continuous matrix.
4.B	An erosion control blanket composed of processed slow degrading natural or polymer fibers mechanically bound together between two slow degrading synthetic or natural fiber nettings to form a continuous matrix.

Table ECB-4 Material Composition of Turf Reinforcement Mats

Type	Material Composition
5.A 5.B 5.C 5.D 5.E	A product composed of UV-stabilized non-degradable synthetic fibers, filaments, nets, wire mesh and/or other elements, processed into a permanent, three- dimensional matrix which may be supplemented with degradable components.
5.F	A product composed of UV-stabilized, non-degradable, synthetic fibers, filaments, nets, wire mesh and/or other elements, processed into a permanent, three- dimensional matrix for highest performance.

Materials Physical Requirements

A properly designed erosion control blanket installation requires selection of a product manufactured with physical properties to withstand the stresses the product will be subjected to for the design life of the product. Refer to the ECTC standard specifications for the minimum physical requirements for each type of blanket.

Product Placement

General. Refer to the ECTC Installation Guide for the general guidelines for the installation of rolled erosion control products (RECPs); however, the ECTC guidelines do not supersede the manufacturer's installation guidelines.

Prior to installation of a RECP, the surface on which it is to be placed must be properly prepared. The surface should be stable and firm, the top soil should be evenly spread if specified, and the soil amendments added. The soil pH in the root zone and soil compaction MUST be addressed for long-term vegetal success. Fertilizer and lime applications per soil test recommendations should always be incorporated into the soil surface whenever possible. Some RECPs may require an application of mulch prior to placement of the blanket. Some TRMs may require soil or hydraulically-applied matrix in-filling after placement of the blanket. For soil in-filling, some of the soil amendment and the seed should be applied to the soil in-fill and lightly brushed or raked in to cover the seed.

Blankets shall be rolled out in the direction of flow to reduce rill erosion. The RECP should always have intimate contact with the soil surface over the entire installation. Do not stretch the RECP over surface irregularities.

For temporary blankets, staples should be U-shaped wire with an 11-gauge thickness or greater. Staples should be of sufficient thickness for soil penetration without undue distortion. The legs of the staples shall be at least 6" long with a crown of 1". Appropriate biodegradable staples can be used in lieu of wire staples.

Permanent blankets shall be anchored in one of two ways. Blankets can be anchored using sound wood stakes, 1" by 3" stock sawn in a triangular shape. The length of the stakes shall be from 12" to 18" depending upon the soil compaction at the site. Stakes shall be installed on 4 feet centers along each edge of the blanket. Blankets can also be anchored using U shaped staples of 11-gauge steel or greater with a minimum leg length of 8" and a 2" crown.

Upslope Anchor. The upslope portion of the RECP should be properly anchored. There are several different techniques that can be used. Always refer to the manufacturer's or the ECTC installation guidelines for the proper technique.

Seams. Edges of the RECP should be properly secured to adjacent blankets. There are several different techniques used to prevent seam or abutted rolls from separating. Always refer to the manufacturer's or the ECTC installation guidelines for the proper technique.

Terminal Ends. RECP should be securely fastened at the terminal end of the blanket. Always refer to the manufacturer's or the ECTC installation guidelines for the proper technique.

Slopes. RECP should be securely fastened to the soil by installing stakes/staples at a minimum rate of 1.3/yd^2 within the body of the blanket. Always refer to the manufacturer's or the ECTC installation guidelines for the proper technique.

Channels. Always follow manufacturer's or ECTC guidelines for anchor trenches or stake/staple check slots, seaming, and terminal end anchoring. Unroll RECPs down the center of the channel in the primary water flow direction. Securely fasten all RECPs to the soil by installing stakes/staples at a minimum rate of 1.7/yd^2. Significantly higher anchor rates and longer stakes/stapes may be necessary in sandy, loose, or wet soil and in severe applications. Always refer to the manufacturer's or the ECTC installation guidelines for the proper technique for staking/stapling.

Figure ECB-1 RECP Slope Installation.
Photo courtesy of John Slupecki.

Figure ECB-2 Topsoil “In-Fill” Being Placed in TRM.

Figure ECB-3 TRM in the Middle of a Swale.

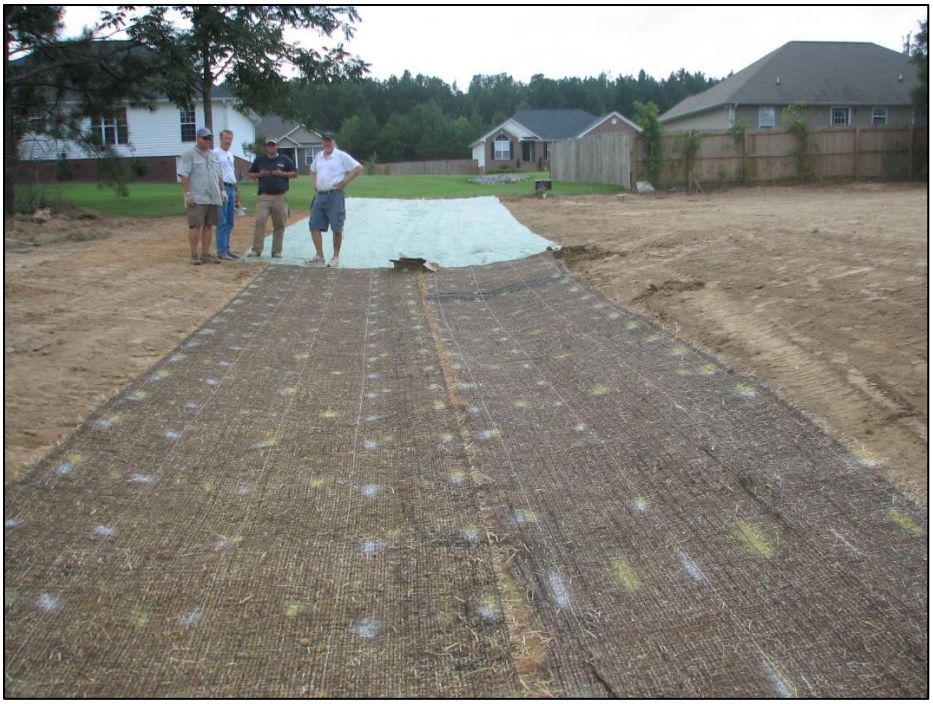


Figure ECB-4 TRM with Pre-Marked Stapling Pattern.

Mulching (MU)

Practice Description

Mulching is the application of plant residues such as straw or other suitable materials to the soil surface to minimize erosion. Mulching is used to support permanent and temporary seeding and, also, to provide short-term cover without seeding.

Planning Considerations

Surface mulch is the most effective, practical means of controlling runoff and erosion on disturbed land prior to vegetation establishment. Mulch absorbs the energy associated with raindrops and thereby minimizes soil particle detachment, which is the initial step of erosion.

Mulch also reduces soil moisture loss by evaporation, prevents crusting and sealing of the soil surface, moderates soil temperatures, and provides a suitable microclimate for seed germination.

Organic mulches such as straw, wood chips and shredded bark have been found to be very effective mulch materials. Materials containing weed and grass seeds which may compete with establishing vegetation should not be used. Also, decomposition of some wood products can tie up significant amounts of soil nitrogen, making it necessary to modify fertilization rates or add fertilizer with the mulch.

Hydraulic Erosion Control Products (HECPs) as defined by the Erosion Control Technology Council (ECTC) can also be used as effective mulch applications. HECPs are designated as 5 different types based on product characteristics and performance. Information from the ECTC table dated April 2014 is provided as Table MU-1. To ensure that you use the most valid information refer to the latest HECP specifications provided by the ECTC or the manufacturer's recommendation. The Alabama Department of Transportation characterizes mulches based on performance levels identified in Sections 656 and 659 of their Standard Specifications for Highway Construction.

The choice of materials for mulching should be based on soil conditions, season, type of vegetation to establish, and size of the area. Properly applied and tacked mulch is always beneficial. Mulching is especially important when conditions of germination are not optimum, such as midsummer and early winter, and on difficult sites such as cut slopes, fill slopes and droughty soils.

Straw has traditionally been the most commonly used mulching material in conjunction with seeding. Wheat straw is the mostly commonly used straw and can be spread by hand or with a mulch blower. If the site is susceptible to blowing wind, the straw should be tacked down with a tackifier, or a crimper to prevent loss.

Wood chips are suitable for areas that will not be closely mowed, and around ornamental plantings. Chips do not require tacking. Because they decompose slowly, they must be treated with 12 pounds of nitrogen per ton to prevent nutrient deficiency in plants. This can be an inexpensive mulch if the chips are obtained from trees cleared on the site.

Compost, peanut hulls, and pine straw are organic materials that potentially make excellent mulches but may only be available locally or seasonally. Creative use of these materials may reduce costs.

Jute mesh or the various types of netting is very effective in holding mulch in place on waterways and slopes before grasses become established. Always consider the use of wildlife friendly netting products.

Erosion control blankets promote seedling growth in the same way as organic mulches and are suited for use in areas with concentrated flows (see Erosion Control Blanket practice).

Table MU-1 Hydraulic Erosion Control Products (HECP) Specification Chart [1]

Hydraulic Erosion Control							
Type HECP[2]	Term	Functional Longevity[3]	Typical Application Rates Lbs/acre (kg/ha)	Typical Maximum Slope Gradient (H:V)	Maximum Uninterrupted Slope Length (ft)	Maximum C Factor[4, 5] (3:1 test)	Minimum Vegetation Establishment[6]
1	Ultra Short Term	1 month	1500—2500 (1700—2800)	≤ 5:1	20	0.3	150 %
2	Short Term	2 month	2000—3000 (2250—3400)	≤ 4:1	25	0.2	150 %
3	Moderate Term	3 month	2000—3500 (2250—3900)	≤ 3:1	50	0.1	200 %
4	Extended Term	6 month	2500—4000 (2800—4500)	≤ 2:1	75	0.05	300 %
5	Long Term	12 month	3000—4500 (3400—5100)	≤ 2:1	100	0.02	300 %

[1] This table is for general guidelines only. Refer to manufacturer for application rates, instructions, gradients, maximum continuous slope lengths and other site-specific recommendations.

[2] These categories are independent of rolled erosion control products (RECPs) categories, despite the identical names.

[3] A manufacturer's estimated time period, based upon field observations, that a material can be anticipated to provide erosion control as influenced by it composition and site-specific conditions.

[4] "C" Factor calculated as ratio of soil loss from HECP protected slope (tested at specified or greater gradient, h:v) to ratio of soil loss from unprotected (control) plot based on large-scale testing.

[5] Acceptable large-scale test methods may include ASTM D 6459, or other independent testing deemed acceptable by the engineer.

[6] Minimum vegetation establishment is calculated as outlined in ASTM D 7322 being a percentage by dividing the plant mass per area of the protected plot by the plant mass per area of the control plot.

EROSION CONTROL TECHNOLOGY COUNCIL —WWW.ECTC.ORG

ECTC makes no representations or warranties of any kind express or implied, about the completeness, accuracy, reliability, suitability or availability with respect to the website or the information, products, services, or related graphics contained on the website for any purpose. Any reliance you place on such information is therefore strictly at your own risk.

(Source: Erosion Control Technology Council, April 2, 2014)

Design Criteria

Site Preparation

Before mulching, complete the required site preparation. Site preparation includes grading, if needed, and seedbed preparation and fertilizing, liming and seeding if a planting is being made by means other than hydroseeding.

Spreading the Mulch

Select a mulch material based on the site and practice requirements, availability of material, and availability of labor and equipment. Table MU-2 lists commonly used mulches.

Table MU-2 Mulching Materials and Application Rates

Material	Rate Per Acre and (Per 1000 ft.^{2})	Notes
Straw with Seed	1 ½-2 tons (70 lbs-90 lbs)	Spread by hand or machine to attain 75% groundcover; anchor when subject to blowing.
Straw Alone (no seed)	2 ½-3 tons (115 lbs-160 lbs)	Spread by hand or machine; anchor when subject to blowing.
Wood Chips	5-6 tons (225 lbs-270 lbs)	Treat with 12 lbs. nitrogen/ton.
Bark	35 cubic yards (0.8 cubic yard)	Can apply with mulch blower.
Pine Straw	1-2 tons (45 lbs-90 lbs)	Spread by hand or machine; will not blow like straw.
Peanut Hulls	10-20 tons (450 lbs-900 lbs)	Will wash off slopes. Treat with 12 lbs. nitrogen/ton.
HECPs	0.75 – 2.25 tons (35 lbs – 103 lbs)	Refer to ECTC or Manufacturer's Specifications.

Uniformly spread organic mulches by hand or with a mulch blower at a rate which provides about 75% ground cover. Spread HECPs utilizing appropriate equipment and at rates as specified. When spreading straw mulch by hand, divide the area to be mulched into sections of approximately 1000 sq. ft. and place 70-90 pounds of straw (1 ½ to 2 bales) in each section to facilitate uniform distribution. **Caution:** *An over-application of wheat straw will reduce stand success – do not over-apply wheat straw when mulching a seeding!*

When straw mulch is subject to be blown away by wind, it must be anchored immediately after spreading. It is best anchored with a mulch anchoring tool.

Application of a commercial tackifier through a hydroseeder is often practical for steep slopes and can be effective on most sites. Binders (tackifiers) may be applied after mulch is spread or may be sprayed into the mulch as it is being blown onto the soil. Applying straw and binder together is the most effective

method. Liquid binders include an array of commercially available synthetic binders and organic tackifiers.

In high wind situations like roadways, crimping the mulch is the best alternative as the use of mulch binders may still result in the mulch being rolled up on the edge.

Straw mulch may also be anchored with lightweight plastic, cotton, jute, wire or paper netting which is stapled over the mulch. The manufacturer's recommendations on stapling netting should be followed. Consider the use of wildlife friendly netting.

Maintenance

Inspect all mulches periodically, and after rainstorms to check for rill erosion, dislocation, or failure. Where erosion is observed, apply additional mulch or if washout has occurred, repair the slope grade, reseed, and reinstall mulch. Continue inspections until vegetation is firmly established.

Permanent Seeding (PS)

Practice Description

Permanent seeding is the establishment of perennial vegetation from seed. This practice is used when vegetation is desired and appropriate to permanently stabilize the soil.

Planning Considerations

The advantages of seeding over other means of establishing plants include the smaller initial cost, lower labor input, and greater flexibility of method.

Disadvantages of seeding include potential for erosion during the establishment stage, seasonal limitations on suitable seeding dates, and weather-related problems such as droughts.

The probability of successful plant establishment can be maximized through good planning. The selection of plants for permanent vegetation should be site specific and based on plant characteristics, wear and mowing tolerance, soil conditions, time of year of planting, method of planting, the intended use, and management requirement of the vegetated area. Climate factors can vary widely in Alabama. Important plant attributes are discussed in Vegetation Establishment for Erosion and Sediment Control in Chapter 2. Other factors that may be important are wear, mowing tolerance, and salt tolerance of vegetation.

Plant selection may include companion plants to provide quick cover on difficult sites, late seedings, or where the desired permanent cover may be slow to

establish. Annuals are usually used for companion plants and should be selected carefully to prevent using a species that provide so much competition that it prevents the establishment of the desired species.

Seeding properly carried out within the optimum planting dates has a higher probability of success. It is also possible to have satisfactory establishment when seeding outside these dates. However, as plantings are deviated from the optimum dates, the probability of failure increases rapidly. Seeding dates should be taken into account in scheduling land-disturbing activities.

Site quality impacts both short-term and long-term plant success. Sites that have compacted soils, soils that are shallow to rock or have textures that are too clayey or too sandy should be modified whenever practical to improve the potential for plant growth and long-term cover success.

The operation of equipment is restricted on slopes steeper than 3:1, severely limiting the quality of the seedbed that can be prepared. Provisions for establishment of vegetation on steep slopes can be made during final grading. In construction of fill slopes, for example, the last 4-6” might not be compacted. A loose, rough seedbed with irregularities that hold seeds and lime and fertilizer is essential for hydroseeding. Cut slopes should be roughened (see Land Grading practice).

Appropriate mulching is critical to protect against erosion on steep slopes. When using straw, anchor with netting or asphalt. On slopes steeper than 3:1, rolled erosion control products or hydraulic erosion control products are usually needed.

The use of irrigation (temporary or permanent) will greatly improve the success of vegetation establishment.

Design Criteria

Plant Selection

Select plants that can be expected to meet planting objectives. To simplify plant selection, use Figure PS-1 Geographical Areas for Species Adaptation and Seeding Dates and Table PS-1, Commonly Used Plants for Permanent Cover. Mixtures commonly specified by the Alabama Department of Transportation are an appropriate alternative for plantings on rights-of-ways. Additional information related to plants commonly used in Alabama is found in Chapter 2 under the section Vegetation for Erosion and Sediment Control.

The plants used for temporary vegetation may be used for companion plants provided the seeding rate of the annual species is reduced by one half. See the Temporary Seeding practice for additional information on establishing temporary vegetation. **Ryegrass or other highly competitive plants should not be used as a companion plant with a permanent seeding**.

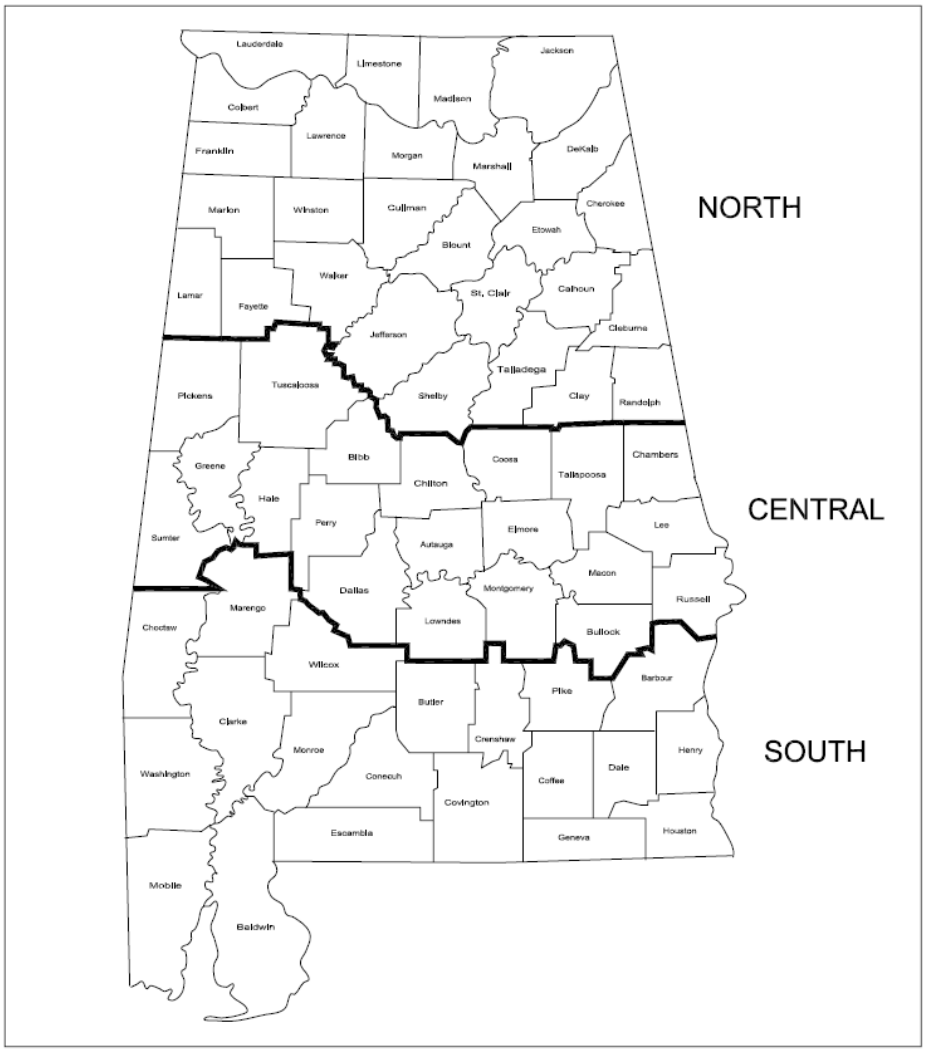


Figure PS-1 Geographical Areas for Species Adaptation and Seeding Dates

Note: Site conditions related to soils and aspect in counties adjacent to or close to county boundaries may justify adjustments in planting dates by qualified design professionals.

Table PS-1 Commonly Used Plants for Permanent Cover with Seeding Rates and Dates[1]

Species	Seeding Rates/Ac PLS[2]	North	Central	South
		Seeding Dates		
Bahiagrass, Pensacola	40 lbs	--	Mar 1-July 1	Feb 1-Nov 1
Bermudagrass, Common	10 lbs	Apr 1-July 1	Mar 15-July 15	Mar 1-July 15
Bahiagrass, Pensacola Bermudagrass, Common	30 lbs 5 lbs	--	Mar 1-July 1	Mar 1-July 15
Bermudagrass, Hybrid (Lawn Types)	Solid Sod	Anytime	Anytime	Anytime
Bermudagrass, Hybrid (Lawn Types)	Sprigs 1/sq ft	Mar 1-Aug 1	Mar 1-Aug 1	Feb 15-Sep 1
Fescue, Tall	40-50 lbs	Sep 1-Nov 1	Sep 1-Nov 1	--
Sericea	40-60 lbs	Mar 15-July 15	Mar 1-July 15	Feb 15-July 15
Sericea & Common Bermudagrass	40lbs 10 lbs	Mar 15-July 15	Mar 1-July 15	Feb 15-July 15
Switchgrass, Alamo	4 lbs	Apr 1-Jun 15	Mar 15-Jun 15	Mar 15-Jun15

1 DO NOT USE Seeding Rates as part of a mixture unless shown as a mixture in this table.
2 PLS means Pure Live Seed and is used to adjust seeding rates. For example, to plant 10 lbs PLS of a species with germination of 80% and purity of 90%, PLS= 0.8 X 0.9 = 72%. 10lbs PLS = 10/0.72 = 13.9 lbs of the species to be planted.

Seedbed Requirements

Establishment of vegetation should not be attempted on sites that are unsuitable due to compaction or inappropriate soil texture, poor drainage, concentrated overland flow, or steepness of slope until measures have been completed to correct these problems. To maintain a good stand of vegetation, the soil must meet certain minimum requirements as a growth medium. A good growth medium should have these attributes:

- Sufficient pore space to permit root penetration.
- Enough fine-grained soil material (silt and clay) to maintain adequate moisture and nutrient supply.
- Sufficient depth of soil to provide an adequate root zone. The depth to rock or impermeable layers such as hardpans should be 12” or more, except on slopes steeper than 2:1 where topsoiling is not feasible.
- A favorable pH range for plant growth, usually 6.0-6.5.

- Sufficient nutrients (nitrogen, phosphorus, and potassium) for initial plant establishment.

- Freedom from large roots, branches, stones, or large clods. Clods and stones may be left on slopes steeper than 3:1 if they are to be hydroseeded.

If any of the above attributes are not met i.e., if the existing soil is too dense, coarse, shallow or acidic to foster vegetation – chiseling, topsoil, or special amendments should be used to improve soil conditions. The soil conditioners described below may be beneficial or topsoil may be applied (for guidance on topsoiling see Topsoiling practice). These amendments should only be necessary where soils have limitations that make them poor for plant growth or for turf establishment.

- Peat-appropriate types are sphagnum moss peat, reed-sedge peat, or peat humus, all from fresh-water sources. Peat should be shredded and conditioned in storage piles for at least 6 months after excavation.

- Sand-should be clean and free of toxic materials.

- Vermiculite-use horticultural grade.

- Rotted manure-use stable or cattle manure not containing undue amounts of straw or other bedding materials.

- Thoroughly rotted sawdust-should be free of stones and debris. Add 6 lbs of nitrogen to each cubic yard.

- Manufactured products that improve stand establishment and performance of the turf.

Soil Amendments

Liming Materials

Lime (Agricultural limestone) should have a neutralizing value of not less than 90 percent calcium carbonate equivalent and 90 percent will pass through a 10-mesh sieve and 50 percent will pass through a 60-mesh sieve.

Selma chalk should have a neutralizing value of not less than 80 percent calcium carbonate equivalent and 90 percent will pass through a 10-mesh sieve.

Other liming materials that may be selected should be provided in amounts that provide equal value to the criteria listed for agricultural lime or be used in combination with agricultural limestone or Selma chalk to provide equivalent values to agricultural limestone.

Plant Nutrients

Commercial grade fertilizers that comply with current Alabama Fertilizer Laws should be used to supply nutrients required to establish vegetation.

Lime and fertilizer needs should be determined by soil tests. Soil testing is performed by the Auburn University Soil Testing Laboratory and provides recommendations based on field tests on Alabama soils. The local county Cooperative Extension Service can provide information on obtaining soil tests. Commercial laboratories that make recommendations based on soil analysis may be used.

When soil tests are not available, use the following rates for application of soil amendments:

Lime Rates
Sandy soils: Use 1 ton/acre (exception on sandy soils – if the cover will be tall fescue and clover) use 2 tons/acre.

Clayey soils: 2 tons/acre.
(Do not apply lime to alkaline soils).

Fertilizer Rates
Grasses alone: Use 400 lbs/acre of 8-24-24 or the equivalent. Apply 30 lbs of additional nitrogen when grass has emerged and begun growth (approximately 0.8lbs/1000 ft^2).

Grass-legume mixtures: Use 800 to 1200 lbs/acre of 5-10-10 or the equivalent.
Legumes Alone: Use 400 to 600 lbs/acre of 0-20-20 or the equivalent.

Note: Fertilizer can be blended to meet exact fertilizer recommendations. Take soil test recommendations to local fertilizer dealer for bulk fertilizer blends. This may be more economical than bagged fertilizer.

Application of Soil Amendments

Apply lime and fertilizer evenly and incorporate into the top 6” of soil by disking, chiseling, or other suitable means during seedbed preparation. Operate machinery on the contour. On sites too steep for seedbed preparation, fertilizer and lime can be applied with a hydroseeder.

Seedbed Preparation

If needed, grade and shape to provide a surface on which equipment can safely and efficiently be used for seedbed preparation and seeding.

Install necessary sediment control practices before seedbed preparation and complete grading according to the approved plan.

Prepare a friable seedbed with tillage to a depth of at least 6". Break up large clods, alleviate compaction, and smooth and firm the soil into a uniform surface. Fill in or level depressions that can collect water.

Planting Methods

Seeding

Use certified seed for permanent seeding whenever possible. Certified seed is inspected by the Alabama Crop Improvement Association to meet high quality standards and will be tagged with a "Certified Seed" tag. (Note: all seed sold in Alabama is required by law to be tagged to identify seed purity, germination, and presence of weed seeds. Seed must meet state standards for content of noxious weeds.)

Seeding dates are determined using Figure PS-1 and Table PS-1.

Inoculate legume seed with the Rhizobium bacteria appropriate to the species of legume if seed are not coated with the appropriate inoculant. Details of legume inoculation are located in Chapter 2 in the part on Vegetation for Erosion and Sediment Control under Inoculation of Legumes.

Plant seed uniformly with a cyclone seeder, a drill seeder, a cultipacker seeder, or by hand on a fresh, firm, friable seedbed. If the seedbed has been sealed by rainfall, it should be disked so the seed will be sown into a freshly prepared seedbed.

When using broadcast-seeding methods, subdivide the area into workable sections and determine the amount of seed needed for each section. Apply one-half the seed while moving back and forth across the area, making a uniform pattern; then apply the second half in the same way, but moving at right angles to the first pass.

Cover broadcast seed by raking or chain dragging; then firm the surface with a roller or cultipacker to provide good seed contact. Small grains should be planted no more than 1" deep and grasses and legume seed no more than ½" deep.

Hydroseeding

Surface roughening is particularly important when hydroseeding, as a roughened slope will provide some natural coverage for lime, fertilizer, and seed. The surface should not be compacted or smooth. Fine seedbed preparation is not necessary for hydroseeding operations; large clods, stones, and irregularities provide cavities in which seeds can lodge.

Mix seed, inoculant if required, and a seed carrier with water and apply as a slurry uniformly over the area to be treated. The seed carrier should be a cellulose fiber, natural wood fiber or other approved fiber mulch material which is dyed an appropriate color to facilitate uniform application of seed. Use the correct legume inoculant at 4 times the recommended rate when adding inoculant to a hydroseeder slurry. The mixture should be applied within one hour after mixing to reduce damage to seed.

Fertilizer should not be mixed with the seed-inoculant mixture because fertilizer salts may damage seed and reduce germination and seedling vigor.

Fertilizer may be applied with a hydroseeder as a separate operation after seedlings are established.

Lime is not normally applied with a hydraulic seeder because it is abrasive but if necessary it can be added to the seed slurry and applied at seeding or it may be applied with the fertilizer mixture. Also, lime can be blown onto steeper slopes in dry form.

Sprigging

Hybrid bermudagrass cannot be grown from seed and must be planted vegetatively. Vegetative methods of establishing common and hybrid bermudagrass, centipede grass and zoysia include sodding, plugging, and sprigging (see Sodding practice).

When sprigs are planted with a sprigging machine, furrows should be 4-6" deep and 2 feet apart. Place sprigs no farther than 2 feet apart in the row and so that at least one rooting node is in the furrow.

When broadcasting is used for sprig planting, broadcast sprigs at the specified rate (Table PS-1). Press into the top ½" to 2" of soil with a cultipacker or with a disk set nearly straight so that the sprigs are not brought back to the surface. A mulch tacking machine may be used to press sprigs into the soil.

Mulching

The use of mulch provides instant cover and helps ensure establishment of vegetation under normal conditions and is essential to seeding success under harsh site conditions (see Mulching practice). Harsh site conditions include: slopes steeper than 3:1 and adverse soils (shallow, rocky, or high in clay or sand). Areas with concentrated flow should be treated differently and require sod, a hydromulch formulated for channels or an appropriate erosion control blanket.

Irrigation

Moisture is essential for seed germination and vegetation establishment. Supplemental irrigation can be very helpful in assuring adequate stands in dry seasons or to speed development of full cover. It is a requirement for establishment of vegetation from sod and sprigs and should be used elsewhere when feasible. However, irrigation is rarely critical for low-maintenance vegetation planted at the appropriate time of the year.

Water application rates must be carefully controlled to prevent runoff. Inadequate or excessive amounts of water can be more harmful than no supplemental water.

Maintenance

Generally, a stand of vegetation cannot be determined to be fully established until soil cover has been maintained for 1 full year from planting. Inspect vegetated areas for failure and make necessary repairs and vegetate as soon as possible.

If a stand has inadequate cover, reevaluate choice of plant materials and quantities of lime and fertilizer. Re-establish the stand after seedbed preparation or over-seed the stand. Consider a temporary seeding if the time of year is not appropriate for establishment of permanent vegetation (see Temporary Seeding practice).

If vegetation fails to grow, a soil test should be made to determine if soil acidity or nutrient imbalance is responsible.

To attain complete establishment, fertilization is usually required in the second growing season. Turf grasses require annual maintenance fertilization. Use soil tests if possible or follow the guidelines given for the specific seeding mixtures.

Protect vegetation during its establishing period from traffic that will be harmful. If appropriate, use either temporary fences or barriers to protect areas that may be damaged by excessive traffic.

Temporary Seeding (TS)

Practice Description

Temporary seeding is the establishment of fast-growing annual vegetation from seed. Temporary vegetation provides economical erosion control for up to a year and reduces the amount of sediment moving off the site.

This practice applies where short-lived vegetation can be established before final grading or in a season not suitable for planting the desired permanent species. It helps prevent costly maintenance operations on other practices such as sediment basins and sediment barriers. In addition, it reduces problems of mud and dust production from bare soil surfaces during construction. Temporary or permanent seeding is necessary to protect earthen structures such as dikes, diversions, grass-lined channels and the banks and dams of sediment basins.

Planning Considerations

Temporary vegetative cover can provide significant short-term erosion and sediment reduction before establishing perennial vegetation.

Temporary vegetation will reduce the amount of maintenance associated with sediment basins.

Temporary vegetation is used to provide cover for no more than 1 year. Permanent vegetation should be established at the proper planting time for permanent vegetative cover.

Certain plants species used for temporary vegetation will produce large quantities of residue which can provide mulch for establishment of the permanent vegetation.

Proper seedbed preparation and selection of appropriate species are important with this practice. Failure to follow establishment guidelines and recommendations carefully may result in an inadequate or short-lived stand of vegetation that will not control erosion.

The selection of plants for temporary vegetation must be site specific. Factors that should be considered are type of soils, climate, establishment rate, and management requirements of the vegetation. Other factors that may be important are wear, mowing tolerance, and salt tolerance of vegetation.

Seeding properly carried out within the optimum dates has a higher probability of success. It is also possible to have satisfactory establishment when seeding outside these dates. However, as plantings are deviated from the optimum dates, the probability of failure increases rapidly. Seeding dates should be taken into account in scheduling land-disturbing activities.

Site quality impacts both short-term and long-term plant success. Sites that have compacted soils should be modified whenever practical to improve the potential for plant growth.

The operation of equipment is restricted on slopes steeper than 3:1, severely limiting the quality of the seedbed that can be prepared. Provisions for establishment of vegetation on steep slopes can be made during final grading. In construction of fill slopes, for example, the last 4-6” might not be compacted. A loose, rough seedbed with irregularities that hold seeds and fertilizer is essential for hydroseeding. Cut slopes should be roughened (see practice Land Grading).

Appropriate mulching practices are critical to protect against erosion on steep slopes. When using straw, anchor with netting or asphalt. On slopes steeper than 2:1, either hydraulic mulch or erosion control blanket is more appropriate than straw to protect the slope.

The use of irrigation (temporary or permanent) will greatly improve the success of vegetation establishment.

Design Criteria

Plant Selection

Select plants that can be expected to meet planting objectives. To simplify plant selection, use Table TS-1, Commonly Used Plants for Temporary Cover and Figure TS-1, Geographical Areas for Species Adaptation and Seeding Dates. Seeding mixtures commonly specified by the Alabama Department of Transportation are an appropriate alternative for plantings on rights-of-ways. Additional information related to plantings in Alabama is found in Chapter 2 in the sections on Non-Woody Vegetation.

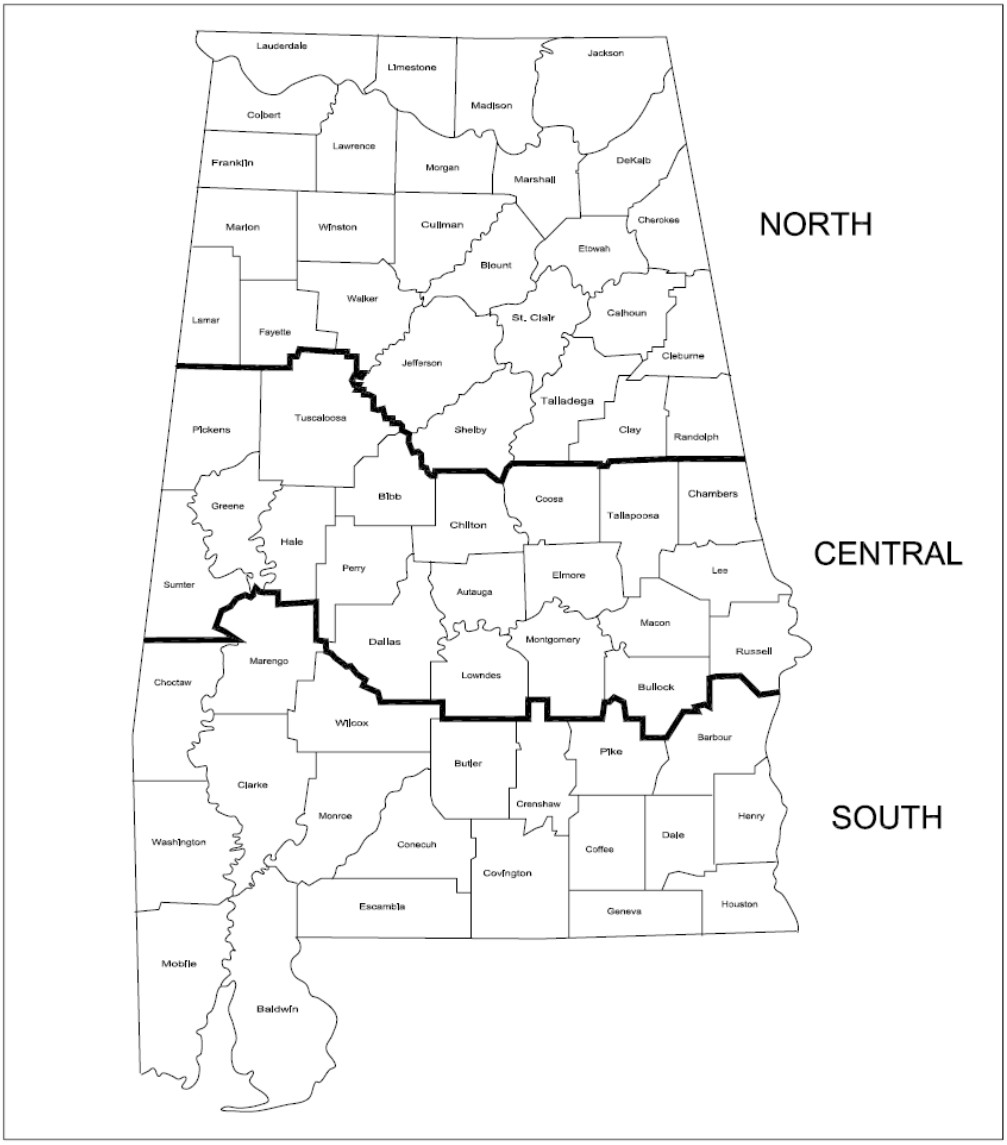


Figure TS-1 Geographical Areas for Species Adaptation and Seeding Dates

Note: Site conditions related to soils and aspect in counties adjacent to or close to county boundaries may justify adjustments in planting dates by qualified design professionals.

Table TS-1 Commonly Used Plants for Temporary Cover[1]

Species	Seeding Rate/AC PLS[2]	North	Central	South
		Seeding Dates		
Millet, Browntop or German	40 lbs	Apr1-Aug 1	Apr1- Aug 15	Apr 1-Aug 15
Rye	3 bu	Sep I-Nov 15	Sep 15-Nov 15	Sep 15-Nov 15
Ryegrass	30 lbs	Aug l-Sep 15	Sep l-Oct 15	Sep 1-Oct 15
Sorghum-Sudan Hybrids	40 lbs	May l-Aug 1	Apr 15-Aug 1	Apr l-Aug 15
Sudangrass	40 lbs	May l-Aug I	Apr 15-Aug	Apr l-Aug 15
Wheat	3 bu	Sep I-Nov 1	Sep 15-Nov 15	Sep 15-Nov 15
Common Bermudagrass	10 lbs	Apr 1-July 1	Mar 15-July 15	Mar 1-July 15
Crimson Clover	10 lbs	Sept 1-Nov 1	Sept 1-Nov 1	Sept 1-Nov 1

1 DO NOT USE Seeding Rates as part of a mixture.
2 PLS means Pure Live Seed and is used to adjust seeding rates. For example, to plant 10 lbs PLS of a species with germination of 80% and purity of 90%, PLS= 0.8 X 0.9 = 72%. 10lbs PLS = 10/0.72 = 13.9 lbs of the species to be planted.

Site Preparation and Soil Amendments

Complete grading and shaping before applying soil amendments if needed to provide a surface on which equipment can safely and efficiently be used to apply soil amendments and accomplish seedbed preparation and seeding.

Lime

Apply lime according to soil test recommendations. If a soil test is not available, use 1 ton of agricultural limestone or equivalent per acre on coarse textured soils and 2 tons per acre on fine textured soils. Do not apply lime to alkaline soils or to areas which have been limed during the preceding 2 years. Other liming materials that may be selected should be provided in amounts that provide equal value to the criteria listed for agricultural lime or be used in combination with agricultural limestone or Selma chalk to provide equivalent values to agricultural limestone.

Fertilizer

Apply fertilizer according to soil test results. If a soil test is not available, apply 8-24-24 fertilizer at a rate of 400 lbs/acre (approximately 9 lbs/1000 ft^2).

When vegetation has emerged to a stand and is growing, 30 to 40 lbs/acre (approximately 0.8 lbs/1000 ft^2) of additional nitrogen fertilizer should be applied.

Note: Fertilizer can be blended to meet exact fertilizer recommendations. Take soil test recommendations to local fertilizer dealer for bulk fertilizer blends. This may be more economical than bagged fertilizer.

Application of Soil Amendments

Incorporate lime and fertilizer into the top 6” of soil during seedbed preparation.

Seedbed Preparation

Good seedbed preparation is essential to successful plant establishment. A good seedbed is well pulverized, loose, and smooth. If soils become compacted during grading, loosen them to a depth of 6” to 8” using a ripper or chisel plow.

If rainfall has caused the surface to become sealed or crusted, loosen it just prior to seeding by disking, raking, harrowing, or other suitable methods. When hydroseeding methods are used, the surface should be left with a more irregular surface of clods.

Planting Methods

Seeding

Evenly apply seed using a cyclone seeder (broadcast), drill seeder, cultipacker seeder, or hydroseeder. Broadcast seeding and hydroseeding are appropriate for steep slopes where equipment cannot operate safely. Small grains should be planted no more than 1” deep, and grasses and legumes no more than ½” deep. Seed that are broadcast must be covered by raking or chain dragging, and then lightly firmed with a roller or cultipacker.

Hydroseeding

Surface roughening is particularly important when hydroseeding, as a roughened slope will provide some natural coverage for lime, fertilizer, and seed. The surface should not be compacted or smooth. Fine seedbed preparation is not necessary for hydroseeding operations; large clods, stones, and irregularities provide cavities in which seeds can lodge.

Mix seed, inoculant if required, and a seed carrier with water and apply as slurry uniformly over the area to be treated. The seed carrier should be a cellulose fiber, natural wood fiber or other approved fiber mulch material which is dyed an appropriate color to facilitate uniform application of seed. Use the correct legume inoculant at 4 times the recommended rate when adding inoculant to hydroseeder slurry. The mixture should be applied within one hour after mixing to reduce damage to seed.

Fertilizer should not be mixed with the seed-inoculant mixture because fertilizer salts may damage seed and reduce germination and seedling vigor. Fertilizer may be applied with a hydroseeder as a separate operation after seedlings are established.

Mulching

The use of appropriate mulch provides instant cover and helps ensure establishment of vegetative cover under normal conditions and is essential to seeding success under harsh site conditions (see the Mulching practice for guidance). Harsh site conditions include the following: slopes steeper than 3:1 and adverse soils (soils that are shallow to rock, rocky, or high in clay or sand). Areas with concentrated flow should be treated differently and require a practice appropriate for channel flow. (Refer to Chapter 5 Runoff Conveyance for guidance).

Check Dam (CD)

Practice Description

A check dam (also referred to as a “ditch check”) is a barrier constructed across a conveyance to impound water for the purpose of velocity reduction by flattening the flow gradient and reducing shear stress within the channel. This practice applies in small open channels and drainageways, including temporary and permanent swales.

Check dams are not to be used in a live stream. Situations of use include areas in need of protection during establishment of grass and areas that cannot receive a temporary or permanent non-erodible lining for an extended period.

Planning Considerations

Check dams are used in concentrated flow areas to provide temporary channel stabilization with minimal sediment retention during rainfall runoff periods on construction sites. Channel erosion is reduced because check dams flatten the gradient of the flow channel and slow the velocity of channel flow. Check dams do not reduce turbidity of runoff. Check dams can be constructed of rock, wattles (sometimes referred to as tubes or rolls), sandbags, or other materials that may be acceptable to the design professional. Unless installed correctly, check dams will not capture a significant amount of sediment. When installed correctly, most check dams can capture the coarser grained material, which can be significant for sandy

soils. Sediment capture increases as velocity in the channel decreases by creating impoundments with the check dams. This impoundment pool creates the flattening of the gradient, greatly reducing channel erosion.

Water flowing over a check dam creates turbulent erosive forces (super critical flow) that must be addressed to prevent erosion downstream of the check dam. Inevitably, water will likely flow under check dams due to limitation with ground contact. Therefore, it is of upmost importance to ensure the performance of the check dam that erosion and scour under the check dam be minimized. This is best achieved using an underlay such as an 8-oz. nonwoven filter fabric. If the underlay is extended downstream, it will also protect the channel from super critical flows from water flowing over and under the dam.

Check dams should be planned to be compatible with the other features such as streets, walkways, trails, sediment basins and rights-of-way or property lines. Check dams are installed with the center overflow area lower in elevation than the ends to ensure flow goes over the check dam and not around. Check dams are normally constructed in series and the dams should be located at a normal interval from other grade controls such as culverts or sediment basins.

Check dams are generally used as a temporary BMP that is removed following construction to allow for final long-term stabilization of the channel. Provisions should be made to establish permanent channel linings as early as possible.

Check dams can also be used for other purposes such as the capture of sediment upstream of other practices or flocculent dosing upstream of a sediment basin.

Extensive research has been conducted by The Auburn University Stormwater Research Facility. The research recommendations are incorporated in the following planning considerations:

Rock Check Dams

Many check dams are constructed of rock. Rock may not be acceptable in some installations and alternative types of check dams need to be considered. Rock check dams (Figures CD-1 and CD-2) are usually installed with mechanical equipment, but hand labor is likely needed to complete most installations to the quality needed. The availability and cost of commercially produced rock should be considered. The use of rock should be considered carefully in areas to be mowed. Some rock may be washed downstream and should be removed before each mowing operation. The use of geotextile can be used on the upstream face of the rock check dam to increase the sediment trapping efficiency of the rock check dam. Measures must be taken to prevent undermining of the check dam and erosion below the check dam. A non-woven geotextile underlayment should be used to prevent this from happening. The geotextile meeting AASHTO M 288 requirement for separation Class II (minimum 8-oz. fabric) should extend approximately 3 ft. upstream and downstream, and pinned securely with the upstream edge buried.

Measures to prevent downstream erosion associated with a rock check dam include placing larger rock on the downstream face of a rock dam and providing erosion protection material just downstream of the dam.

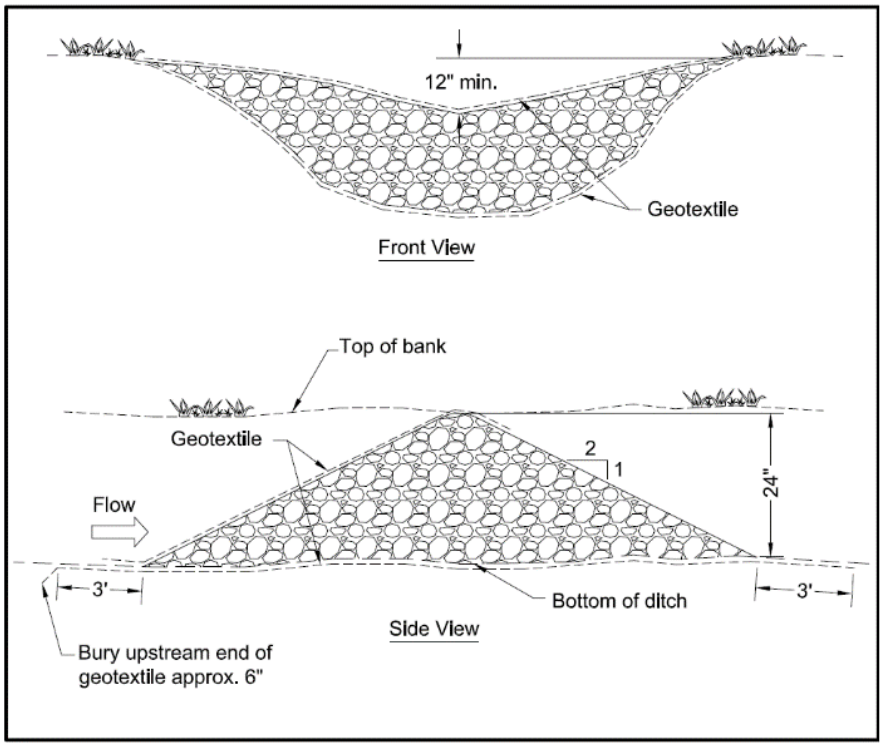


Figure CD-1 Profile and Cross-Section of Typical Rock Check Dams

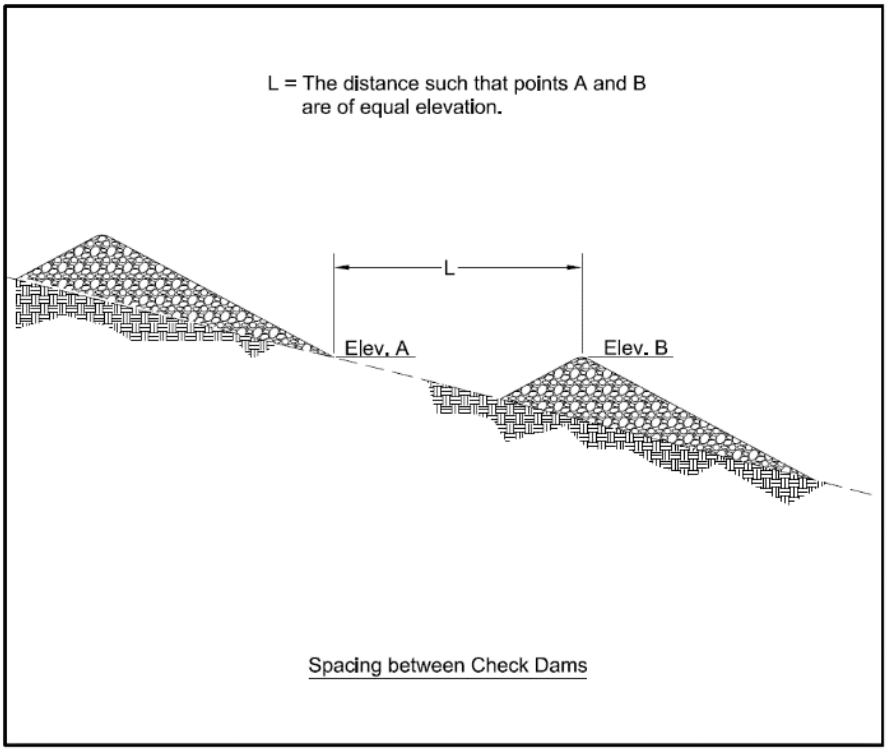


Figure CD-2 Profile of Typical Rock Check Dams

Wattle Check Dams

Wattles have been found to be best installed without trenching and on top of stapled geotextile underlayment that extends a minimum 3 ft. up and downstream from the wattle. Wattles must be properly stapled with sod staples on approximately 6-inch centers on each side of the wattle to prevent flotation and staked over the top using non-destructive tee-pee type staking. Wattles that provide less "flow through" create more ponding of water that increases the trapping of sediment (see Figures CD-3 and CD-4).

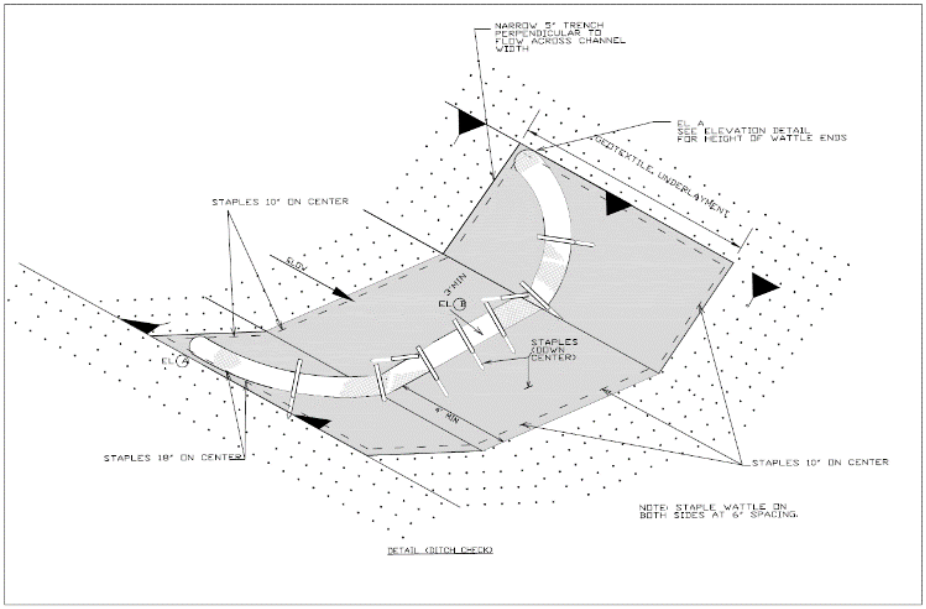


Figure CD-3 Wattle Check Dam (ditch check)

Figure CD-4 Wattle Check Dam (ditch check)
(Photo courtesy of Auburn University Stormwater Research Facility)

Silt Fence Check Dam

When properly designed and installed, typical silt fence materials can be utilized to construct a check dam. Geotextile underlayment should be used, and the fence notched as needed to ensure the maximum depth of flow is no greater than the depth of the channel. Figures CD-5 and CD-6 show the recommended details.

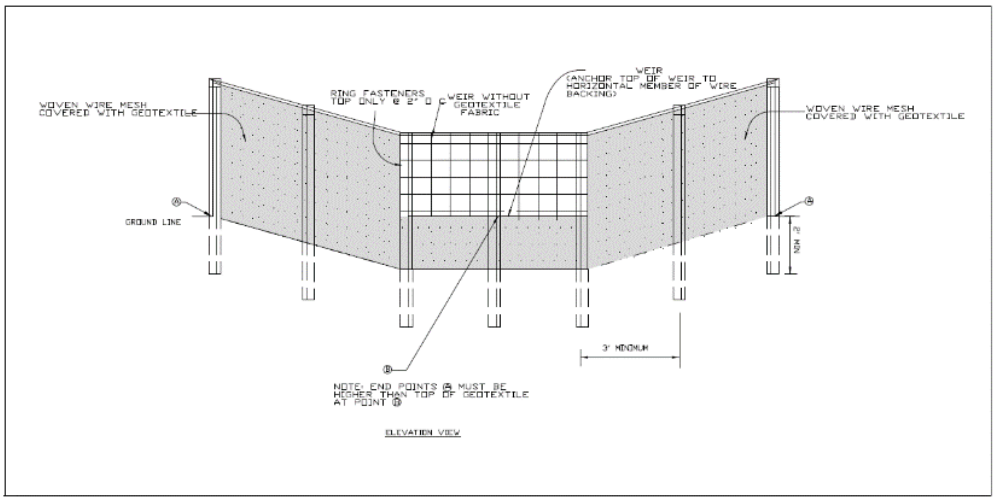


Figure CD-5 Silt Fence Check Dam Cross-Section

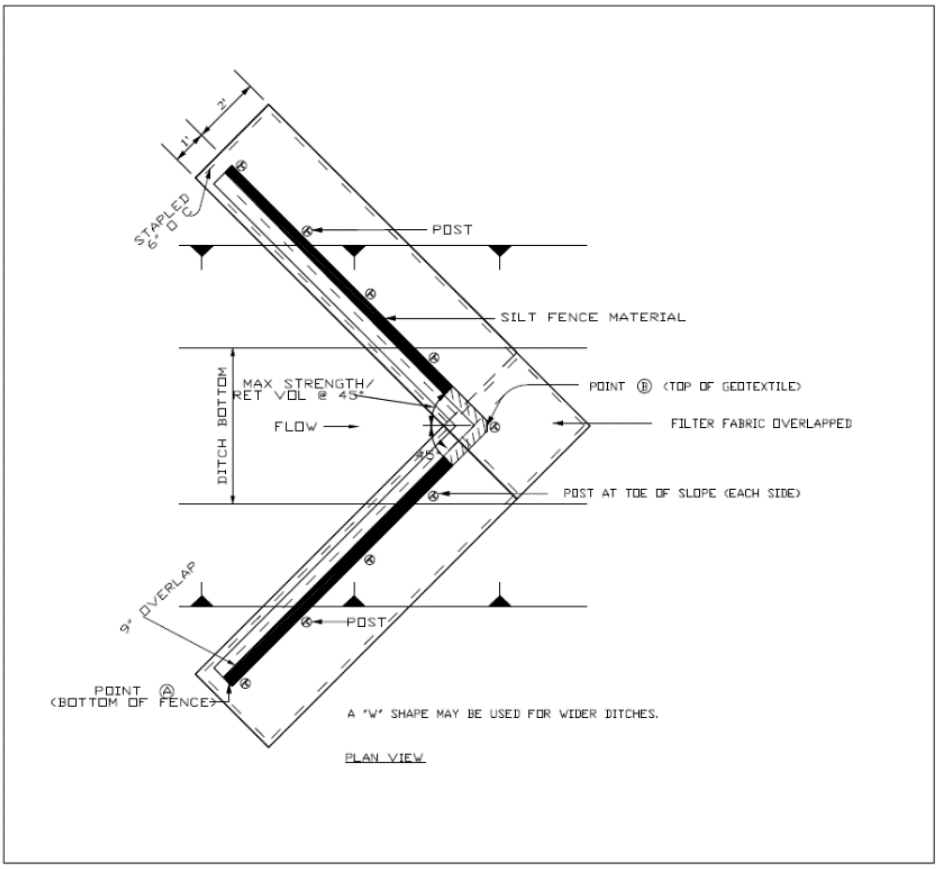


Figure CD-6 Silt Fence Check Dam Plan View

Figure CD-7 Silt Fence Check Dam
(Photo courtesy of Auburn University SWRC)

Sandbag Check Dam

Sandbags have also been proven to be effective as check dams but only when the bags are properly oriented (See Figures CD-8 and CD-9). A geotextile underlayment that extends approximately 3 ft. upstream and downstream should also be used in earth channel situations to prevent undermining and scour.

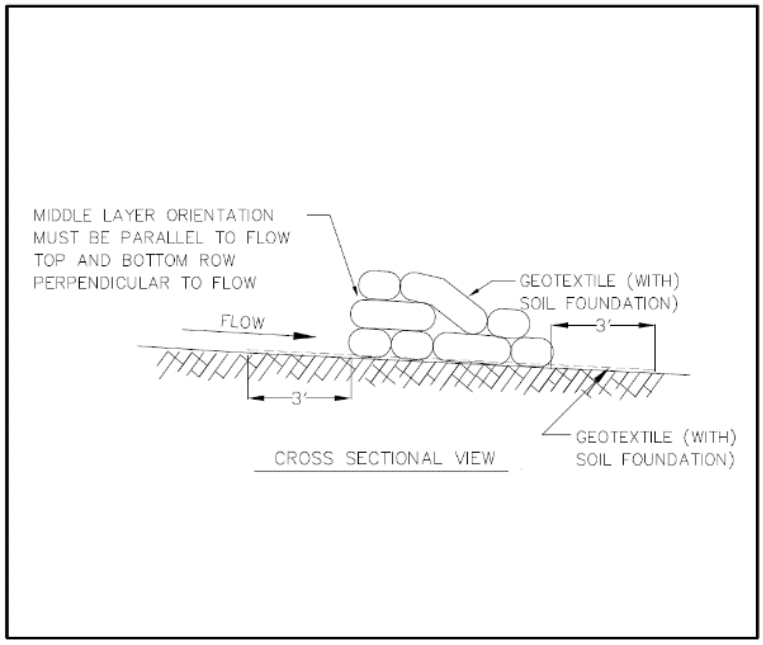


Figure CD-8 Sandbag Check Dam Cross-Section

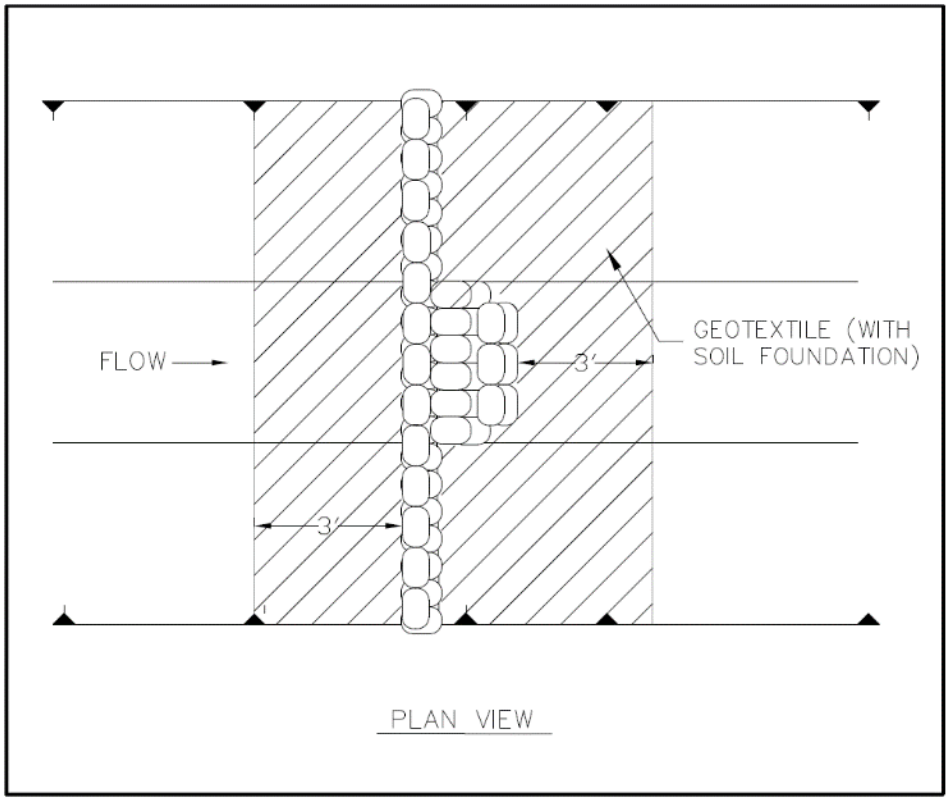


Figure CD-9 Sandbag Check Dam Plan View

Design Criteria

Formal design is not required. The following factors should be considered when designing check dams.

Drainage Area

Generally, one acre or less.

Maximum Height

Check dam height is a function of channel geometry. Most check dams are 3 feet or less in height.

Depth of Flow

Depth of flow over a check dam is a function of the cross-section and porosity of the check dam. Generally, flows over a check dam are less than 1 foot.

The center of the dam should be constructed lower than the ends. The elevation of the center of the dam should be lower than the ends by the depth of design flow.

Side Slopes

2:1 or flatter (rock check dam).

Spacing

The elevation of the toe of the upstream dam should be at or below the elevation of crest of the downstream dam (Figure CD-2).

For example, if the channel is 3% grade, and the check dam height is 2 feet, The check dam spacing should be 67 feet:

Spacing (ft) = dam height (ft) / channel grade

Spacing = 2 ft / 0.03 = 67 feet

Geotextile

Generally, the non-woven geotextile should meet the requirements found in AASHTO M 288 Class II used for separation.

Diversion (DV)

Practice Description

A diversion is a watercourse constructed on a designed grade, across a slope, and consisting of an excavated channel, a compacted ridge, or a combination of both.

This practice applies to sites where stormwater runoff can be redirected to permanently protect structures or areas downslope from erosion, sediment, and excessive wetness or localized flooding. Diversions may be used to temporarily divert stormwater runoff to protect disturbed areas and slopes or to retain sediment on-site during construction.

Planning Considerations

Diversions are designed to intercept and carry excess water to a stable outlet.

Diversions can be useful tools for managing surface water flows and preventing soil erosion. On moderately sloping areas, they may be placed at intervals to trap and divert sheet flow before it has a chance to concentrate and cause rill and gully erosion.

Most diversions are constructed by excavating a channel and using the excavated material to construct a ridge on the downslope side of the channel. Right-of-way diversions and temporary diversions are sometimes constructed by making a ridge, often called a berm, from fill material.

Perimeter protection is sometimes used to describe both permanent and temporary diversions used at either the upslope or downslope side of a construction area.

Right-of-way diversions, sometimes referred to as water bars, are used to shorten the flow length on a sloping right-of-way and reduce the erosion potential of the stormwater runoff.

Diversions may be placed at the top of cut or fill slopes to keep runoff from upgradient drainage areas off the slope. The following picture illustrates the placement of a diversion near the top of the slope. Diversions are sometimes built at the base of steeper slopes to protect flatter developed areas which cannot withstand runoff water from outside areas. Also, they can be used to protect structures, parking lots, adjacent properties, and other special areas from flooding.

Figure DV-1 Diversion near the top of a slope

Diversions are preferable to other types of man-made stormwater conveyance systems because they more closely simulate natural flow patterns and characteristics. Flow velocities are generally kept to a minimum. When properly coordinated into the landscape design of a site, diversions can he visually pleasing as well as functional.

As with any earthen structure, it is very important to establish adequate vegetation as soon as possible after installation. It is usually important to stabilize the drainage area above the diversion so that sediment will not enter and accumulate in the diversion channel.

Design Criteria

Location

Diversion location should be determined by considering outlet conditions, topography, land use, soil type, length of slope, seepage (where seepage is a problem) and the development layout. Outlets must be stable after the diversion empties stormwater flow into it; therefore, care should be exercised in selecting the location of the diversion and its outlet.

Slope (Grade)

The bed slope of the diversion should be selected to meet velocity, capacity, and lining requirements for the site. Variable grades may be needed to obtain more uniform cross-sections and improve alignment. During the design process, the slope may need to be modified to meet stability and capacity requirements.

Capacity

The diversion channel must have a minimum capacity to carry the runoff expected from a storm frequency meeting the requirements of Table DV-l with a freeboard of at least 0.3 foot (Figure DV-2).

The storm frequency should be used to determine the required channel capacity, Q (peak rate of runoff). The peak rate of runoff should be determined using the Natural Resources Conservation Service runoff curve number (RCN) method or other equivalent methods.

Table DV-1 Design Frequency

Diversion Type	Typical Area of Protection	24-Hour Design Storm Frequency
Temporary	Construction Areas	2-year
	Building Sites	5-year
Permanent	Agricultural Land	10-year
	Mined Reclamation Area	10-year
	Recreation Areas	10-year
	Isolated Buildings	25-year
	Urban areas, Residential, School, Industrial Areas, etc.	50-year

Diversions designed to protect homes, schools, industrial buildings, roads, parking lots, and comparable high-risk areas, and those designed to function in connection with other structures, should have sufficient capacity to carry peak runoff expected from a storm frequency consistent with the hazard involved.

Velocities

Diversions should be planned and designed for the conditions of the construction site. If the diversion is grass or earth-lined, the acceptable velocity to be expected will be determined by the allowable soil effective stress and the properties of the vegetation.

Cross-Section Shape

The land slope where the diversion is to be constructed must be taken into consideration when choosing a channel cross-section. On steeper terrain, narrow and deep channels may be required to reduce earth-moving quantities. However, if the diversion is to be vegetated or unlined, there may be a limit to how steep and deep it can be and still meet allowable effective stress criteria for stability. Broad, shallow channels usually are more applicable on gentler terrain. The diversion channel may be parabolic, trapezoidal, or V-shaped as shown in Figure DV-2.

Ridge Design

The supporting ridge cross section should meet the configuration and requirements of Figure DV-2.

The side slopes should be no steeper than 2:1. Side slopes should be flatter, 5:1 to 10:1, when the diversion is to be permanent with mowing and other maintenance activities performed on or around it.

The width of the ridge at the design water elevation should be a minimum of 4 feet.

The minimum freeboard should be 0.3 foot.

The design should include a 10% settlement factor.

Soils Investigation

The soil textures encountered along the diversion are needed to determine the allowable soil effective stress for stability assessment of bare soil and vegetated channels.

Outlet

Diversions should have adequate outlets which will convey concentrated runoff without erosion. Acceptable outlets include practices such as Grassed Swale, Lined Swale, Drop Structure, Riprap-Lined Swale, Sediment Basin, and Stormwater Detention Basins.

Stabilization

Unless otherwise stabilized, the ridge and channel should be seeded within 13 days of installation in accordance with the applicable seeding practice, Permanent Seeding or Temporary Seeding.

Disturbed areas draining into the diversion should be seeded and mulched prior to or at the time the diversion is constructed in accordance with the Permanent Seeding or Temporary Seeding (whichever is applicable) practices.

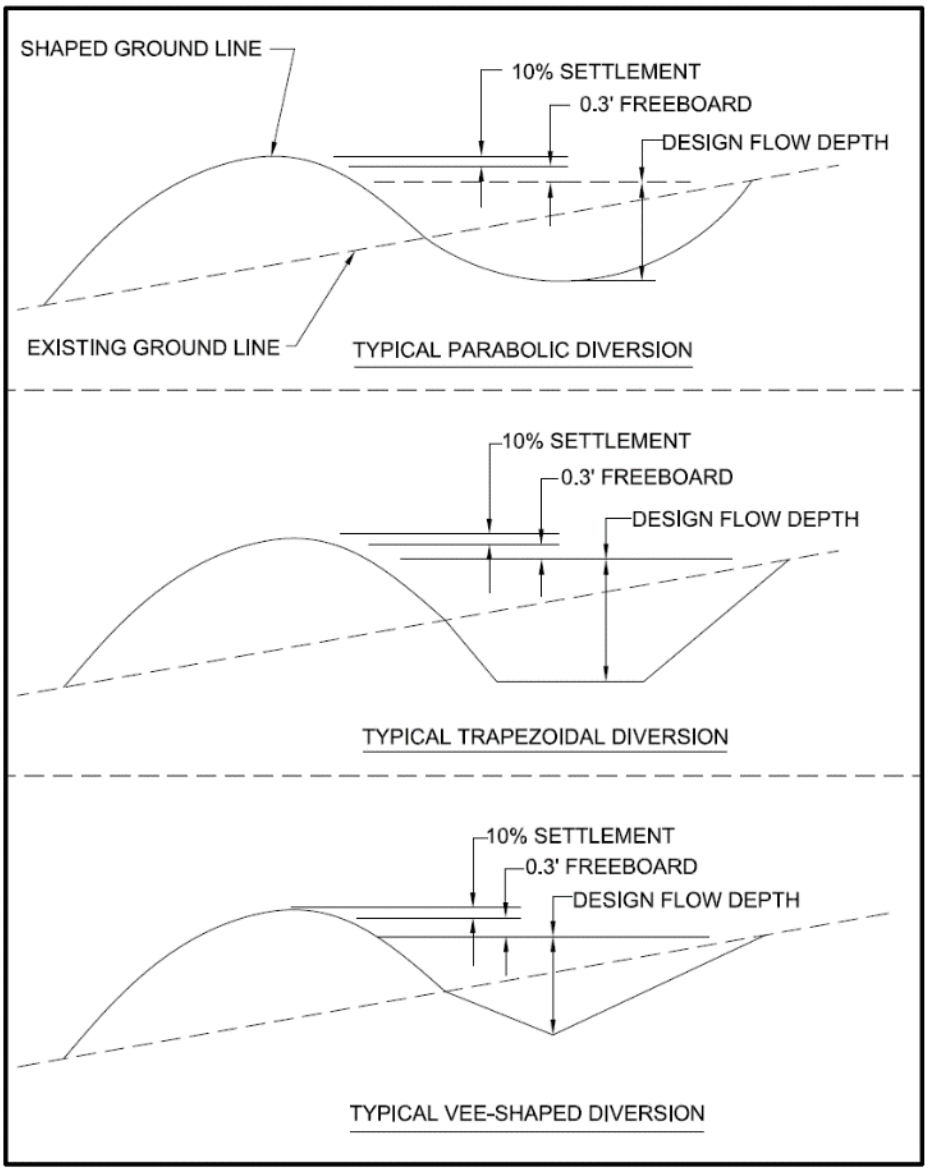


Figure DV-2 Typical Diversions Detail

Diversion Design

Steps in Designing a Diversion

1. Plan the location and type of diversion that minimizes negative impacts.
2. Select design points along the diversion where grades change or drainage areas and type of lining change significantly.
3. Determine the watershed area for the points in step 2 and for the outlet.
4. Find the peak runoff produced by the design storm at each design point identified in step 2.
5. Determine the slope of each reach of the diversion.
6. For the type of diversion to be constructed, select the appropriate channel cross section and the type of channel lining to be used, for example, bare soil, vegetation, rigid lining, or some combination.
7. Design the channel cross section for adequate capacity, typically based on the densest vegetation expected.
8. Check the design for stability by computing effective stress based on the sparsest vegetation expected. Repeating stability design computations may be necessary to complete the design if the stability check shows an inadequate design.
9. Add appurtenant structures, such as reinforced centers, as needed to allow for prolonged flows.

References and Tools for Diversion Design

General design guidance can be found in the USDA-NRCS Part 650, Engineering Field Handbook, Chapter 9, Diversion.

https://directives.sc.egov.usda.gov/OpenNonWebContent.aspx?content=46275.wba

Design tables can be found in the appendix of USDA-NRCS Part 650, Engineering Field Handbook, Chapter 7, Grassed Waterways.

https://directives.sc.egov.usda.gov/OpenNonWebContent.aspx?content=46771.wba

Software for the design of a diversion can be found in the USDA-NRCS Engineering Field Tools (EFT). This can be downloaded at:

https://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/ndcsmc/?cid=stelprdb1042198

Outlet Protection (OP)

Practice Description

Outlet Protection is an erosion control practice designed to prevent erosion at the outlet of a channel or conduit by reducing the velocity of flow and dissipating the energy. This practice applies wherever high velocity discharge must be released on erodible material.

Planning Considerations

Outlet protection measures usually consist of a riprap-lined apron, a reinforced concrete flume with concrete baffles, a reinforced concrete box with chambers or baffles and possibly pre-manufactured products.

The outlets of pipes and structurally lined channels are points of critical erosion potential. Stormwater which is transported through man-made conveyance systems at design capacity generally reaches a velocity which exceeds the ability of the receiving channel or area to resist erosion. To prevent scour at stormwater outlets, a flow transition structure is required which will absorb the initial impact of the flow and reduce the flow velocity to a level which will not erode the receiving channel or area of discharge.

The most commonly used structure for outlet protection is an erosion resistant lined apron. These aprons are generally lined with loose rock riprap, grouted riprap, or concrete. They are constructed at zero grade for a distance which is related to the outlet flow rate and the tailwater level. Criteria for designing these structures are contained in this practice. Several outlet conditions are shown in Figure OP-1. Example design problems for outlet protection are found at the end of this practice.

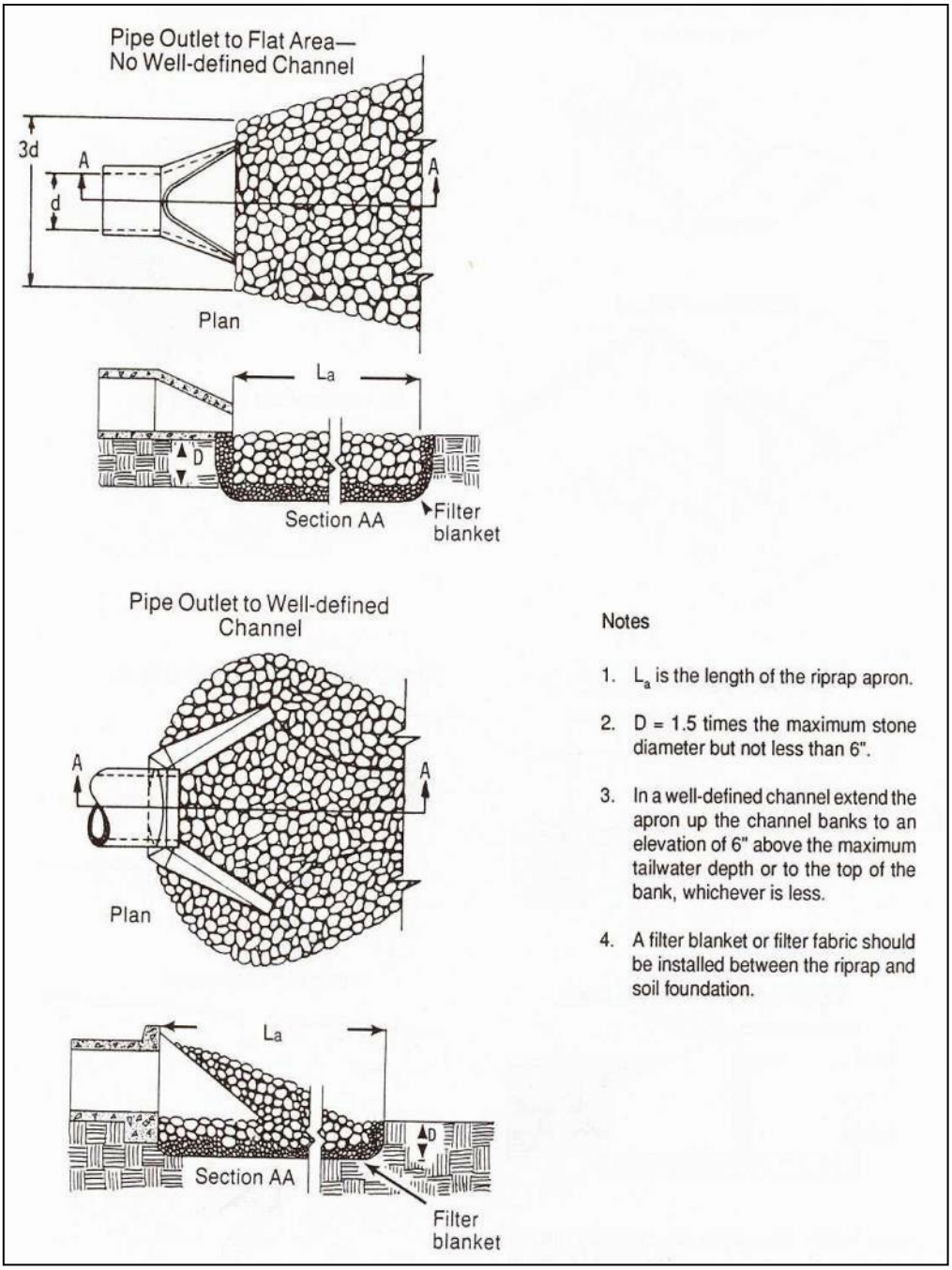


Figure OP-1 Pipe Outlet Conditions

Where the flow is excessive for the economical use of an apron, excavated stilling basins may be used. Acceptable designs for stilling basins may be found in the following documents available from the U. S. Government Printing Office.

1) Hydraulic Design of Energy Dissipaters for Culverts and Channels, Hydraulics Engineering Circular No.14, U. S. Department of Transportation, Federal Highway Administration.

2) Hydraulic Design of Stilling Basins and Energy Dissipaters, Engineering Monograph No.25 U. S. Department of Interior-Bureau of Reclamation.

Design Criteria

Structurally lined aprons at the outlets of pipes and paved channel sections should be designed according to the following criteria:

Pipe Outlets

Capacity

The structurally lined apron should have the capacity to carry the peak stormflow from the 25-year 24-hour frequency storm or the storm specified in state laws or local ordinances or the design discharge of the water conveyance structure, whichever is greatest.

Tailwater

The depth of tailwater immediately below the pipe outlet must be determined for the design capacity of the pipe. Manning's Equation may be used to determine tailwater depth. Manning's Equation may be found in the practice Grass Swales. If the tailwater depth is less than half the diameter of the outlet pipe, it shall be classified as a Minimum Tailwater Condition. If the tailwater depth is greater than half the pipe diameter, it shall be classified as a Maximum Tailwater Condition. Pipes which outlet to flat areas, with no defined channel, may be assumed to have a Minimum Tailwater Condition.

Apron Length

The apron length should be determined from Figure OP-2 or OP-3 according to the tailwater condition.

Apron Thickness

The apron thickness should be determined by the maximum stone size (dmax), when the apron is lined with riprap. The maximum stone size shall be 1.5 x d_{50} (median stone size), as determined from Figure OP-2 or OP-3. The apron thickness shall be 1.5 x dmax.

When the apron is lined with concrete, the minimum thickness of the concrete shall be 4".

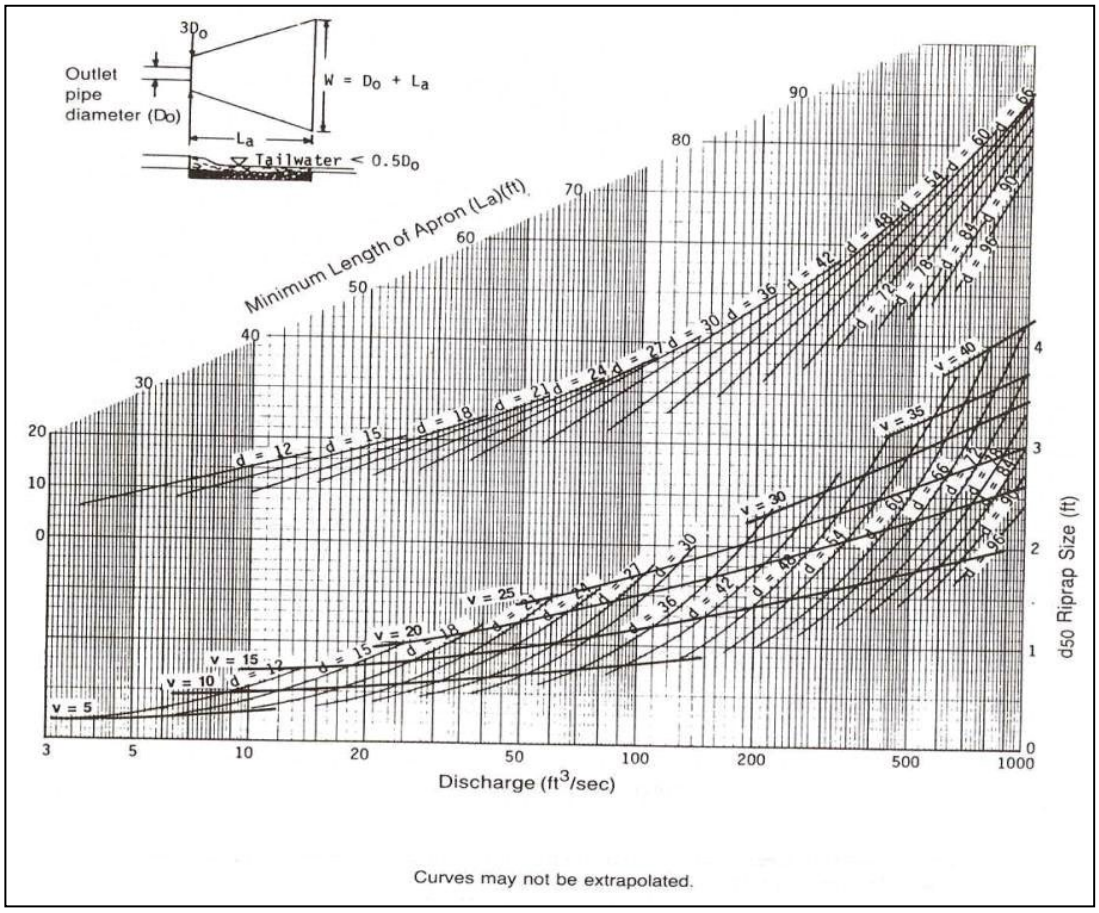


Figure OP-2 Outlet Protection Design for Tailwater < 0.5 Diameter

Apron Width

If the pipe discharges directly into a well-defined channel, the apron should extend across the channel bottom and up the channel banks to an elevation 1foot above the maximum tailwater depth or to the top of the bank, whichever is the least.

If the pipe discharges onto a flat area with no defined channel, the width of the apron should be determined as follows:

- The upstream end of the apron, adjacent to the pipe, should have a width 3 times the diameter of the outlet pipe.
- For a Minimum Tailwater Condition, the downstream end of the apron should have a width equal to the pipe diameter plus the length of the apron obtained from the figures.
- For a Maximum Tailwater Condition, the downstream end shall have a width equal to the pipe diameter plus 0.4 times the length of the apron from Figures OP-2 or OP-3.

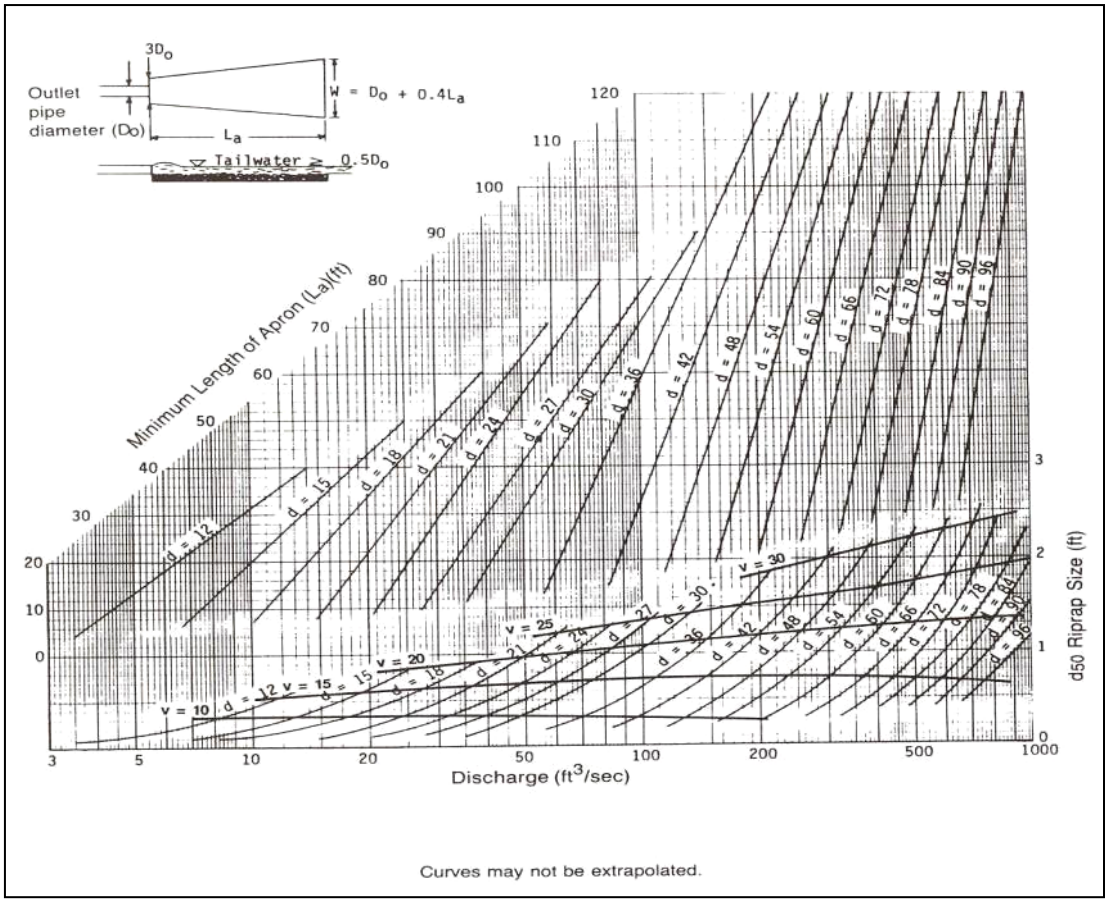


Figure OP-3 Outlet Protection Design for Tailwater ≥ 0.5 Diameter

Bottom Grade

The apron should be constructed with no slope along its length (0.0% grade). The invert elevation of the downstream end of the apron shall be equal to the elevation of the invert of the receiving channel. There shall be no overfall at the end of the apron.

Side Slope

If the pipe discharges into a well-defined channel, the side slopes of the channel should not be steeper than 2:1 (Horizontal:Vertical).

Alignment

The apron should be located so that there are no bends in the horizontal alignment.

Geotextile

When riprap is used to line the apron, non-woven geotextile should be used as a separator between the graded stone, the soil subgrade, and the abutments. Geotextile should be placed immediately adjacent to the subgrade without any voids between the fabric and the subgrade. The geotextile will prevent the migration of soil particles from the subgrade into the graded stone. The geotextile shall be of the strength and durability required for the project to ensure the aggregate and soil base are stable. Generally, the non-woven geotextile should meet the requirements found in AASHTO M288 for a Class 2 separation geotextile.

Materials

The apron may be lined with loose rock riprap, grouted riprap, or concrete. The median sized stone for riprap should be determined from the curves on Figure OP-2 and OP-3 according to the tailwater condition.

After the median stone size is determined, the gradation of rock to be used should be specified using Tables OP-2 and OP-3. Table OP-2 is used to determine the weight of the median stone size (d_{50}). Using this median weight, a gradation can be selected from Table OP-3, which shows the commercially available riprap gradations as classified by the Alabama Department of Transportation.

Stone for riprap should consist of field stone or rough unhewn quarry stone of approximately rectangular shape. The stone should be hard and angular and of such quality that it will not disintegrate on exposure to water or weathering and it shall be suitable in all other respects for the purpose intended. The specific gravity of the individual stones should be at least 2.5.

When the apron is lined with concrete, the concrete should have a minimum compressive strength at 28 days of 3000 pounds per square inch. American Concrete Institute guidelines should be used to design concrete structures and reinforcement. As a minimum, the concrete should be reinforced with steel welded wire fabric.

Table OP-2 Size of Riprap Stones

		Rectangular Shape	
Weight (lbs.)	**Mean Spherical Diameter** (feet)	**Length** (feet)	**Width, Height** (feet)
50	0.8	1.4	0.5
100	1.1	1.75	0.6
150	1.3	2.0	0.67
300	1.6	2.6	0.9
500	1.9	3.0	1.0
1000	2.2	3.7	1.25
1500	2.6	4.7	1.5
2000	2.75	5.4	1.8
4000	3.6	6.0	2.0
6000	4.0	6.9	2.3
8000	4.5	7.6	2.5
20000	6.1	10.0	3.3

Table OP-3 Graded Riprap

Class	**Weight** (lbs.)					
	d_{10}	**d_{15}**	**d_{25}**	**d_{50}**	**d_{75}**	**d_{90}**
1	10	-	-	50	-	100
2	10	-	-	80	-	200
3	-	25	-	200	-	500
4	-	-	50	500	1000	-
5	-	-	200	1000	-	2000

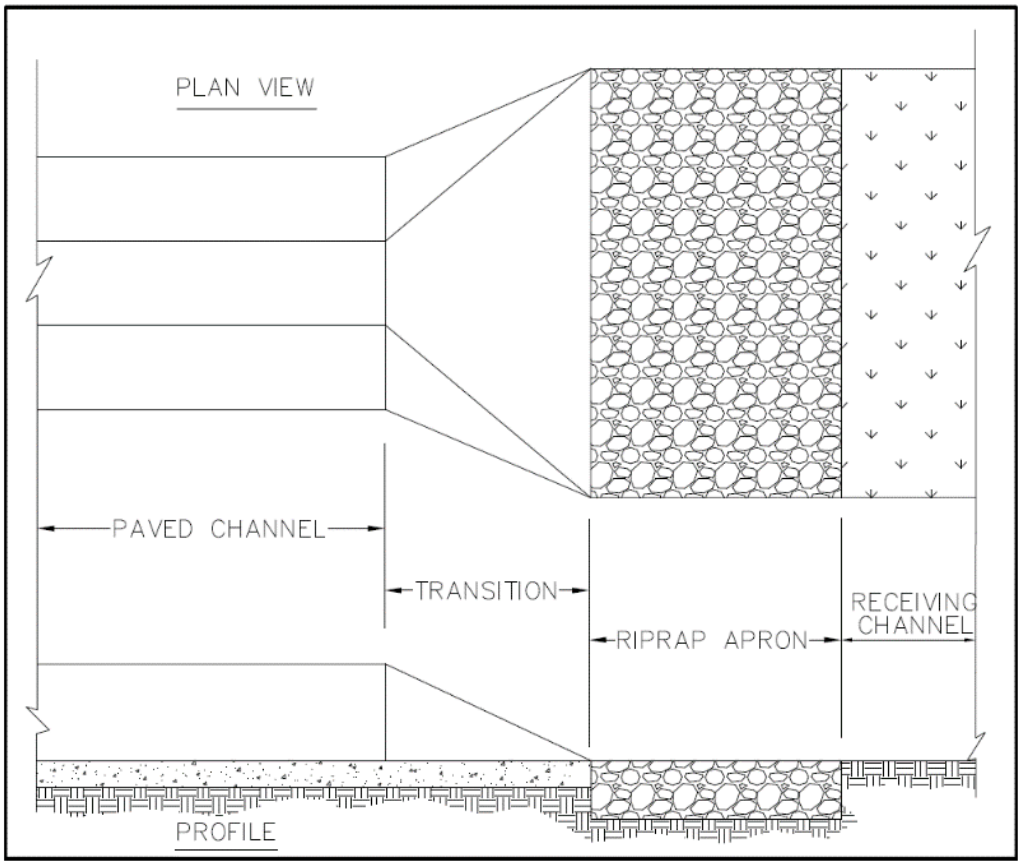


Figure OP-4 Paved Channel Outlet

1) The flow velocity at the outlet of paved channels flowing at design capacity should not exceed the velocity, which will cause erosion and instability in the receiving channel.

2) The end of the paved channel should merge smoothly with the receiving channel section. There should be no overfall at the end of the paved section. Where the bottom width of the paved channel is narrower than the bottom width of the receiving channel, a transition section should be provided. The maximum side divergence of the transition shall be 1 in 3F where

   F = v/gd, and
   F = Froude no.
   V = Velocity at beginning of transition (ft./sec.)
   d = Depth of flow at beginning of transition (feet.)
   g = 32.2 ft./sec.^{2}

3) Bends or curves in the horizontal alignment of the transition are not allowed unless the Froude no. (F) is 0.8 or less, or the section is specifically designed for turbulent flow.

Example Design Problems

Example 1

Given: An 18" pipe discharges 24 cu. ft/sec at design capacity onto a grassy slope (no defined channel).

Find: The required length, width and median stone size (d_{50}) for a riprap-lined apron.

Solution

Since the pipe discharges onto a grassy slope with no defined channel, a Minimum Tailwater Condition may be assumed.

From Figure OP-2, an apron length (La) of 20 feet and a median stone size (d_{50}) of 0.8 feet is determined.

The upstream apron width equals 3 times the pipe diameter: 3 x 1.5 feet = 4.5 feet.

The downstream apron width equals the apron length plus the pipe diameter:
20 feet + 1.5 feet = 21.5 feet.

Example 2

Given: The pipe in example No. 1 discharges into a channel with a triangular cross section, 2 feet deep and 2:1 side slopes. The channel has a 2% slope and an "n" coefficient of 0.045.

Find: The required length, width and the median stone size (d_{50}) for a riprap lining.

Solution

Determine the tailwater depth using Manning's Equation and the Continuity Equation.

$Q = 1.49/n \; R^{2/3} S^{1/2} A$

$24 = 1.49/n \; [2d/4.47]^{2/3} (.02)^{1/2} (2d^2)$

where, d = depth of tailwater
d = 1.74 feet. *

*Since d is greater than half the pipe diameter, a Maximum Tailwater Condition exists.

From Figure OP-3, a median stone size (d_{50}) of 0.5 feet. and an apron length (La) of 41 feet. is determined.

The entire channel cross section should be lined since the maximum tailwater depth is within 1-foot of the top of the channel.

Sediment Barrier (SB)

Practice Description

A sediment barrier is a temporary sediment control practice installed downstream of a disturbed area intended to remove large-sized suspended sediment from sheet flow runoff by facilitating settling and to a lesser extent filtration. The most commonly used sediment barrier is a silt fence made up of a geotextile fabric that is anchored into the ground and attached to supporting posts and possibly reinforced with a wire fence or polypropylene netting. Other barrier materials could include sand bags, wattles, and various man-made materials and devices that can be used in a similar manner as a silt fence.

This practice applies downstream of small disturbed areas that yield runoff volumes less than the design storage volume. Barriers intercept runoff from upslope to form impoundments that temporarily detain runoff and allow sediment to settle out of the water and remain on the construction site.

Planning Considerations

Sediment barriers are used downslope of a disturbed area to intercept sediment-laden runoff. It is important that they be designed and installed to impound runoff from the design storm event and create favorable conditions for sediment to settle out of suspension. It is also important that the ends of sediment barriers are turned back upslope to prevent runoff from bypass around the ends of the barrier. Sediment barriers should be designed to safely overtop when the design storm is exceeded and provide for controlled dewatering of the detained runoff. Prevention

of scouring, erosion, and undermining at and under sediment barriers is also of upmost importance to ensure maximum impoundment capabilities.

The success of silt fences depends on a proper installation. Ideally, silt fences should be placed on the contour with each end turned up slope. When this installation is not feasible, “C” configurations (smiles), or “J” hooks should be used. Silt fences should be carefully installed to meet the intended purpose of intercepting and impounding sheet flow runoff. When properly installed, silt fences are effective at trapping coarse sediment but do not effectively reduce turbidity.

A silt fence is specifically designed to retain sediment transported by sheet flow from disturbed areas. Water flow through the silt fence often decreases over time as silts and debris “blind” or seal the geotextile fabric. Silt fences should be installed to be stable under the flows expected from the site. Generally, silt fences should not be installed across streams, ditches, waterways, or other concentrated flow areas. When properly designed and installed, silt fences can be used as a Check Dam (See Check Dam).

Silt fences are composed of geotextile (i.e., woven and non-woven) supported between steel or wooden posts. Silt fences are commercially available with geotextile attached to the post and can be rolled out and installed by driving the post into the ground. This type of silt fence is simple to install, but more expensive than some other installations. Silt fences must be trenched in at the bottom to prevent runoff from undermining the fence and developing rills under the fence. Locations with high runoff flows or velocities (steeper slopes and higher Runoff Curve Numbers) should use either a wire or polypropylene net reinforcement. In addition, decreasing the spacing between support posts will improve the structural integrity of the silt fence in these areas.

The “off-set” trench installation method (See Fig. SB-1) is now the preferred method of silt fence installation. This involves a conventional 6 in. x 6 in. trench or 6 in. slice installation to bury the geotextile, with the posts and wire installed 6 in. downslope of the trench or slice. The wire (when used) is on top of the ground surface and not in a trench. This installation has proven to have less potential for undermining than any installation tested at the Auburn University Stormwater Research Facility.

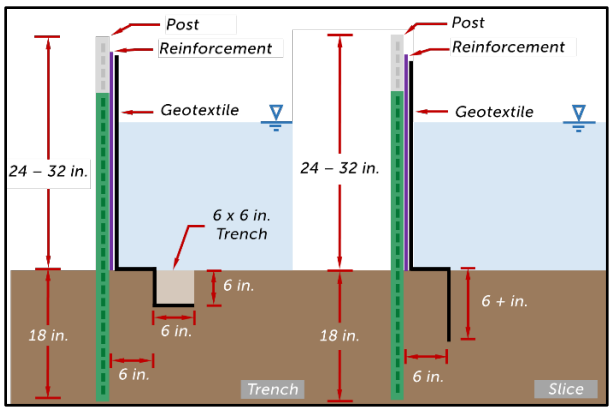


Figure SB-1 Off-Set Installation

Design Criteria (for silt fence)

Silt fence installations are normally limited to situations in which only sheet or overland flow is expected because the practice cannot pass the volumes of water generated by channelized flows. Silt fences are normally constructed of synthetic fabric (geotextile) and the life is expected to be the duration of most construction projects. Silt fence geotextile should conform to the property requirements found in AASHTO M288 shown in Table SB-1 as follows:

Table SB-1 Silt Fence Geotextile Fabric Requirements per AASHTO M288

Requirement	Test Methods	Units	Type A supported fence	Type B unsupported fence
Grab Strength Machine Direction X-Machine Direction	ASTM D4632/D4632M	N	 400 400	 550 450
Permittivity	ASTM D4491	sec^{-1}	0.05	0.05
Apparent Opening Size	ASTM D4751	mm	0.60 max avg roll value	0.60 max avg roll value
Ultraviolet stability (retained strength)	ASTM D4355/4355M	%	70% after 500 h of exposure	70% after 500 h of exposure

Note: ALDOT has an approved products list for geotextile

As a general rule-of-thumb the drainage area behind the silt fence should not exceed ¼ acre per 100 linear feet of silt fence for non-reinforced fence and ½ acre per 100 feet of reinforced silt fence. However, silt fence segments must be designed to impound runoff from the design storm event. Selection of the design storm should be based on site-specific characteristics including project location, duration of disturbance, and acceptable levels of risk to downstream receiving waters. Lacking site-specific guidance, a 2-yr, 24-hr design storm event is recommended.

Overflow Outlet and Dewatering

A silt fence segment must be designed for dewatering and overflow. Since geotextile materials blind or clog over time an effective means for dewatering must be included to prepare the silt fence for subsequent storms and minimize the chance of overtopping or periods of excessive ponding. The silt fence, at full storage capacity, should dewater in 4 to 12 hours. Overflow outlet(s) must be included for runoff that exceeds the design storm event and must convey the peak flow rate for the design storm event. One outlet option which has been well tested is a perforated board with a weir. This is installed in a break along the silt fence, which is sealed to the board. The break should be located at the lowest point of the silt fence segment. The board has several 1 in. diameter orifices, and a v-notch weir at the top, placed 18 in. from the bottom, to maintain volumetric storage (Fig. SB-2).

Figure SB-2 Example dewatering board & overflow weir.

Discharge from silt fence segments should be controlled to be non-erosive. Erosion control or scour protection, such as a geotextile splash apron and/or riprap, must be used immediately downstream of the dewatering and overflow outlet.

Type A Silt Fence

Type A fence shall be a minimum of 24 in. and not more than 32 in. above ground with wire reinforcements and is used on sites needing the highest degree of protection by a silt fence. The wire reinforcement is necessary because this type of silt fence is used for the highest runoff and flow situations. Wire fence should be made of 14-gauge wire with 6 in. x 6 in. openings (Note: ALDOT wire spacing may differ). Equivalent backing or reinforcement is allowed for wire reinforcement if it is sewn in or physically attached to the silt fence fabric. Type A silt fence should be used where runoff flows or velocities are particularly high or where slopes exceed a vertical height of 10 feet. Staked tie backs on each end of a Type A silt fence may be necessary to prevent overturning. Tie backs should also be used at points of possible concentration and overtopping if site conditions do not allow for the silt fence to be installed on the contour.

Provide an overflow outlet with a riprap splash pad with a geotextile underlay or other outlet protection device for any point where flow may overtop the silt fence.

The silt fence should be installed as shown in Figure SB-3. Maximum post spacing is 10 ft. In situations where runoff flows parallel with the silt fence when in perimeter control applications, 10 ft spacing is adequate. J-hooks should also be considered for long parallel flow scenarios to slow flow velocity and create areas of impoundments, thereby reducing scour potential under the silt fence. For the portion of the silt fence that creates the J-hook impoundment area, the maximum post spacing should be reduced to 5 ft. to support the hydrostatic loads. For all installations that intercept flow perpendicularly to the slope causing a concentrated impoundment, the maximum post spacing should be reduced to 5 ft. Materials for posts, post size, and fasteners are shown in Tables SB-2 and SB-3. Do not use "light weight" steel posts commonly found at building supply stores. Details for overlap of Type A silt fence is available from The Alabama Department of Transportation construction drawings and shown in Figure SB-4.

Geotextile silt fence material should be looped over each post and the top of the wire to prevent sagging. A "hog ring" attachment should be made each 1 ft along the top of the wire.

Table SB-2 Post Size for Silt Fence

Silt Fence	Minimum Length	Type of Post	Size of Post
Type A	4 ft	Steel "T" Post	1.25 lb./ft min.
Type B	4 ft	Soft Wood Oak Steel	3 in. diameter or 2X4 1.5 in. X 1.5 in. 1.33 lb./ft min.

Table SB-3 Wood Post Fasteners for Silt Fence

Fastener	Gauge	Crown	Legs	Staples/Post
Wire Staples	17 min.	¾" wide	½" long	5 min.
	Gauge	**Length**	**Button Heads**	**Nail/Post**
Nails	14 min.	1"	¾" long	4 min.

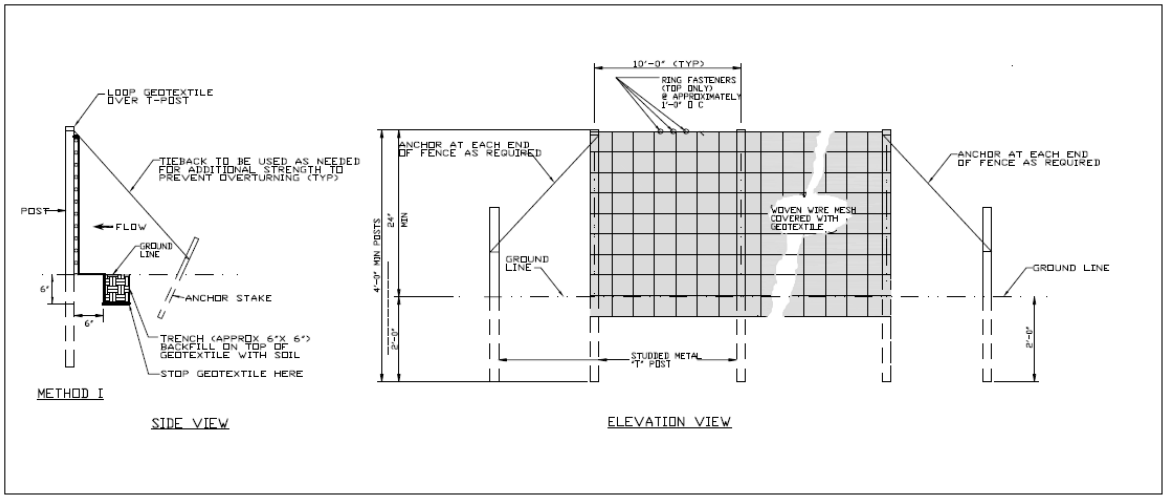


Figure SB-3 Silt Fence-Type A
(For post material requirements see Tables SB-2 and SB-3)

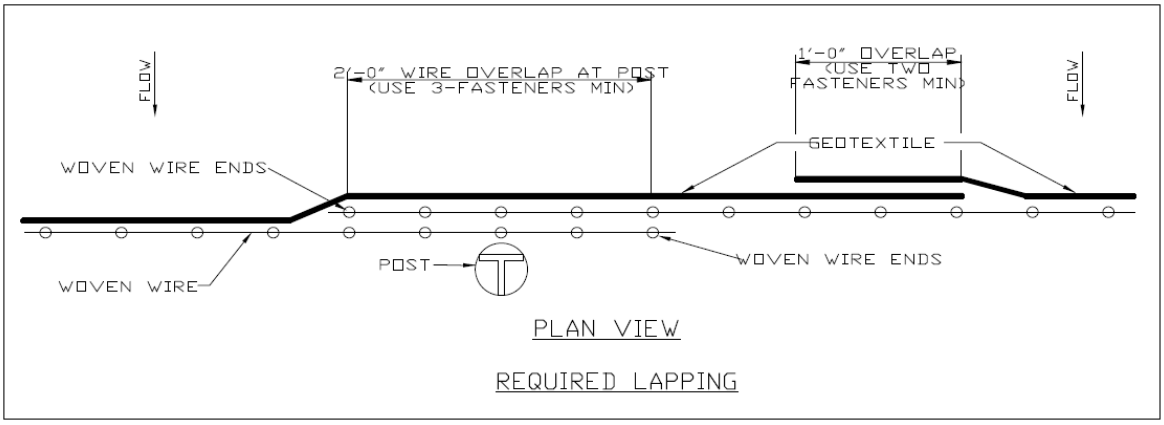


Figure SB-4 Type A Silt Fence Overlap

Type B Silt Fence

This 36 in. wide geotextile fabric should be used on developments where the life of the project is short (6 months or less) and there is less need for protection from a silt fence.

The silt fence should be installed as shown in Figure SB-5. Post spacing is either 4 ft or 6 ft based on geotextile elongation % (see note on Figure SB-5). Materials for posts and fasteners are shown in Tables SB-2 and SB-3. Details for overlap of the silt fence and fastener placement are shown in Figure SB-6. Provide overflow and dewatering devices if needed.

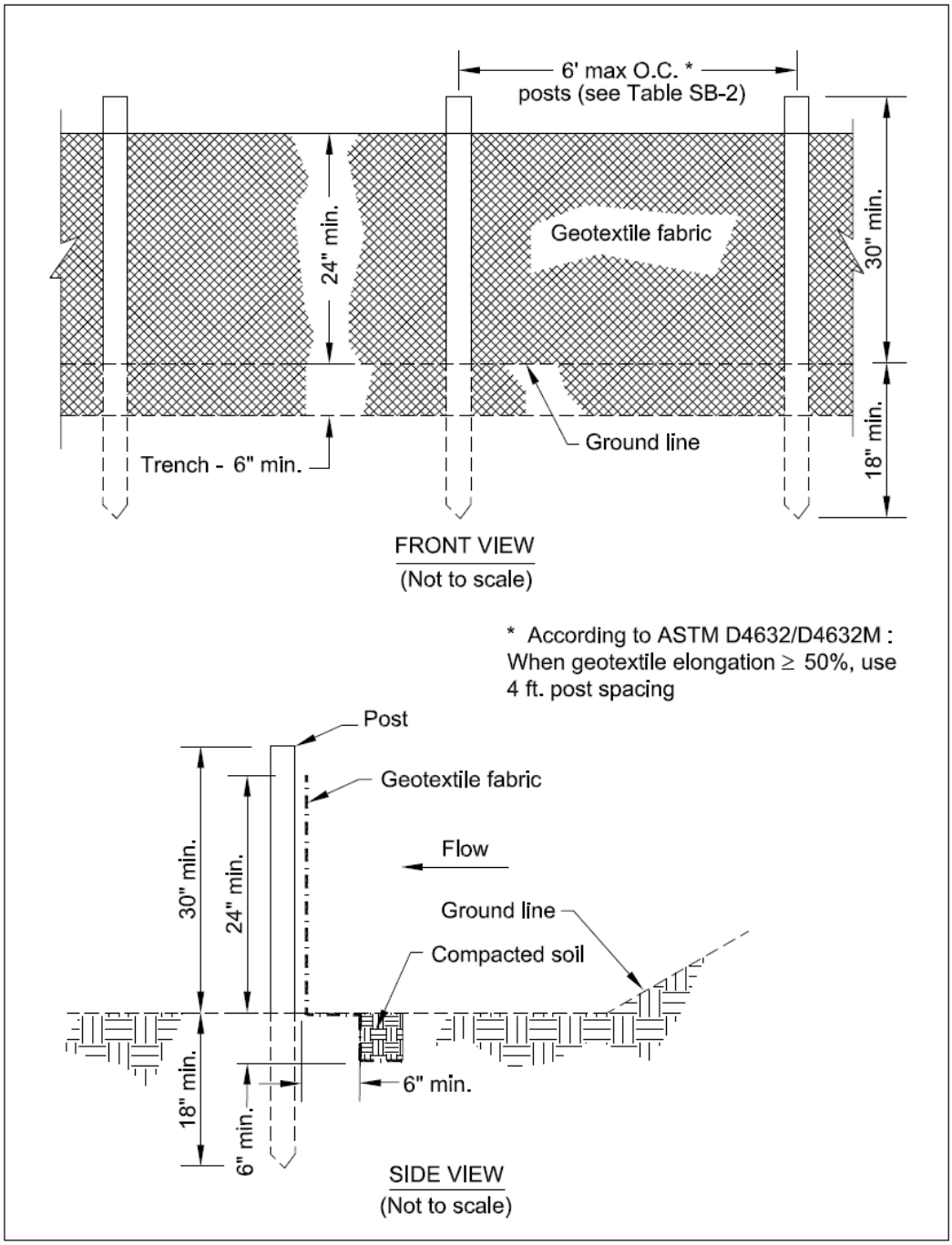


Figure SB-5 Silt Fence - Type B
(For post material requirements see Tables SB-2 and SB-3)

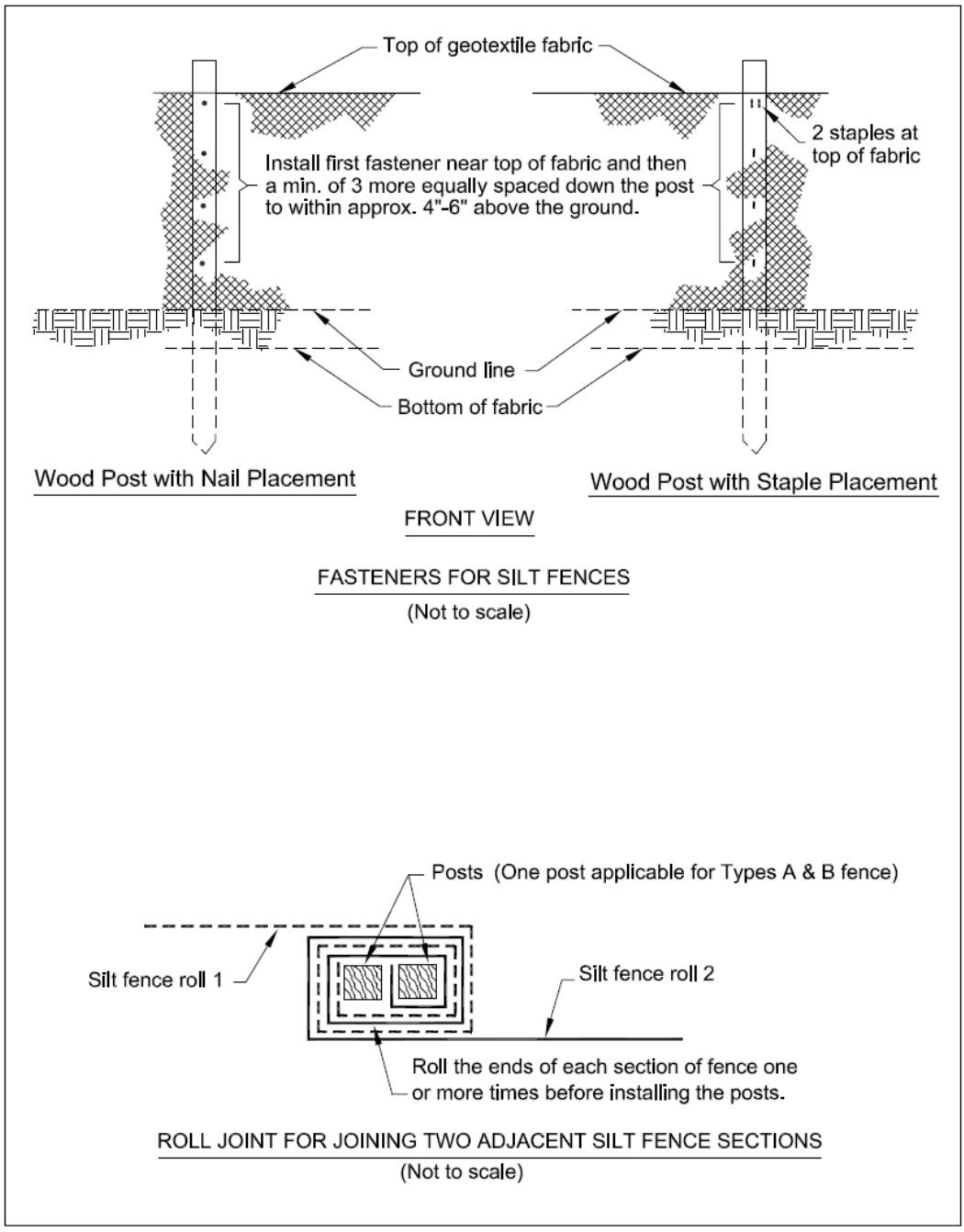


Figure SB-6 Silt Fence Installation Details for Type B

Sediment Basin (SBN)

Practice Description

A temporary impoundment designed and constructed to capture stormwater runoff and soil particles. This practice applies to sites where more storage is needed than provided by other sediment control practices and where turbidity must be reduced.

Planning Considerations

Sediment basins are needed where drainage areas are too large for other sediment control practices.

Select locations for basins during initial site evaluation. Locate basin so that sudden failure should not cause loss of life or serious property damage. Install sediment basins before any site grading takes place within the drainage area.

Select sediment basin sites to capture sediment from all areas that are not treated adequately by other sediment control measures. Always consider access for cleanout and disposal of the trapped sediment. Locations where a pond can be formed by constructing a low dam across a natural swale are generally preferred to sites that require excavation. Where practical, divert sediment-free runoff away from the basin. Ensure the slopes of the basin are stabilized to prevent erosion by vegetating or using a non-woven geotextile.

Because the auxiliary spillway is used relatively frequently, it is generally stabilized using geotextile and riprap that can withstand the expected flows and velocities without causing erosion. The spillway should be placed as far from the inlet of the basin as possible to maximize sedimentation before discharge. The spillway should be in natural ground (not over the embankment) to the greatest extent possible.

The use of approved flocculants properly introduced into the turbid runoff water should be considered to help polish the discharge from the basin for meeting turbidity requirements. Flocculant is best introduced upstream of the basin in a turbulent flow area.

A forebay or sump area prior to the basin should be considered for capture of heavier soil particles. Forebays also provide a more localized area for removing captured sediment and can extend maintenance cycles for the basin.

Sediment Basin technology can be retrofitted on Stormwater Detention Basins during the construction phase of a project.

Design Criteria

Inlet Structure

Turbid runoff should be directed to an inlet structure that conveys the runoff into the basin without causing erosion of the basin itself. The inlet structure must be positioned so that flows enter the basin from the opposite side of the discharge outlet.

Baffles

Porous baffles should be installed perpendicular between the inlet and outlet of the basin to effectively spread the flow across the entire width of a sediment basin and cause increased deposition within the basin. Water flows through the baffle material, but is slowed sufficiently to impound flow, causing it to spread across the entire width of the baffle (Figure SBN-1). Spreading the flow in this manner uses the full cross section of the basin and reduces turbulence, which shortens the time required for sediment to be deposited.

The installation should be similar to a sediment barrier (silt fence) (Figure SBN-2) using posts and wire backing. The most effective material for a baffle is two layers of 700 - 900 g/m^2 coir erosion blanket (Figure SBN-3). Other materials proven by research to be equivalent in this application may be used. A support wire or rope across the top will help prevent excessive sagging if the material is attached to it with appropriate ties. Another option is to use a sawhorse type of support with the legs stabilized with rebar inserted into the basin floor. These structures work well and can be prefabricated off site and quickly installed.

Baffles need to be installed correctly to fully provide their benefits. Refer to Figure SBN-2 and the following key points:

- The baffle material needs to be secured at the bottom and sides by using staples or stakes, trenching, or securing horizontally to the bottom. Flow should not be allowed under, over, or around the baffle. The height of the baffle should be the full depth of the basin, including the depth of flow through the auxiliary spillway.
- Most of the sediment will accumulate in the first bay, so this should be readily accessible for maintenance.

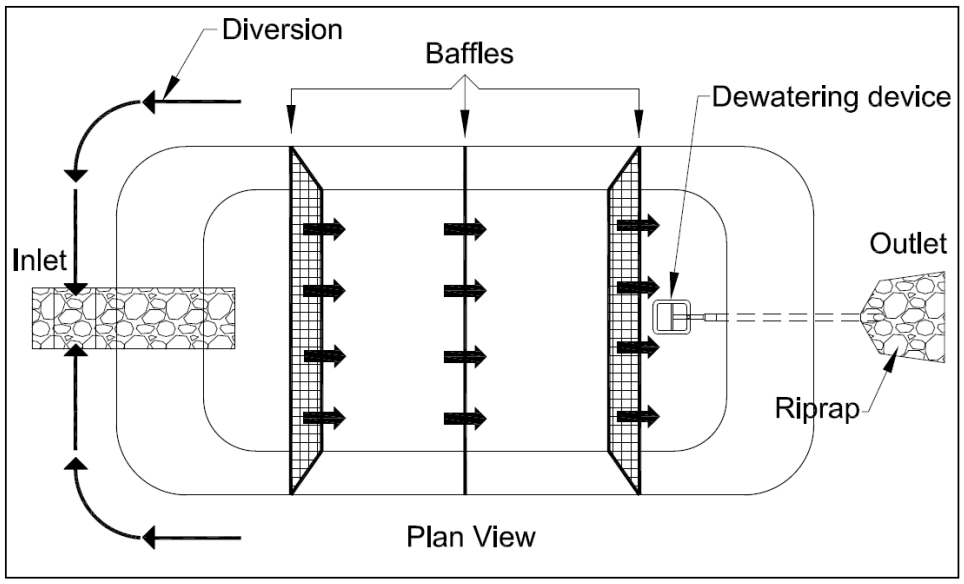


Figure SBN-1 Porous Baffles in a Sediment Basin
(modified from the North Carolina Erosion and Sediment Control Planning and Design Manual.)

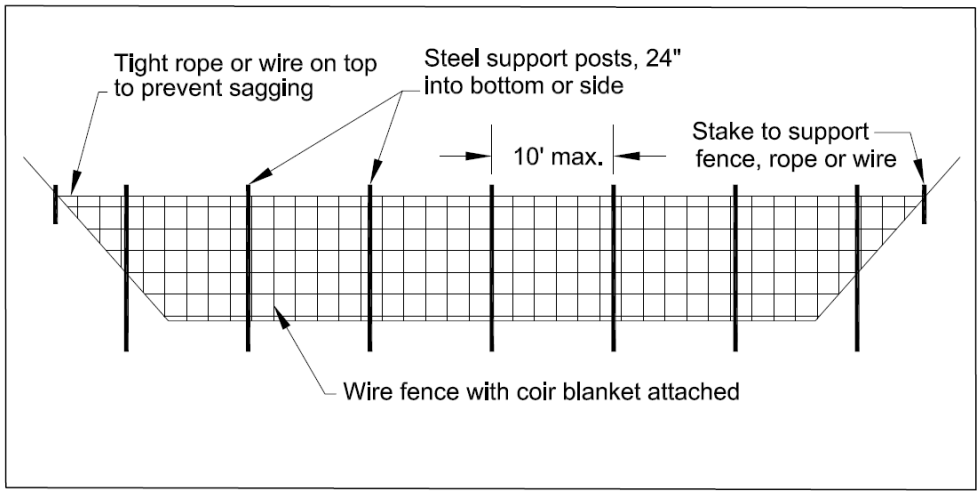


Figure SBN-2: Cross-Section of a Porous Baffle in a Sediment Basin.
Note: there is no weir because the water flows through the baffle material.
(from North Carolina Erosion and Sediment Control Planning and Design Manual.)

Figure SBN-3: Example of Porous Baffle Made of Coir Erosion Blanket as Viewed from the Inlet

Basin Dewatering

Sediment basins should be dewatered from the surface. A device often used for this is a skimmer that withdraws water from the basin's water surface, thus removing the highest quality water for delivery to the uncontrolled environment. One type of skimmer is shown in Figure SBN-4. By properly sizing the skimmer's control orifice, the skimmer can be made to dewater a design hydrologic event in a prescribed period.

An advantage of the skimmer is that it can be reused on future projects. Skimmers are generally maintenance free, but may require occasional maintenance to remove debris from the orifice.

All basin dewatering devices must dewater the basin from the top of the water surface. The rate of dewatering must be controlled. A dewatering time of 48 to 120 hours (2 to 5 days) is required for the basin to function properly.

If turbidity requirements are unattainable, the designer may want to consider adding a valve to the outlet of the discharge pipe to contain turbid runoff. This provides additional settling time and may allow the captured water to be actively treated with flocculant prior to discharge, if deemed necessary. However, if the treated water is not timely discharged, the basin storage volume will not be available for subsequent rainfall events occurring on site that result in additional runoff.

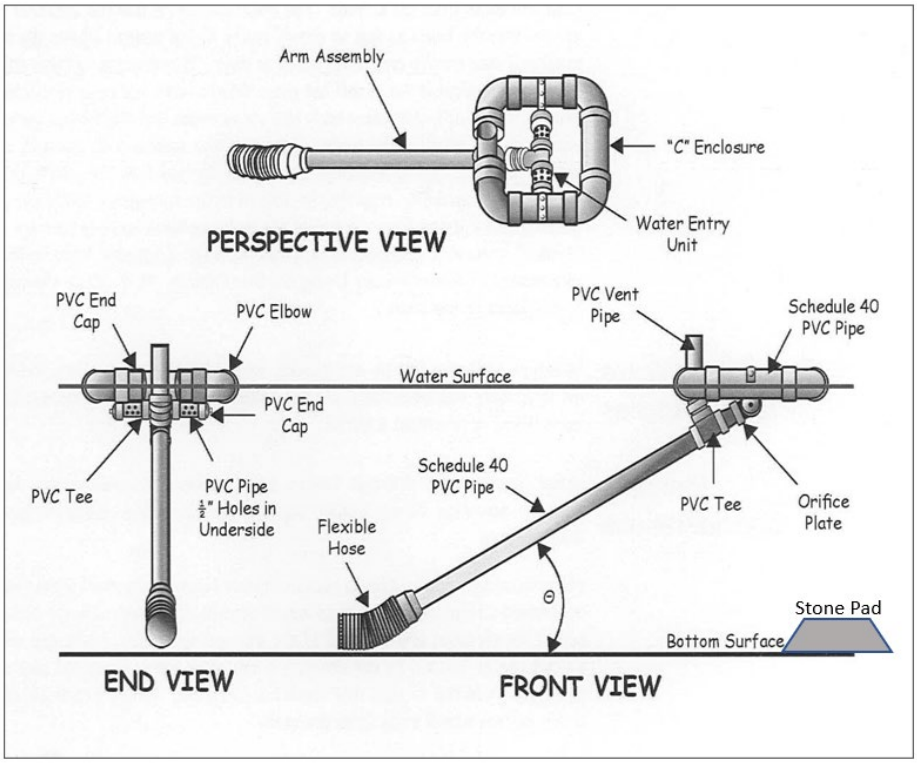


Figure SBN-4: Schematic of a Skimmer
(modified from Pennsylvania Erosion and Sediment Pollution Control Manual, March 2000)

Design Criteria

Summary:	**Temporary Sediment Trap**
Auxiliary Spillway:	Trapezoidal open channel spillway with non-erosive lining. 10 – year, 24 – hour rainfall event
Recommended Maximum Drainage Area:	10 acres
Minimum Standing Pool Depth:	1 foot
Minimum Volume:	3,600 cubic feet per acre of drainage area
Minimum L/W Ratio:	2:1
Minimum Depth:	2 feet
Dewatering Mechanism:	Skimmer(s) or other approved basin dewatering device.
Dewatering Time:	2 – 5 days
Baffles Required:	3

Compliance with Laws and Regulations

Design and construction should comply with state and local laws, ordinances, rules, and regulations.

Design Basin Life

Structures intended for more than 3 years of use should be designed as permanent structures. Procedures outlined in this section do not apply to permanent structures.

Dam Height

To ensure public safety, the maximum dam height should be 10 feet, measured from the designed (settled) top elevation of the dam to the lowest point at the downstream toe.

Drainage Area

To minimize risk to the public and environment, the maximum drainage area for each sediment basin should be minimized. Diverting water from undisturbed areas can reduce the size of the basin. The recommended maximum drainage area is 10 acres.

Basin Locations

Select areas that:

- Are not intermittent or perennial streams
- Allow a maximum amount of construction runoff to be brought into the structure
- Provide capacity for storage of sediment from as much of the planned disturbed area as practical
- Exclude runoff from undisturbed areas where practical
- Provide access for sediment removal throughout the life of the project
- Interfere minimally with construction activities

Basin Shape

Ensure that the flow length to basin width ratio is 2:1 or larger to improve trapping efficiency. Length is measured at the elevation associated with the minimum storage volume. Generally, the bottom of the basin should be level to ensure the baffles function properly. The area between the inlet and first baffle can be designed with reverse grade to improve the trapping efficiency.

Research has shown that the surface area of the basin should be maximized to improve trapping efficiency. Results of tests show that a surface area of 325 sq. ft. per cubic feet per second of discharge associated with the peak discharge for the 10-year, 24-hour event, is needed for effective trapping efficiency. Designers should check to see if this surface area is possible on the site.

Storage Volume

Ensure that the sediment storage volume of the basin is at least 3,600 cubic feet per acre for the area draining into the basin. Volume is measured below the crest of the auxiliary spillway crest and above the standing pool elevation. Remove sediment from the basin when approximately one-half of the sediment storage volume has been filled.

Runoff in excess of 1 inch per acre from the drainage basin will not be contained in the 3,600 cubic feet per acre requirement. More storage volume may be needed for local conditions or requirements. Adding dead storage may be necessary on some sites in order to retain a portion of the runoff within the basin.

Baffles

Space the baffles to create equal zones of volume within the basin.

The top of the baffle should be the same elevation as the maximum water depth flowing through the auxiliary spillway. Baffles are most effective at a height of 3 feet; however, site conditions may warrant taller baffles.

Baffles should be designed to go up the sides of the basin banks, so water does not flow around the baffles. Most of the sediment will be captured in the first bay. Smaller particle size sediments are captured in the latter bays.

The design life of the baffle fabric can be up to 3 years but may need to be replaced more often if damaged or clogged.

Spillway Capacity

The auxiliary spillway system must carry the peak runoff from the 10-year 24-hour storm with a minimum 1 foot of freeboard (distance between the surface of the water with the spillway flowing full and the top of the embankment). Base runoff computations on the most severe soil cover conditions expected in the drainage area during the effective life of the structure.

Sediment Cleanout Elevation

Determine the elevation at which the invert of the basin would be half-full. This elevation should also be marked in the field with a permanent stake set at this ground elevation (not the top of the stake).

Basin Dewatering

The basin should be provided with a surface outlet. A floating skimmer should be attached to a Schedule 40 PVC barrel pipe of the same diameter as the skimmer arm. The skimmer apparatus will control the rate of dewatering. The skimmer should be sized to dewater the basin in 48-120 hours (2-5 days). The barrel pipe should be located under the embankment. When potential soil piping is a concern during the life of the project, place at least one anti-seep collar at the center of the embankment projecting a minimum of 1.5 ft. in all directions from the pipe. A filter diaphragm can be used in lieu of an anti-seep collar (See NRCS National Engineering Handbook Chapter 45 – Filter Diaphragms for design procedures). The barrel pipe outlet must be stable and not cause erosion.

Skimmer Orifice Diameter

Skimmer Selection Procedure

The manufacturer's skimmer performance charts are recommended for use in selecting skimmers for use in dewatering sediment control basins. Always verify performance with the manufacturer's information.

Required input data:
Basin volume = _____ ft^3
Desired dewatering time = _____ days

Procedure:
1. First use the basin volume (ft^3) and the desired dewatering time (days) and determine the required skimmer outflow rate in cubic feet per day (ft^3/d) from the following equation

$$Q = \frac{V}{t_d}$$

2. Scan the manufacturer's skimmer performance charts and select the (a) skimmer size and (b) the skimmer orifice diameter (in inches) if desired.

Example: Select a skimmer that will dewater a 20,000 ft^3 sediment basin in 3 days.

Solution: First compute the required outflow rate as

$$Q = \frac{V}{t_d} = \frac{20000\,ft^3}{3d} = 6670\,ft^3/d$$

Now go to the manufacturer's selection charts and select an appropriate skimmer. For example, a 2-inch skimmer with no orifice could have an outflow rate of 5,429 ft^3/d, which will require about 3.5 days to dewater the basin. A 4-inch

skimmer with a 2.5-inch diameter orifice could have an outflow rate of 8,181 ft^3/d and dewater the basin in about 2.5 days.

Example: A More Precise Alternative: Most skimmers come with a plastic plug that can be drilled forming a hole that will limit the skimmer's outflow to any desired rate. Thus, for a specific skimmer the orifice that will dewater a basin in a more precisely chosen time can be determined. The flow through an orifice can be computed as

$$Q = CA\sqrt{2gH}$$

where C is the orifice coefficient (usually taken to be 0.6), A is the orifice cross-sectional area in ft^2, g is the acceleration of gravity (32.2 ft./sec^2), and H is the driving head on the orifice center in feet. The orifice equation can be simplified to yield the orifice flow in gpm using the diameter D (in inches) and the head in feet as

$$Q = 12D^2\sqrt{H} \ .$$

Or the orifice flow in ft^3/d using the diameter D (in inches) and the head in feet as

$$Q = 2310D^2\sqrt{H} \ .$$

If we solve the orifice equation for the orifice diameter using the desired outflow rate (6670 ft^3/d) and the head driving water through the skimmer (0.333 ft. for a 4-inch skimmer) as

$$D = \sqrt{\frac{Q}{2310\sqrt{H}}} = \sqrt{\frac{6670}{2310\sqrt{0.333}}} = 2.24 inches$$

We see that if the plastic plug were drilled to a diameter of 2.24 inches and placed in a 4-inch skimmer, the dewater rate would be 6,670 ft^3/d and the 20,000 ft^3 basin would dewater in 3 days.

Outlet Protection

Provide outlet protection to ensure erosion does not occur at the pipe outlet.

Basin Auxiliary Spillway

The auxiliary spillway should carry the peak runoff from a 10-year storm. The spillway should have a minimum 10-foot bottom width, 0.5-foot flow depth, and 1-foot freeboard above the design water surface.

Construct the entire flow area of the spillway in undisturbed soil to the greatest extent possible. Cross section should be trapezoidal, with side slopes 3:1 or flatter for grass spillways (Figure SBN-5) and 2:1 for riprap. Select a vegetated lining to meet flow requirements and site conditions.

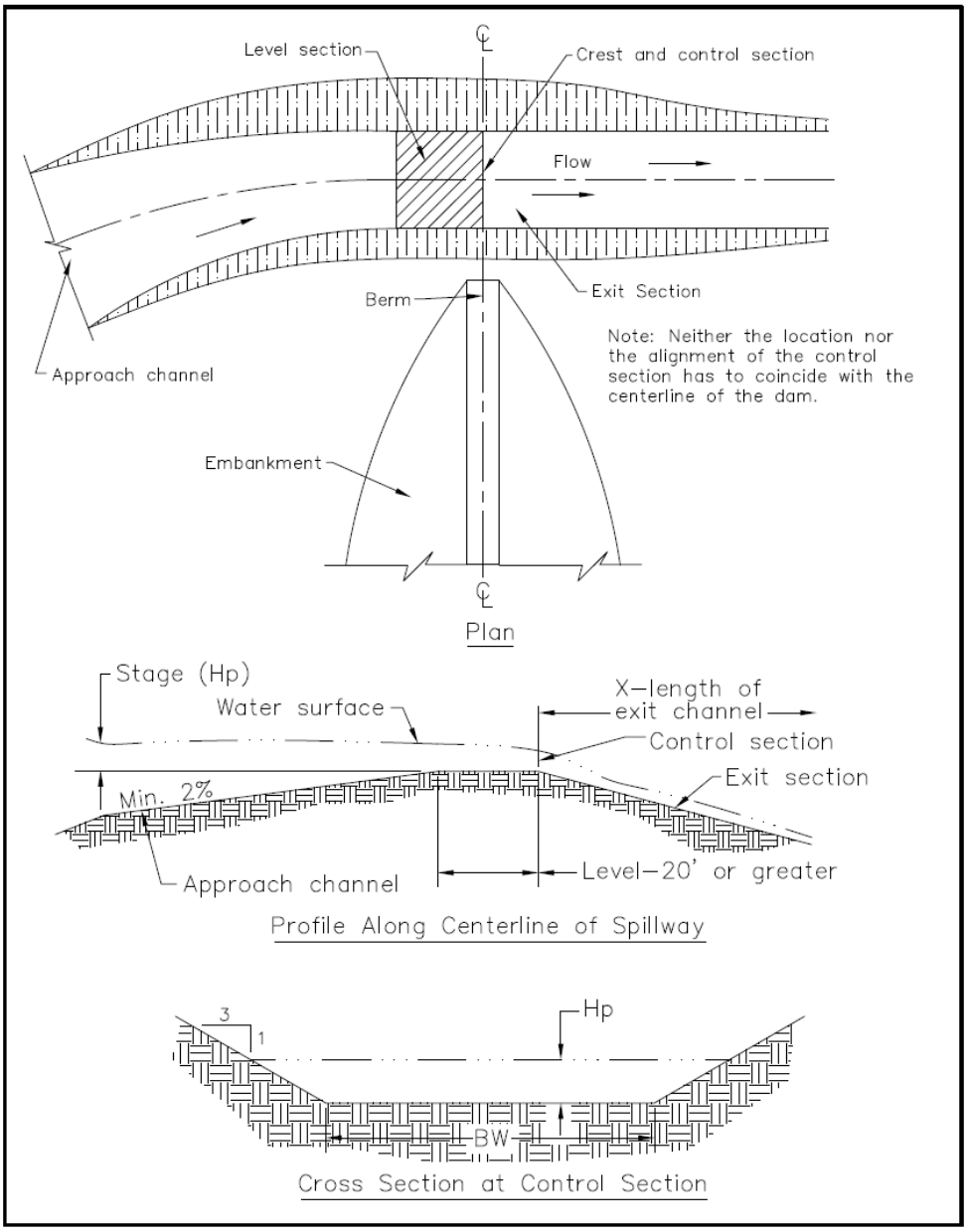


Figure SBN-5: Excavated Grass Spillway Views

Inlet Section

Ensure that the approach section has a slope toward the impoundment area of not less than 2% and is flared at its entrance, gradually reducing to the design width of the control section. The inlet portion of the spillway may be curved to improve alignment.

The Control Section

The control section of the spillway should be level and straight and at least 20 ft. long for grass spillways and 10 feet for riprap. Determine the width and depth for the required capacity and site conditions. Wide, shallow spillways are preferred because they reduce outlet velocities.

The Outlet Section

The outlet section of the spillway should be straight, aligned and sloped to assure supercritical flow with exit velocities not exceeding values acceptable for site conditions.

Outlet Velocity

Ensure that the velocity of flow from the basin is nonerosive for existing site conditions. It may be necessary to stabilize the downstream areas or the receiving channels.

Embankment

Embankments should not exceed 10 feet in height, measured at the center line from the original ground surface to the designed (settled) top elevation of the embankment. Keep a minimum of 1 foot between the designed (settled) top of the dam and the design water level in the auxiliary spillway. Additional freeboard may be added to the embankment height which allows flow through a designated bypass location. Embankments are generally constructed with a minimum top width of 8 feet and side slopes of 2.5:1 or flatter.

When needed to control seepage, a cutoff trench should be installed under the dam at the centerline. The trench would be at least 2 feet deep with 1.5:1 side slopes, and sufficiently wide (at least 8 ft.) to allow compaction by machine.

Embankment material should be a stable mineral soil, free of roots, woody vegetation, rocks or other objectionable materials, with adequate moisture for compaction. Place fill in 9-inch layers through the length of dam and compact by routing construction hauling equipment over it. Maintain moisture and compaction requirements according to the plans and specifications. Hauling or compaction equipment must traverse each layer so that the entire surface has been compacted by at least one pass of the equipment wheels or tracks.

Excavation

Where sediment pools are formed or enlarged by excavation, keep side slopes at 2:1 or flatter for safety.

Erosion Protection

Minimize the area disturbed during construction. Divert surface water from disturbed areas. When possible, delay clearing the sediment impoundment area until the dam is in place. Keep the remaining temporary pool area undisturbed. Stabilize the spillway, embankment, and all disturbed areas with permanent vegetation. The basin bottom should also be established to a vegetative cover or covered with non-woven geotextile to prevent erosion of the basin itself and promote sediment deposition.

Trap Efficiency

Improve sediment basin trapping efficiency by employing the following considerations in the basin design:

- Surface area—In the design of the settling pond, allow the largest surface area possible. The shallower the pool, the better.
- Length—Maximize the length-to-width ratio of the basin to provide the longest flow path possible.
- Baffles—Provide a minimum of three porous baffles to evenly distribute flow across the basin and reduce turbulence.
- Inlets—Area between the sediment inlets and the basin bottom should be stabilized by geotextile material, riprap with geotextile, a pipe drop, or other similar methods (Figure SBN-6 shows the area with rocks). Inlets to basin should be located the greatest distance possible from the spillway.
- Dewatering—Allow the maximum reasonable detention period before the basin is completely dewatered (minimum of at least 48 hours).
- Inflow rate—Reduce the inflow velocity to nonerosive rates and divert all sediment-free runoff
- Establish permanent vegetation in the bottom and side slopes of the basin.
- Introduce the appropriate flocculent material at the turbulent entrance of the runoff water into the basin. Apply the flocculent according to manufacturer's recommendations.

Safety

Avoid steep side slopes. Fence basins properly and mark them with warning signs if trespassing is likely. Follow all State and local safety requirements.

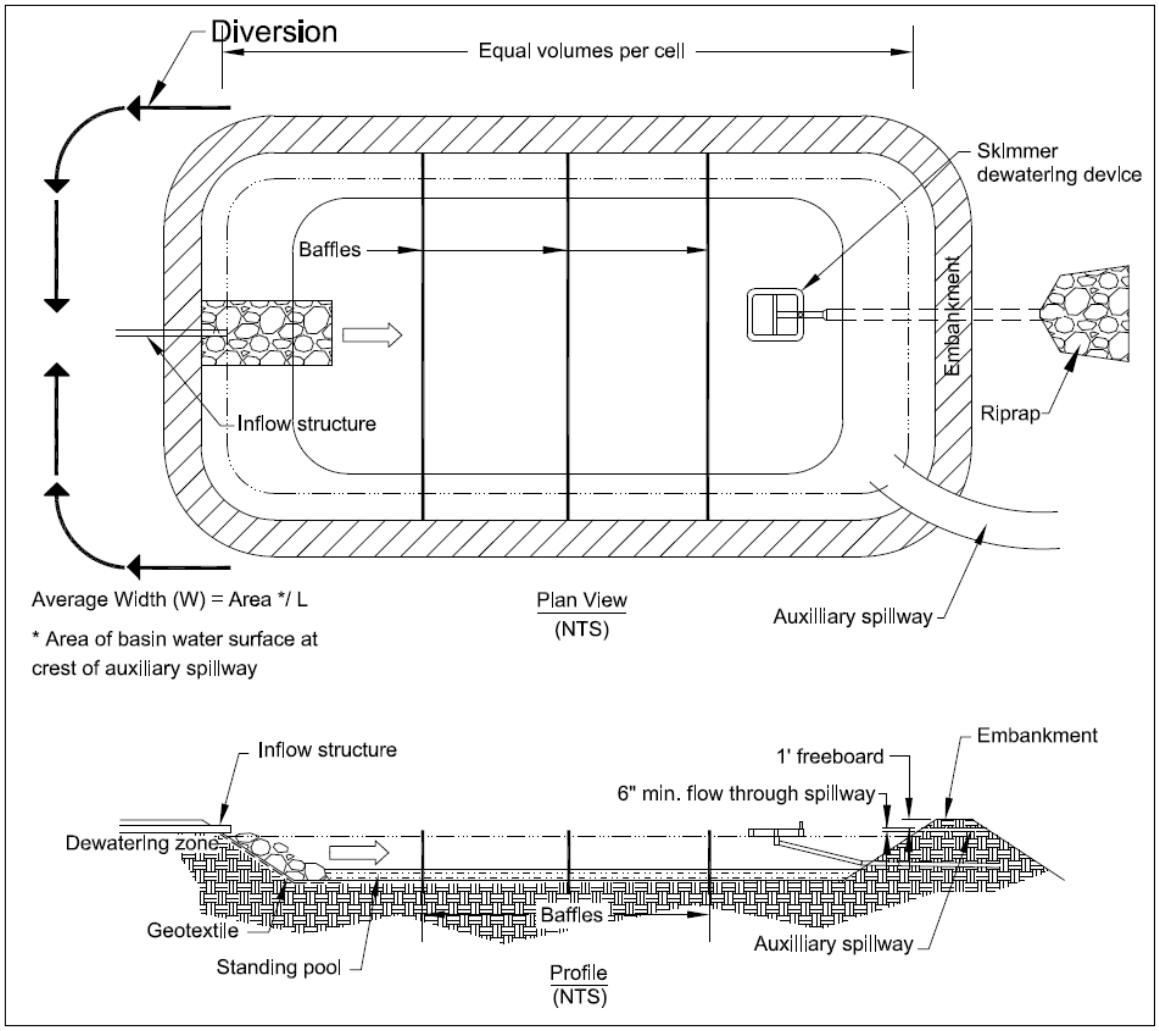


Figure SBN-6: Example of a Sediment Basin with a Skimmer Outlet and Auxiliary Spillway
(modified from Pennsylvania Erosion and Sediment Control Manual, March 2000)

Design Procedure

Step 1. Determine peak flow, Q_{10}, for the basin drainage area using the NRCS runoff curve number method.

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

Step 3. Determine basin volumes:

- Determine standing pool elevation.
- Compute minimum volume required (3,600 ft^3/acre of drainage area) above the standing pool.
- Specify sediment cleanout level to be clearly marked (one-half the design volume). Specify that the basin area is to be cleared after the dam is built.

Step 4. Determine area of basin, shape of basin, and baffles:

- Check length/width ratio (should be 2:1 or larger) and the surface area (325 sq.ft./Qp10).
- Ensure the bottom of the basin is level.
- Design and locate a minimum of 3 coir baffles. The baffle spacing should produce equal volumes of storage within the basin when the basin if full. The top elevation of the baffles will be set in Step 7.

Step 5. Size the skimmer, skimmer orifice, and barrel pipe.

Use Table SBN-1 or the precise alternative design to size the orifice. Generally, a Schedule 40 PVC barrel pipe the same size as the skimmer arm is used under the embankment.

Step 6. Design the anti-seep collar (optional based on site conditions).

Ensure that antiseep collar is no closer than 2 ft from a pipe joint and as close to the center of the embankment as possible. Collar must project at least 1.5 ft. from the pipe and be watertight.

Step 7. Determine the auxiliary spillway dimensions.

Size the spillway bottom width and flow depth to handle the Q_{10} peak flow. Tables SBN-1 and SBN-2 can be used for the design process for grassed auxiliary spillways. Use appropriate design procedures for spillways with other surfaces. Set top of baffles at the elevation of the designed maximum flow depth of the auxiliary spillway.

Step 8. Spillway approach section.

Adjust the spillway alignment so that the control section and outlet section are straight. The entrance width should be 1.5 times the width of the control section

with a smooth transition to the width of the control section. Approach channel should slope toward the reservoir no less than 2%.

Step 9. Spillway control section.

- Locate the control section in natural ground to the greatest extent possible.
- Keep a level area to extend at least 20 ft. (grass) or 10 ft. (riprap) upstream from the outlet end of the control section to ensure a straight alignment.
- Side slopes should be 3:1 (grass) or 2:1 (riprap).

Step 10. Design spillway exit section.

- Spillway exit should align with the control section and have the same bottom width and side slopes.
- Slope should be sufficient to maintain supercritical flow, but make sure it does not create erosive velocities for site conditions. (Stay within slope ranges in appropriate design tables.)
- Extend the exit channel to a point where the water may be released without damage.

Step 11. Size the embankment.

- Set the design elevation of the top of the dam a minimum of 1 ft. above the water surface for the design flow in the auxiliary spillway.
- Constructed height should be 10% greater than the design to allow for settlement.
- Set side slopes 2.5:1 or flatter.
- Determine depth of cutoff trench from site borings. It should extend to a stable, tight soil layer (a minimum of 2 ft. deep).
- Select borrow site remembering that the spillway cut may provide a significant amount of fill.

Step 12. Erosion control

- Select surface stabilization measures to control erosion.
- Select groundcover for auxiliary spillway to provide protection for design flow velocity and site conditions. Riprap stone over geotextile fabric may be required in erodible soils or when the spillway is not in undisturbed soils.
- Establish all disturbed areas including the basin bottom and side slopes to vegetation (see the Permanent Seeding practice).

Step 13. Safety.

- Construct a fence and install warning signs as needed.

Table SBN-1 Design Table for Vegetated Spillways Excavated in Erosion Resistant Soils (side slopes 3 horizontal: 1 vertical)

Discharge Q CFS	Slope Range		Bottom Width Feet	Stage Feet
	Minimum Percent	Maximum Percent		
15	3.3	12.2	8	.83
	3.5	18.2	12	.69
20	3.1	8.9	8	.97
	3.2	13.0	12	.81
	3.3	17.3	16	.70
25	2.9	7.1	8	1.09
	3.2	9.9	12	.91
	3.3	13.2	16	.79
	3.3	17.2	20	.70
30	2.9	6.0	8	1.20
	3.0	8.2	12	1.01
	3.0	10.7	16	.88
	3.3	13.8	20	.78
35	2.8	5.1	8	1.30
	2.9	6.9	12	1.10
	3.1	9.0	16	.94
	3.1	11.3	20	.85
	3.2	14.1	24	.77
40	2.7	4.5	8	1.40
	2.9	6.0	12	1.18
	2.9	7.6	16	1.03
	3.1	9.7	20	.91
	3.1	11.9	24	.83
45	2.6	4.1	8	1.49
	2.8	5.3	12	1.25
	2.9	6.7	16	1.09
	3.0	8.4	20	.98
	3.0	10.4	24	.89
50	2.7	3.7	8	1.57
	2.8	4.7	12	1.33
	2.8	6.0	16	1.16
	2.9	7.3	20	1.03
	3.1	9.0	24	.94
60	2.6	3.1	8	1.73
	2.7	3.9	12	1.47
	2.7	4.8	16	1.28
	2.9	5.9	20	1.15
	2.9	7.3	24	1.05
	3.0	8.6	28	.97
70	2.5	2.8	8	1.88
	2.6	3.3	12	1.60
	2.6	4.1	16	1.40
	2.7	5.0	20	1.26
	2.8	6.1	24	1.15
	2.9	7.0	28	1.05
80	2.5	2.9	12	1.72
	2.6	3.6	16	1.51
	2.7	4.3	20	1.35

Discharge Q CFS	Slope Range		Bottom Width Feet	Stage Feet
	Minimum Percent	Maximum Percent		
80	2.8	5.2	24	1.24
	2.8	5.9	28	1.14
	2.9	7.0	32	1.06
90	2.5	2.6	12	1.84
	2.5	3.1	16	1.61
	2.6	3.8	20	1.45
	2.7	4.5	24	1.32
	2.8	5.3	28	1.22
	2.8	6.1	32	1.14
100	2.5	2.8	16	1.71
	2.6	3.3	20	1.54
	2.6	4.0	24	1.41
	2.7	4.8	28	1.30
	2.7	5.3	32	1.21
	2.8	6.1	36	1.13
120	2.5	2.8	20	1.71
	2.6	3.2	24	1.56
	2.7	3.8	28	1.44
	2.7	4.2	32	1.34
	2.7	4.8	36	1.26
140	2.5	2.7	24	1.71
	2.5	3.2	28	1.58
	2.6	3.6	32	1.47
	2.6	4.0	36	1.38
	2.7	4.5	40	1.30
160	2.5	2.7	28	1.70
	2.5	3.1	32	1.58
	2.6	3.4	36	1.49
	2.6	3.8	40	1.40
	2.7	4.3	44	1.33
180	2.4	2.7	32	1.72
	2.4	3.0	36	1.60
	2.5	3.4	40	1.51
	2.6	3.7	44	1.43
200	2.5	2.7	36	1.70
	2.5	2.9	40	1.60
	2.5	3.3	44	1.52
	2.6	3.6	48	1.45
220	2.4	2.6	40	1.70
	2.5	2.9	44	1.61
	2.5	3.2	48	1.53
240	2.5	2.6	44	1.70
	2.5	2.9	48	1.62
	2.6	3.2	52	1.54
260	2.4	2.6	48	1.70
	2.5	2.9	52	1.62
280	2.4	2.6	52	1.70
300	2.5	2.6	56	1.69

Example of Table Use:

Given: Discharge, Q_{10} = 87 cfs, Spillway slope (exit section) = 4%.
Find: Bottom Width and Stage in Spillway.
Procedure: Using a discharge of 90 cfs, note that the spillway (exit section) slope falls within slope ranges corresponding to bottom widths of 24, 28, and 32 ft. Use bottom width of 32 ft, to minimize velocity. Stage in the spillway is 1.14 ft.
Note: Computations are based on: Roughness coefficient, n = 0.40 and a maximum velocity of 5.50 ft. per sec.

Table SBN-2 Design Table for Vegetated Spillways Excavated in Very Erodible Soils (side slopes 3 horizontal: 1 vertical)

Discharge Q CFS	Slope Range		Bottom Width Feet	Stage Feet
	Minimum Percent	Maximum Percent		
10	3.5	4.7	8	.68
15	3.4	4.4	12	.69
	3.4	5.9	16	.60
20	3.3	3.3	12	.80
	3.3	4.1	16	.70
	3.5	5.3	20	.62
25	3.3	3.3	16	.79
	3.3	4.0	20	.70
	3.5	4.9	24	.64
30	3.3	3.3	20	.78
	3.3	4.0	24	.71
	3.4	4.7	28	.65
	3.4	5.5	32	.61
35	3.2	3.2	24	.77
	3.3	3.9	28	.71
	3.5	4.6	32	.66
	3.5	5.2	36	.62
40	3.3	3.3	28	.76
	3.4	3.8	32	.71
	3.4	4.4	36	.67
	3.4	5.0	40	.64
45	3.3	3.3	32	.76
	3.4	3.8	36	.71
	3.4	4.3	40	.67
	3.4	4.8	44	.64
50	3.3	3.3	36	.75
	3.3	3.8	40	.71
	3.3	4.3	44	.68
60	3.2	3.2	44	.75
	3.2	3.7	48	.72
70	3.3	3.3	52	.75
80	3.1	3.1	56	.78

Example of Table Use:

Given: Discharge, Q_{10} = 38 cfs, Spillway slope (exit section) = 4%.
Find: Bottom Width and Stage in Spillway.
Procedure: Using a discharge of 40 cfs, note that the spillway (exit section) slope falls within slope ranges corresponding to bottom widths of 36 and 40 ft. Use bottom width of 40 ft., to minimize velocity. Stage in the spillway is 0.64 ft.
Note: Computations are based on: Roughness coefficient, n = 0.40 and a maximum velocity of 3.50 ft. per sec.