

## **SECTION 31 25 00**

### **EROSION AND SEDIMENTATION CONTROLS**

#### **PART 1 - GENERAL**

##### **1.1 SUMMARY**

###### **A. Section Includes:**

1. Compliance with NPDES Phase II Construction General Permit No. GAR 100001 for land disturbing activities over 1 acre in extent.
2. Temporary erosion, sedimentation, and pollution controls (air, water, soil) from site preparation through final site stabilization that include, but are not limited to:
  - a. Silt dams, traps, barriers and
  - b. Slope stabilization,
  - c. Temporary grading to manage stormwater and dewatering activities.
  - d. Polyacrylamide (PAM) applications.

###### **B. Related Sections:**

1. 31 00 01 "SITE PREPARATION AND GENERAL SITE WORK" for protection of existing vegetation, waste management, and spill prevention.
2. 31 22 00 "EARTHWORK" for dewatering requirements and additional requirements for Temporary Grading and Drainage.
3. 31 25 00 "COMMON WORKS FOR EXTERIOR IMPROVEMENTS" for riprap, and geotextile.
4. 32 92 00 "TURF & GRASSES" for temporary vegetation and mulching and for permanent grassing.

##### **1.2 REFERENCE SPECIFICATIONS AND DOCUMENTS**

- A. The Manual for Erosion and Sediment Control in Georgia, 2016 Edition, by the Georgia Soil and Water Conservation Commission, "Best Management Practices". Apply to all land disturbing activities.
- B. The State of Georgia Department of Natural Resources Environmental Protection Division "National Pollution Discharge Elimination System" General Permit No. GAR 100001. This permit applies to all land disturbing activities for this project.

##### **1.3 SUBMITTALS:**

- A. Schedule of operations: Submit schedule of proposed operations conforming with the "Land Disturbance Activities Sequence" as delineated on the Erosion, Sedimentation & Pollution Control Plan(s), including program for erosion control measures, logs, documentation, identified superintendent with required continuing education certification, maintenance of control facilities and vegetative practices. Show anticipated starting and completion dates for land-disturbing activities including excavation, filling and rough grading, finished grading, construction of temporary and permanent control measures, and disposition of temporary sediment control measures.

- B. Product Data: For each type of the following manufactured products required provide manufactures data to the Owner for review and comment prior to bringing products onsite and incorporating into the work. Product submittals include, but are not limited to:
  - 1. Silt fence.
  - 2. Rolled erosion control blankets.
  - 3. Anionic polyacrylamide (PAM).
- C. Samples: Submit samples of the following items or products prior to incorporating into the work.
  - 1. All Class A and Class B Erosion Control Blanket products proposed for the work.
  - 2. PAM gel bars or logs.

#### 1.4 QUALITY ASSURANCE

- A. Comply with "Manual for Erosion and Sediment Control in Georgia" and "Best Management Practices" for practices, procedures, and operations.
- B. Obtain NPDES Phase II permit coverage and conform to all provisions under the State of Georgia and Federal Clean Water Act (permit no. GAR 100001). Refer to <http://epd.georgia.gov/npdes-construction-storm-water-general-permits>. Responsibilities of the Contractor include, but are not limited to:
  - 1. Filing a NOI (Notice of Intent) with State's Environmental Protection Division (EPD) 14 days prior to land disturbance activities with both the Owner's signature and the General Contractor's signature.
  - 2. Maintain a logbook log book on site documenting the inspections of erosion control devices (minimum once/week and within 24 hrs of any storm event) and noting any corrections or modifications. Document all rainfall events. As necessary, coordinate and assist with required stormwater monitoring requirement and maintain monitoring reports prepared by the Testing Agency (with the log book).
  - 3. Filing a NOT (Notice of Termination) with the EPD when the site is fully stabilized, and all stormwater discharge associated with the construction activity has ceased.
- C. Erosion, Sediment and Pollution Control Superintendent:
  - 1. Provide a designated representative to remain on site during land disturbance activities with the following qualifications:
    - a. Minimum 5 years of experience in erosion, sediment and pollution control.
    - b. Certification Level 1A (minimum) "blue card" from Georgia Soil & Water Conservation Commission.
  - 2. Duties include:
    - a. Oversight of land disturbance operations.
    - b. Ensure strict adherence to the land disturbance construction activities sequence, strict adherence to all "Best Management Practices" as defined in the "Manual for Erosion and Sediment Control in Georgia"
    - c. Monitor proper grading (terracing, berm construction, etc.) to properly divert water, and maximize storm water travel lengths and minimize path slopes.
    - d. Monitor and provide for temporary or permanent site stabilization as soon as possible and within the required time limits.

## 1.5 SITE CONDITIONS

- A. Furnish and install erosion control measures prior to or concurrent with any land disturbance activity. Conform with the "Land Disturbance Activities Sequence" (if applicable).
- B. The Contractor is solely responsible for ensuring that no silt or debris leaves the immediate construction site. Return any silted or eroded area to its natural state.
- C. Install and maintain erosion and sediment control "Best Management Practices" prior to land disturbing activities, and continuously through construction until final site stabilization measures (paving, planting, etc.) are effective at controlling erosion from the site.
- D. Schedule grading operations to allow permanent erosion control to take place in the same construction season. Avoid or minimize exposure of soils to winter weather. Maintain all controls until vegetative cover has been established.
- E. The Contractor is responsible for all quantities of soil erosion control measures regardless if shown on the drawings. The extent of soil erosion control measures shown on the drawings is considered minimum. Install additional erosion and sedimentation control measures when deemed necessary by the Contractor, or onsite inspections from the Owner, Design Professional, Testing Agency or by authorities having jurisdiction.

## 1.6 PROTECTION OF ADJACENT PROPERTY AND STATE WATER BUFFERS

- A. Protection existing State Water Buffers and adjacent property from sediment trespass is of the essence. Flag and fence buffers, tree save areas and property lines prior to any construction activities. Flag stream (State Water) buffers as shown on the approved "Erosion, Sedimentation, and Pollution Control Plan". Unless otherwise shown, install 11"x17" weatherproof signs along State Water buffer(s) at 40 ft intervals, that read:  

"STATE WATER BUFFER – DO NOT DISTURB"
- B. Protect adjacent property including, but not limited to landscape areas, stormwater facilities, sidewalks, curbing, roadways and all utilities therein.

## **PART 2 - PRODUCTS**

### 2.1 TEMPORARY GRASSING MATERIALS

- A. Use quick growing temporary grass species suitable to the area and season.
- B. Refer to 32 05 00 "Common Works for Exterior Improvements" for soil additives and mulches, refer to 32 92 00 "Turf Grasses" for temporary seed mixes.

### 2.2 HYDRAULICALLY APPLIED MULCH

- A. Wood cellulose fiber containing no germination inhibiting or growth inhibiting agents with characteristics (including acceptance tolerances) as follows:
  - 1. Percent moisture content: 9.0% (+ 3, 0%).
  - 2. Percent organic matter: 99.2% (+ 0.8%).

3. Percent ash content: 0.8% (+ 0.2%).
4. pH: 4.8 (+ 0.5).
5. Min. water holding capacity: 150 grams water / 100 grams fiber.

## 2.3 BONDED FIBER MATRIX MULCH

- A. Bonded Fiber matrix (BFM) manufactured to be hydraulically applied, and upon drying, adheres to the soil in the form of a continuous, 100% coverage, biodegradable, erosion control blanket. Acceptable BFM producers include:
  1. Soil Guard as manufactured by Mat, Inc., phone (888) 477-3028
  2. Ecoaegis as manufactured by Canfor Panel & Fibre Market, LTD, phone (800) 363-8873
  3. Conwed 3000 Profile Products, phone (800) 508-8681
- B. The BFM shall be comprised of a long strand, thermally produced wood fibers passing a freeness test at a 760 cc (MLS) level or below (>88% of total volume by weight) held together by organic tackifiers (10%) and mineral bonding agents (>2%) which upon drying become insoluble and non-dispersible.
- C. The matrix which forms shall be designed, tested and proven to perform in a manner equal or superior to biodegradable erosion control blankets (ECB's). Documentation of testing at an independent university laboratory shall be provided which demonstrates superior performance as measured by reduced water runoff, reduced soil loss, and faster plant germination, as compared to ECB's. The formed matrix shall meet the following requirements:
  1. Pass a free liquid quality control test (liquids separate from fibrous solids no greater than one inch in one minute's time as measured on a standard test board).
  2. Does not dissolve or disperse upon rewetting.
  3. Does not have holes > 1mm in size and no gaps between product and the soil.

## 2.4 SILT FENCE (TYPE C)

- A. Geotextile: Silt fence fabric shall be woven geotextile for Type C fabric. Type A fabric may be either woven or non-woven. Fabric shall conform with the following properties:

Property *	Type C Fabric	Type A Fabric
Min. Tensile Strength (lbs) (ASTM D-4632)	Warp – 260 Fill – 180	Warp – 120 Fill – 100
Elongation (% Max.) (ASTM D-4632)	40	40
AOS (Apparent Opening Size) (ASTM D-4751)	No. 30	No. 30
Flow Rate (Gal./Min./Sq.Ft.) (GDT-87)	70	25
Ultraviolet Stability (ASTM D-4632 after 300 hours weathering in accordance with ASTM D-4355)	80	80
Bursting Strength (PSI Min.) (ASTM D-3786)	175	175
Minimum Fabric With (Inches)	36	36

\* from GDOT Standard Specification 881.2.07

- B. Wood posts:
  - 1. Minimum dimension: 1 ½ inch by 1 ½ inch by 4 feet.
  - 2. Untreated fir, redwood, cedar, or pine cut from sound timber with no loose or unsound knots.
- C. Steel posts:
  - 1. 48 inch minimum length.
  - 2. Cross section shape that can resist failure from lateral loads (T-shaped, U-shaped, or L-shaped) and 0.75 pounds per foot minimum mass.
- D. Silt fence reinforcement (if used):
  - 1. Wire mesh consisting of 14 gauge steel with mesh spacing of 6 inch x 6 inches (maximum), or prefabricated polymeric mesh of equivalent strength.

## 2.5 FILTER STONE & SURGE STONE

- A. Unless otherwise shown Filter stone, surge stone is in accordance with Appendix C of the Manual for Erosion and Sediment Control in Georgia.

## 2.6 SLOPE STABILIZATION BLANKET

- A. Class A Blanket:
  - 1. Application: Unless otherwise shown on the Plans, apply on slopes steeper than 3H:1V, up to a maximum of 1H:1V.
  - 2. Double net blanket.
  - 3. Rated for extended survivability with at least a 12 month functional longevity.
  - 4. Biodegradable natural fiber netting for blanket for slopes up to 2H:1V.
  - 5. Slow degrading polypropylene or other manufacturer tested /rated netting for slopes steeper than 2H:1V.
  - 6. Core: Straw and Coir (Coconut) blend fiber or Excelsior (shredded aspen) fiber. Certified weed free straw. Alternative core products may be submitted for approval.

7. Approved Products and Manufacturers:
    - a. "Curlex ® II Blanket" by American Excelsior Company.
    - b. "SK Straw/Coir Blanket" by Bon Terra. Note- Netting option shall be consistent with the slope application.
    - c. "Ero-Mat Excelsior" by Verdyol.
  - B. Class B Blanket:
    1. Application: Unless otherwise shown on the Plans, apply on slopes of 3H:1V or flatter.
    2. Single net blanket.
    3. Net shall be either biodegradable (natural fiber) or photodegradable synthetic mesh.
    4. Rated for short term survivability with up to a 12 month functional longevity.
    5. Straw core material, if used, shall be certified weed free.
    6. Approved Products and Manufacturers:
      - a. "Curlex ® I Blanket" by American Excelsior Company.
      - b. "S Straw Blanket" with jute/cotton threading by Bon Terra.
      - c. "EroNET TM S75" by North America Green.
- 2.7 NON-WOVEN GEOTEXTILE FABRIC
- A. Non-woven geotextile fabric shall be as indicated on Plans. If not otherwise indicated, fabric weight is a minimum of 6 oz. per square yard.
- 2.8 POLYACRYLAMIDE
- A. All polyacrylamide shall be anionic and in emulsion form and gel bars/logs.

### **PART 3 - EXECUTION**

- 3.1 GENERAL
- A. Sedimentation Control: Sediment basins, diversion berms, silt dams, traps, barriers, downlines, check dams, rock filter dams, seep berms, mulching temporary grassing and appurtenances shall be installed and shall be maintained in-place for duration of construction, as shown and detailed on erosion control plan.
  - B. Silt fence:
    1. Construct silt fences as shown in the Plans.
    2. Where shown install multiple rows of silt fence.
  - C. Provide and construct erosion control check dams as shown.
  - D. Maintain erosion and sedimentation controls in a condition which will retain unfiltered water.
  - E. Construct sedimentation ponds and control devices prior to clearing and grubbing the site to insure complete silt control.
  - F. Provide temporary seeding for all exposed soil surfaces that are not to be fine graded or landscaped within 14 calendar days. Multiple temporary seeding applications should be expected.

- G. Provide temporary or permanent grassing (season dependent) and/or mulching for all disturbed areas within 7 calendar days of reaching finished grades. Reduce areas of disturbance daily through use of temporary grassing and mulching.

### 3.2 GRADING OPERATIONS

- A. Grading Operations: Phased grading operations so that the ground surface will be disturbed for the shortest possible time before permanent construction is installed. Maintained large areas as flat as possible to minimize soil transport through surface flow. Immediately install graded diversion channels, ditches and berms to direct storm runoff to sediment and filtering basins. Grade fill slopes in a manner which prevents surface areas from flowing over newly constructed fill slope areas through shaping and providing required temporary downlines or diversions to permanent storm structures as construction allows.
  - 1. Protect newly graded areas from actions of the elements. Repair settlement or washing that occurs prior to acceptance of work and maintain established grades until the date of substantial completion.
  - 2. Contractor is responsible for any damage occurring to adjacent property resulting from drainage or siltation from the site.
  - 3. Construct all fills at outmost part of fill and slope towards original ground so that all surface storm water drains back away from fill and does not run over the top of fill slope. Construct swales at bottom of proposed fill slopes prior to construction of any fills. Construct and maintain a swale /berm at the outermost part of top fills as fills are constructed.
- B. Storm Drainage System: Install as much of the permanent storm drainage system as practical, provide the required temporary inlet sediment traps immediately and divert surface water into the system. Install temporary inlet sediment traps shall as base of structure is set and adjust up periodically as the grading operation raises the grades around the structure.
  - 1. Maintain temporary sediment barriers at drainage structures until final stabilization occurs.
  - 2. Install storm drainage as grading progresses and makes additional storm drainage installation possible. Direct swales to drainage structure locations as shown on drawings.
- C. Ground Cover:
  - 1. All exposed and unworked soil shall be protected by application of temporary groundcover.
  - 2. Ground cover may consist of any effective erosion preventative treatment such as straw or other mulches, planting, etc.
  - 3. All grassing or planting operations shall include mulching as stabilization until ground cover by planting is effective.

### 3.3 STABILIZATION PRACTICES

- A. Control soil erosion during all phases of construction to preserve and protect slopes, drainage structures, pavement, and other facilities, and to reduce potential sources of water pollution and damage to adjacent property.
- B. Mulching: Apply dry straw or hay and/or wood chip mulch to disturbed areas at a depth of two to three inches unless otherwise shown. Apply by hand or mechanical equipment. Press Straw or hay mulch shall be pressed into the soil with a disc harrow

with disc set straight or with special "Packer Disc". The edge of the disc should be dull enough not to cut the mulch but to press it into the soil leaving much of it in an erect position. Anchor immediately after application.

- C. Polyacrylamide (PAM): Utilize anionic polyacrylamide as a temporary soil binding agent to reduce soil erosion. PAM is available in emulsions, powders and gel bars or logs. Use PAM in conjunction with other "best management practices". Use PAM in direct soil surface applications where the timely establishment of vegetation is not feasible (including building pad and parking lot areas). Apply PAM in conjunction with temporary seeding efforts or as a separate hydro spray application. The maximum application of PAM, in pure form, shall not exceed 200 pounds/acre/year. Install a PAM gel bar or log in each storm structure (secured with rope) and replace at the manufactures recommended interval. Apply PAM via hydrospreader to all disturbed areas once per 7 calendar days at the rate of 7.5 pounds per acre. Provide written record of each application.
- D. Temporary Stabilization: Stabilize topsoil stockpiles and disturbed areas of the site, where construction activity has ceased for at least 14 calendar days with temporary cover or seeding.
- E. Seed Bed Preparation for Temporary Vegetation: Loosen ground surface by discing, raking or harrowing. If the area has been recently loosened or disturbed, no further roughening shall be required. Remove all large clods, boulders and debris that will interfere with the work.
- F. Unless otherwise shown, plant temporary grass areas at the rates specified in 32 92 00 Turf and Grasses.
- G. Hydroseeding: Protect existing trees and shrubs during hydroseeding. Apply seed, fertilizer, lime, and fiber in one application. Maintain temporary vegetative cover until the permanent turf planting seson, at which time the temporary grass or annual ryegrass shall be mowed down to the ground surface, the lawn area disc harrowed, the soil prepared for planting lawns and the permanent lawn planted or sodded as called for on the plans. Refer to 32 92 00 "TURF AND GRASSES" for permanent turf.
- H. Reseeding – Reseed and provide straw cover for bare areas 1 square foot and larger to establish and maintain vegetative cover and to prevent sheet and rill erosion. Repair erosion damage as required and reseed.
- I. Matting and Mulching – Cover all seeding with matting or mulch. After seeding, cover all slopes that exceed 3H:1V with erosion control matting and/or blankets. Install mats and/or blankets per manufacturer's recommendations using the recommended fastening hardware.
- J. Depending on the season at which slopes that exceed 3H:1V are established, the Contractor shall anticipate multiple applications of erosion matting. If a permanent slope is established and planted with temporary grass due to planting season, contractor shall eradicate temporary grass and install permanent grassing as called shown. Once bare soil is exposed, an additional application of matting will be required. Remaining seeded areas shall be covered with straw or hay spread at the rate of approximately 2 tons/acre or wood cellulose fiber applied at the rate of approximately 1500 lbs/acre.
- K. Stabilize areas of the site that are to be paved through proper compaction of the soil and placement of a graded, stone aggregate base.



- L. Rolling – Roll all seeded areas with roller weighing 60 to 90 pounds per linear foot of roller before applying mulch. On steep slopes cover seeds by dragging spiked chains or similar methods.
- M. Watering – Depending on weather conditions at the time of construction, Contractor shall anticipate watering measures other than natural rainfall. Provide all watering necessary to establish a healthy vegetative cover.
- N. Permanent Stabilization – Stabilize disturbed areas of the site, where finished grade has been achieved, with season dependent permanent seeding within 7 calendar days of achieving grade. Refer to Plans and 32 92 00 "Turf and Grasses" for permanent seed mixes.
  - 1. Hydroseed mixtures shall contain PAM.
  - 2. After seeding provide erosion control matting or blankets where shown and in accordance with manufacturers recommendations.
- O. Complete all permanent erosion control features at the earliest practical time. Use temporary measures until permanent measures are completed.

### 3.4 STRUCTURAL PRACTICES

- A. Submit any additional structural control measures in the form of shop drawings.
- B. Temporary Construction Entrance – Construct a stabilized, stone aggregate construction entrance shall be constructed, as per the detail set forth in the Manual for Erosion and Sediment Control in Georgia, Latest Edition. The temporary construction entrance shall reduce vehicle tracking of sediments. Out-going trucks shall have the tires washed prior to exiting the site onto any public street or right-of-way. Any mud, dirt, or rock that is tracked onto public streets shall be swept immediately and material placed within the perimeter controls.
- C. Maintain all access to the site to prevent mud from washing or being tracked onto existing pavements. Provide a temporary hose bib system or water truck with a pressure hose for wash down of trucks and equipment entering the public right-of-way as necessary.
- D. Sediment Basins – Construct temporary sediment basins to contain and filter at least 67 cubic yards of sediment per disturbed acre and in accordance with the Manual for Erosion and Sediment Control in Georgia, 2016 Edition. Construct the unit complete as shown including:
  - 1. Principal spillways with riprap outfall protection.
  - 2. Anti-seep collars.
  - 3. Risers and Trash racks.
  - 4. Temporary mulch and grassing of external slopes.
  - 5. Skimmers.
  - 6. Emergency overflow areas.
- E. Silt Barriers – Unless shown otherwise, install a single row of Type "C" Silt fence along the toe of all downstream slopes and a double row of Type "C" Silt Fence adjacent to all state waters buffers.
- F. Temporary Diversion Berms/Dikes – Construct temporary diversion berms/dikes per the approved Erosion, Sedimentation, and Pollution Control Plan. Raise diversions, minimum 4 feet wide, at the end of each day during grading activities. The diversions shall intercept and redirect runoff to the temporary sediment basin(s) and/or

temporary storm drainage structure sediment inlet traps prior to the runoff reaching perimeter sediment controls.

### 3.5 MAINTENANCE

- A. Inspect slope protection and erosion control elements after each rainfall. Unless otherwise shown, inspect all barriers and sediment traps after each rain event. Clear all debris and accumulated sediment from behind barriers and sediment traps when one third full. Remove accumulated sediment from traps after each rain event and spread on site.
- B. Provide appropriate stabilization (mulch, grass seed) where collected sediment is redistributed onsite.
- C. Control dust from disturbed areas by means of mulching, watering, calcium chloride or other method subject to the Design Professionals approval.

### 3.6 REMOVAL OF TEMPORARY EROSION CONTROL DEVICES

- A. As soon as permanent vegetative cover is established, remove temporary devices, including sediment barriers, berms, silt traps and similar devices.
- B. Remove any retrofit structure and clean out all accumulated silt and debris in detention ponds to finish grades.
- C. Remove all debris resulting from temporary erosion control from project site.

**END OF SECTION**