Subcontractor Awareness Seminar

Education and Training Certification Requirements for Persons Involved with Land Disturbing Activities

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Subcontractor Awareness Seminar
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Subcontractor Awareness

Erosion and Sediment Control Awareness

Subcontractor Awareness Seminar

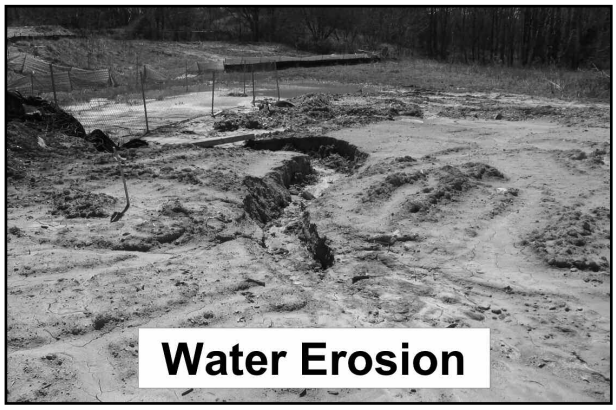
Georgia Soil and Water Conservation Commission

Issued August 2007

OVERVIEW

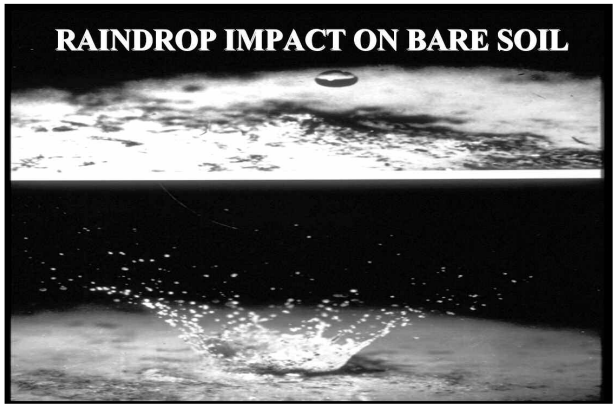
- Introduction of Erosion and Sedimentation (E&S)
  - Definitions and general stages of E&S
  - Basic processes and factors governing E&S
- Impacts of Erosion and Sedimentation (E&S)
  - Environmental impacts
  - Economic impacts
- Best Management Practices (BMPs)
  - Vegetative Practices
  - Structural Practices
- Laws Governing Erosion and Sedimentation (E&S)
  - Education/Certification Requirements
  - Inspections and required documentation
  - Regulatory agency enforcement options

EROSION - The process by which the land surface is worn away by the action of water, wind, ice and gravity



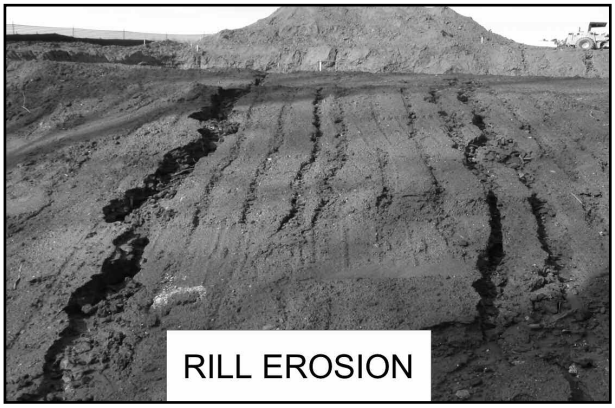
Types of Water Erosion

1. Splash Erosion
2. Sheet Erosion
3. Rill Erosion
4. Gully Erosion

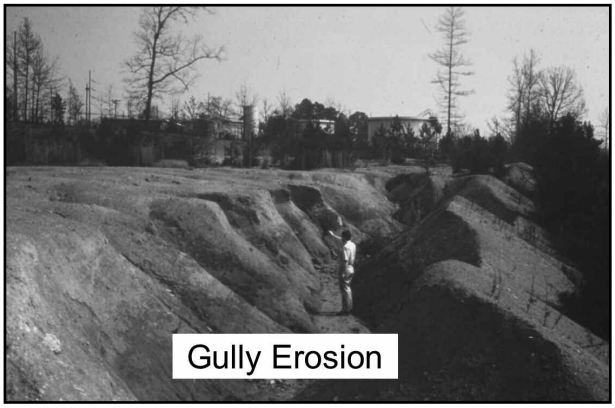


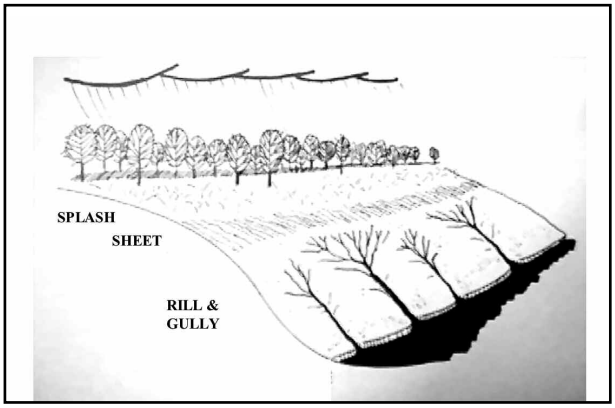
Sheet Erosion: Erosion caused by water flowing in a thin layer over the ground surface

Rill Erosion: An erosion process in which numerous small channels only several inches deep are formed



GULLY EROSION: The erosion process whereby water accumulates in narrow channels and, over short periods, removes the soil from this narrow area to a considerable depth, ranging from 1-2 feet to as high as 70-100 feet.

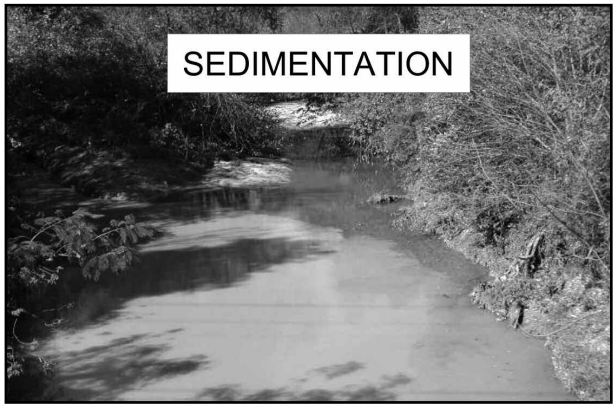




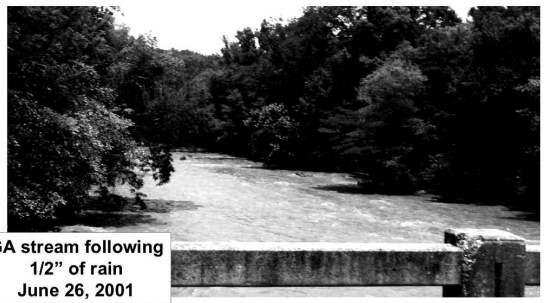
Sedimentation

The process by which the eroded material is transported and deposited by:

- Water
- Wind
- Ice
- Gravity



SEDIMENT TRANSPORT

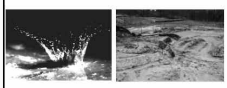


GA stream following 1/2" of rain June 26, 2001

Erosion vs. Sedimentation

Soil Erosion

- Soil particles are detached
- Occurs on all land – Accelerated by construction activities



Sedimentation

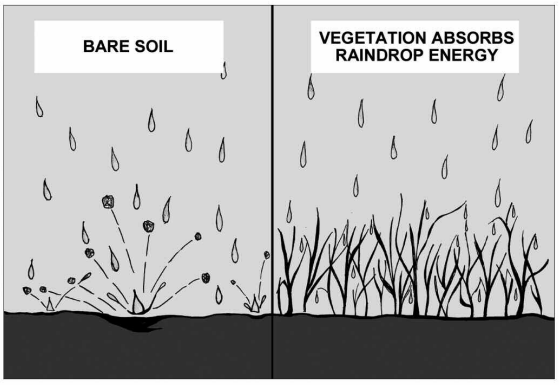
- Transportation and deposition of eroded soil
- **Sediment is #1 non-point source pollutant in U.S.**

Impacts of Construction Activities

1. **Removal of vegetation**
2. Removal of soil organic matter
3. Reshaping of ground surface contours
4. Exposure of subsoil
5. Changing the pervious ground surface to impervious

Importance of Vegetation

- **Absorbs raindrop impact**
- **Reduces detachment**
- **Roots hold soil in place**
- **Slows water flow**
- **Adds organic material to the soil**
- **Reduces runoff**
- **Increases infiltration**

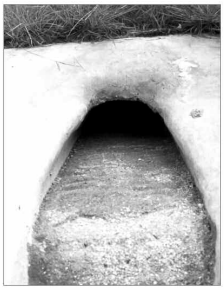


Impacts of Erosion and Sedimentation

1. Loss of soil productivity
2. Adverse effects on other water resource facilities
3. Loss of reservoir storage capacity
4. Flood impacts
5. Recreational impacts
6. Deterioration of water quality

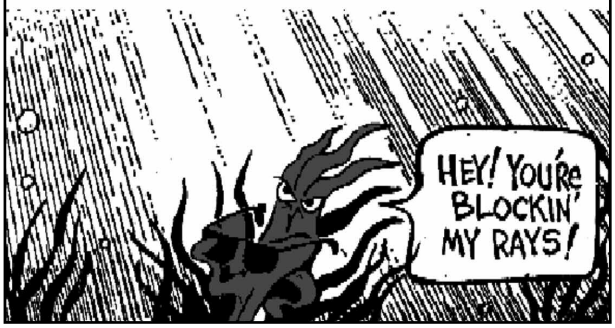
Increased maintenance costs for stormwater management systems

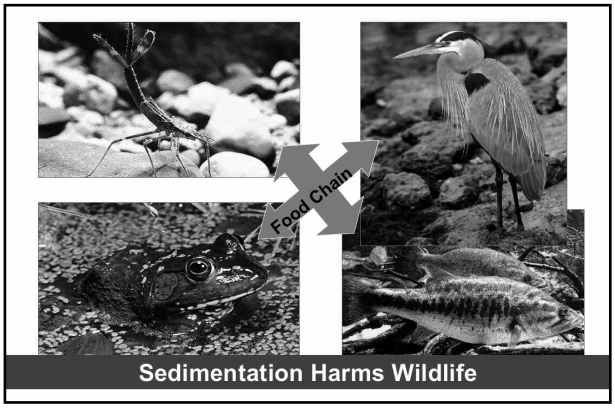
Taxpayer Costs for Unclogging Stormwater Culverts



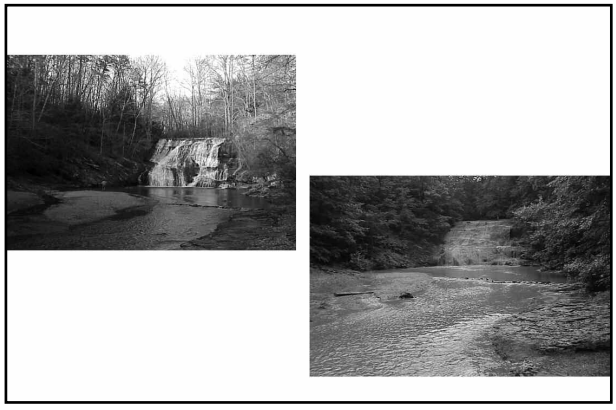
Decreased Recreational Value

Screens Out Sunlight = Decline in Plant Growth





Sedimentation Harms Wildlife



Best Management Practices

BMPs
- Required on 'Land Disturbing Activities' by the Erosion and Sedimentation Control Act of 1975, as amended.

Three keys to BMPs
- Proper Design, Installation, and Maintenance
- Erosion Control versus Sediment Control

Vegetative Practices
- Control Erosion
- Treat the Source

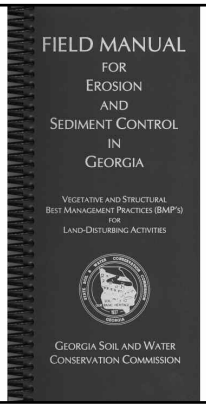
Structural Practices
- Control Sedimentation
- Treat After Erosion Has Begun

'Land Disturbing Activity'

Activity that may result in soil erosion and movement of sediments into state waters or onto state lands
- Clearing
- Excavating
- Dredging
- Transporting
- Grading
- Filling of land

GESA 12-7-3(9)

The revised 2002 "*Field Manual For Erosion and Sediment Control In Georgia*"



Example
Vegetative Practices for Erosion and Sedimentation Control

Bf

Buffer Zone

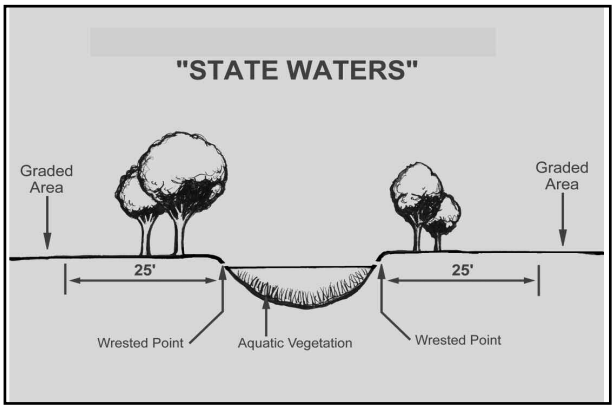
- "Buffer" means the area of land immediately adjacent to the banks of state waters in its natural state of vegetation, which facilitates the protection of water quality and aquatic habitat

(OCGA 12-7-3(2))

Stream Buffers Rules

- Undisturbed buffer adjacent to State Waters
- Measured horizontally from point where vegetation has been ***wrested*** by normal stream flow or wave action
- **25 Feet** - Warm Water streams*
- **50 Feet** - Trout (cold) streams*

*Local issuing authorities may require additional buffers!



Functions of Buffers

- Reduces storm runoff velocities
- Acts as a screen for "visual pollution"

Functions of Buffers

- Reduces construction noise
- Improves aesthetics on the disturbed land
- Filters and increases infiltration of runoff
- Cools rivers and streams by providing shade

Functions of Buffers

- Provides food and cover for wildlife and aquatic organisms
- Aids in flood protection
- Protects channel banks from scour and erosion

Ds1 Disturbed Area Stabilization (With Mulching Only)

Applying plant residues or other suitable materials to the **disturbed soil surface**

- Reduce runoff and erosion
- Conserve moisture
- Prevent surface compaction
- Control undesirable vegetation
- Modify soil temperature
- Increase biological activity in the soil

Ds1 - Mulching Only

- On exposed areas **within 14 days of disturbance**
- Apply at the **appropriate depth**
- Maintain cover on **90% or more** of the soil surface
- Can be used alone for **up to 6 months**
- Must be **anchored**

Mulching Depths

Material	Rate	Depth
Straw or hay	-	2" to 4"
Wood waste, chips, sawdust, bark	-	2" to 3"
Cutback asphalt	1200 gal./acre, 1/4 gal./sq. yd. or See manufacturer's recommendations	---
Polyethylene film	Secure with soil, anchors, weights	---
Geotextiles, jute matting, netting, etc.	See manufacturer's recommendations	---

Poor Ds1 Stabilization

Good Ds1 Stabilization

Ds2 Disturbed Area Stabilization (With Temporary Seeding)

Establishing fast growing vegetation for seasonal soil protection

- Reduce soil erosion
- Reduce runoff
- Increase infiltration
- Improve aesthetics
- Improve soil quality
- Improve wildlife habitat

Browntop millet

Per the *"Manual for E&SC in Georgia"*

Ds2 - Temporary Seeding

- On all exposed areas **within 14 days of disturbance**
- Maintain cover on **90% or more** of the soil surface
- Can be used alone for **up to 6 months**
- **Permanent vegetation** will be used if area is to be undisturbed for **more than 6 months**

Poor Ds2 Stabilization

Good Ds2 Stabilization

Ds3 Disturbed Area Stabilization (with Permanent Vegetation)

Planting perennial vegetation (grasses, legumes, vines, shrubs, and trees) on exposed areas

-Final permanent stabilization means 100% of soil surface covered by permanent vegetation at a density of 70%

-Rough graded sites >6 months

Poor Ds3 Stabilization

Good Ds3 Stabilization

Mb Erosion Control Matting and Blankets

Protective coverings used to establish permanent vegetation

- Protects young plants
- Promotes plant establishment
- Helps reduce erosion

-Temporary and permanent blankets
-All must be approved by GDOT

Tp Topsoiling

Stripping, storing, and using topsoil as topdressing

- **Reduces lime and fertilizer needs**
- **Better plant growth**

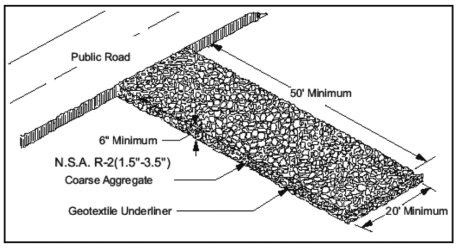
Other Vegetative BMPs

- Cs – Coastal Dune Stabilization
- Du – Dust Control
- Sb – Streambank Stabilization
- Refer to the ES&PC plan for additional info

Example Structural Practices for Erosion and Sedimentation Control

Co Construction Exit

- To reduce or eliminate the transport of mud from the construction area



The Good

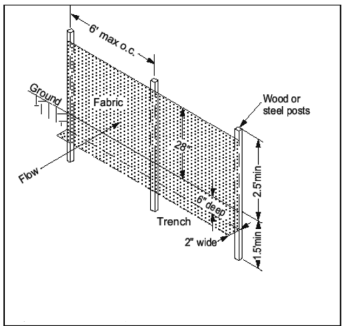
The Bad

And The Ugly

Sd1 Silt Fence

- To slow the velocity of runoff and cause sediment deposition at the structure
- To filter sediment from runoff

Silt Fence – Type A



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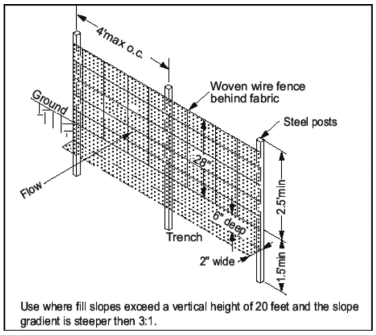
Silt Fence - Type C

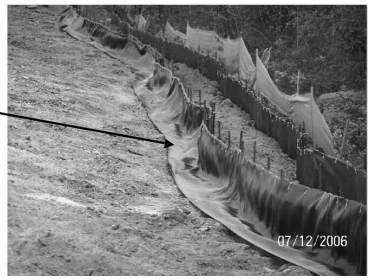


The Good

The Bad

And The Ugly

Placing soil over this bottom flap is NOT the proper way to trench silt fence



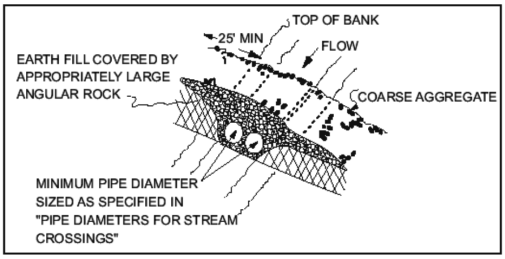
Silt fence must be properly trenched in 6 inches

Sd1 Silt Fence

- For stream buffers and other sensitive areas, two rows of Type C silt fence or one row of Type C backed by haybales shall be used

Sr Temporary Stream Crossing

- To protect streams from damage and erosion.



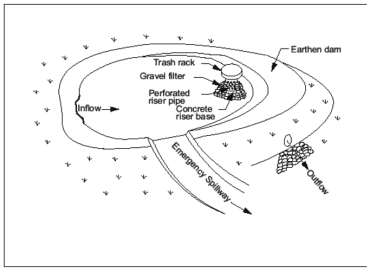
The Good

The Bad

And The Ugly

Sd3 Temporary Sediment Basin

• To detain runoff waters and trap sediment.



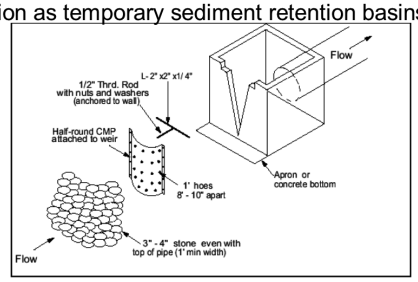
The Good

The Bad

And The Ugly

Rt Retrofitting

- To allow stormwater detention basins to function as temporary sediment retention basins.



The Good

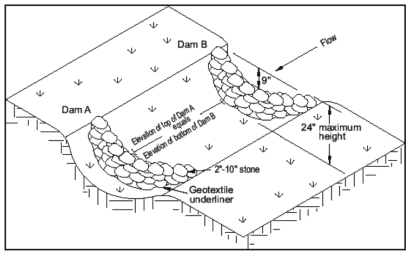
The Bad

And The Ugly

Cd

Check Dam

- To reduce flow velocities and filter sediment.

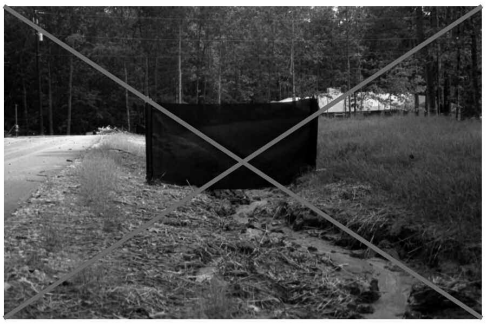


The Good

The Bad

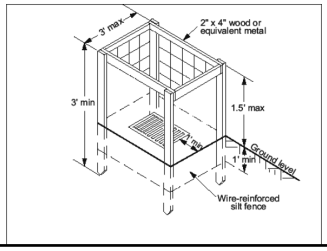
And The Ugly

Never Use Silt Fence as Check Dams

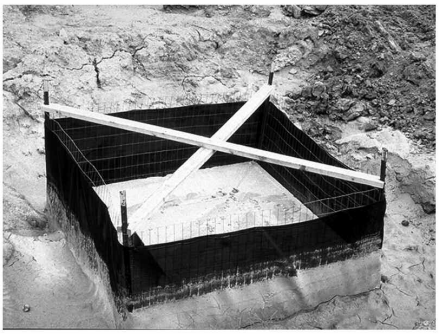


Sd2-F Inlet Sediment Trap

- To prevent sediment from entering storm drain systems.



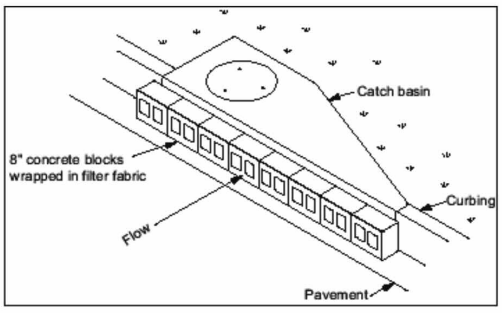
The Good



The Bad

And The Ugly

Temporary Sediment Trap (Sd2-PP)



The Good

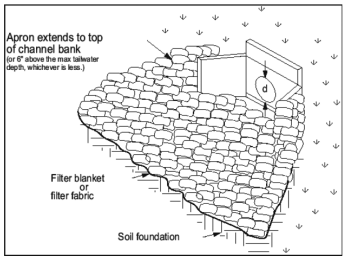
The Bad

And The Ugly

St

Outlet Protection

- To reduce the velocity of flow from storm drain outlets



The Good

The Bad

And The Ugly

Other Structural BMPs

- Ch – Channel Stabilization
- Di – Diversion
- Dn1 – Temporary Downdrain
- Dn2 – Permanent Downdrain
- Ga – Gabion
- Ge – Geotextiles
- Gr- Grade Stabilization
- Lv – Level Spreader
- Rd – Rock Filter Dam
- Re – Retaining Wall
- Su – Surface Roughening
- Wt- Vegetated Waterway

Clean-out Elevations

- One-Half (1/2) Full
  - Silt fence
  - Check dams
  - Rock filter dams
  - Inlet sediment traps
- One-Third (1/3) Full
  - Temporary sediment basins
  - Retrofitted detention ponds

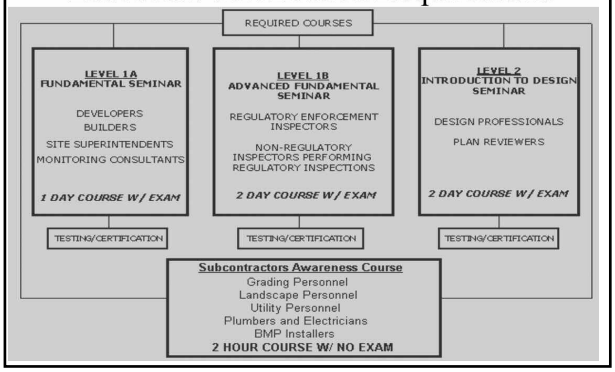
Regulations Governing Erosion and Sediment Control in Georgia

- GA Erosion and Sediment Control Act of 1975
- NPDES Permit for Construction Activities
- Local Government Ordinances

Key Points

- Land disturbing activities are governed on the federal, state and local level
- GESA is a state law that may be adopted and enforced by local governments
  - Includes requirements for Education/Certification Program
- NPDES Permit for Construction Activities is a federal permit delegated to EPD for enforcement
  - Includes requirements for inspections

Education/Certification Requirements



Subcontractor Certification

- Is required for those individuals involved in land disturbing activities working in a subcontractor capacity under a primary, secondary or tertiary permittee.
- Does NOT qualify an individual to perform the duties of a “qualified” or “certified” person/ personnel. If you are performing such duties, a Level IA certification is required.

Education and Certification Program Fact Sheet

Gives guidance on:

- Who needs to be certified
- What type of certification is needed
- What activities are exempt from certification

Available in your course notebook and on the GSWCC website:

www.gaswcc.org under Documents

Examples of a Subcontractor

Include but are not limited to :

- Grading personnel
- Plumbers and Electricians
- Landscape personnel
- Waste water personnel
- Best Management Practice installation personnel
- Other subcontractors conducting land disturbing activities

*Please refer to FACT SHEET for additional occupations

Examples of Primary, Secondary, Tertiary Permittees

Include but are not limited to :

- Developers
- Builders
- Contractors
- Site superintendents

*Please refer to FACT SHEET for additional occupations

Inspection Requirements
Primary and Tertiary Permittees

Inspections made by qualified personnel only (Level 1A Certification)

- **Daily Inspections**
  - Areas where petroleum products are stored, used, or handled for spills and leaks from vehicles and equipment
  - Vehicle entrances and exits for off-site tracking
  - Daily rainfall
- **Weekly and within 24 hours of each rainfall ≥ .0.5"**
  - Disturbed areas not yet finally stabilized
  - Areas used for storage of materials
  - Structural control measures
  - Discharge points as accessible to determine if pollutants are leaving site

  ** For GAR 100002 – this inspection is performed every 14 days
- **Monthly**
  - Areas of site that have reached final stabilization for evidence of impacts to state waters by pollutants and sediment

Permit	Daily (when construction occurs)	Weekly or after each 0.5" rainfall event	Every 14 days or after each 0.5" rainfall event	Monthly
GAR 100001 Stand Alone	1) All areas where petroleum products are stored, used or handled for spills and leaks from vehicles 2) All locations where vehicles enter or leave the site 3) Rainfall for each 24-hour period	1) All areas that have not undergone final stabilization 2) All material storage areas exposed to precipitation that have not undergone final stabilization 3) Structural control measures		Areas that have undergone final stabilization
GAR 100002 Infrastructure	1) All areas where petroleum products are stored, used or handled for spills and leaks from vehicles 2) All locations where vehicles enter or leave the site 3) Rainfall for each 24-hour period		1) All areas that have not undergone final stabilization 2) All material storage areas exposed to precipitation that have not undergone final stabilization 3) Structural control measures	Areas that have undergone final stabilization
GAR 100003 Common Development	1) All areas where petroleum products are stored, used or handled for spills and leaks from vehicles 2) All locations where vehicles enter or leave the site 3) Rainfall for each 24-hour period	1) All areas that have not undergone final stabilization 2) All material storage areas exposed to precipitation that have not undergone final stabilization 3) Structural control measures		Areas that have undergone final stabilization

Inspection Requirements
Secondary Permittees

Inspections made by qualified personnel only (Level 1A Certification)

- **Daily Inspections**
  - Areas where petroleum products are stored, used, or handled for spills and leaks from vehicles and equipment
  - Vehicles entrances and exits for off-site tracking
- **Weekly and within 24 hours of each rainfall ≥ 0.5"**
  - Disturbed areas not yet finally stabilized
  - Areas used for storage of materials
  - Structural control measures
  - Discharge points as accessible to determine if pollutants are leaving site
- **Monthly**
  - Areas of site that have reached final stabilization for evidence of impacts to state waters by pollutants and sediment

Inspection Requirements
Documentation

- If BMP deficiencies are found during an inspection, they should be corrected immediately and the ESPCP must be revised as appropriate within seven days.
- Secondary must notify primary within 24-hours of any suspected BMP design deficiency. Primary must evaluate within 48-hours

Regulatory Agency Enforcement
Options

- Notice of Violation (NOV)
- Issuance of a Stop Work Order
- Revocation of business license
- Suspend LDA permit
- Deny future LDA permit applications for 2 or more violations within 3 years
- Imposition of monetary penalties ($32,500 per day per violation)
- Civil Action
- Imprisonment (Up to 15 years)
- Forfeiture of Bonding (bonding is an option provided in the Act up to $3000 per acre)

Local Issuing Authority Enforcement
Warnings/Notice of Violations

When an inspector finds a violation of any provision of the ordinance:

- First & Second Violation – Written warning
  - Violator has five days to correct the action
  - No corrective action = Stop Work Order
- Third Violation – Immediate Stop Work Order

OCGA 12-7-12(c)

Enforcement
Stop Work Orders

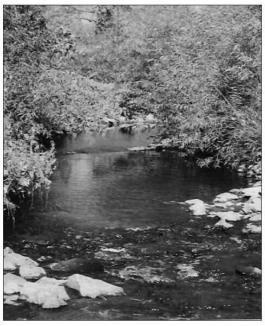
- Immediate Stop Work Orders
  - Third Violation
  - Danger to public health or state waters
  - Disturbing land without a permit
  - Stream buffer violation
  - BMPs not properly designed, installed or maintained
  - Sediment entering state waters

OCGA 12-7-12(c)

Summary

- Erosion and sedimentation is a serious problem associated with active construction sites.
- Implementing a series of sound Best Management Practices that are properly designed, installed, and maintained is the only way to prevent problems.
- Any violations associated with erosion and sedimentation must be properly documented and corrected.

Goal



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Georgia Field Manual
for
E & S Control

Field Manual for Erosion and Sediment Control In Georgia

Fourth Edition
2002

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VEGETATIVE BEST MANAGEMENT PRACTICES

Bf

BUFFER ZONE

DEFINITION

An undisturbed or planted vegetative strip around a site or bordering a stream.

PURPOSE

- Filter sediment.
- Filter chemicals, nutrients, and germs.
- Reduce runoff velocities.
- Stabilize stream banks.
- Improve aesthetics.
- Improve fish and wildlife habitat.
- Reduce construction noise.
- Flood protection.

INSTALLATION

- Install according to approved plan, if shown.
- Mark vegetation to be retained with fencing or highly visible marks (tape, paint, etc.).
- See Section 12-7-6 of E&SC Law and local ordinances for minimum stream buffer widths.
- Three kinds of buffer vegetation are trees, shrubs and grasses.

- *A good buffer properly installed and maintained can filter out 85-95% of sediment in runoff.*
- *Good vegetative buffers are much more durable than sediment barriers and won't fail after a moderate storm.*

Table 1. Effectiveness of Vegetative Buffer Strips

Purpose	Grass	Shrub	Tree
Filter sediment	High	Low	Low
Filter chemicals	Medium	Low	Low
Stabilize stream banks	Low	High	High
Improve aesthetics	Low	Medium	High
Improve habitat	Low	Medium	High
Reduce noise	Low	Medium	High

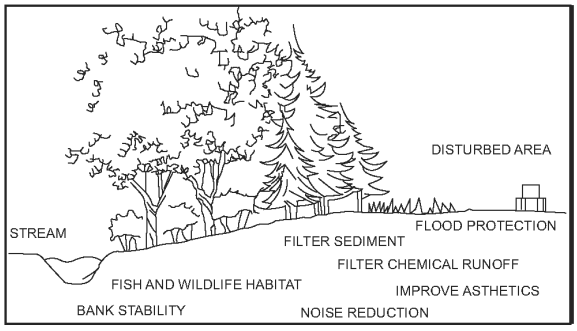

Figure 1. Some Benefits of a Riparian Buffer

Bf

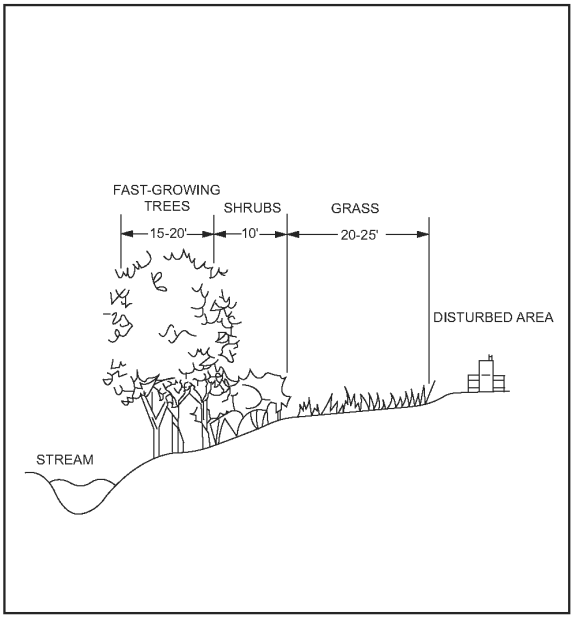

Figure 2. Typical Multi-Purpose Riparian Buffer for Urban Development

MAINTENANCE

- Lime and fertilize appropriately.
- Control weeds to promote desired vegetation.
- Use mulches when establishing new vegetation.
- Remove sediments when buffer effectiveness is reduced or lost.
- Protect trees and shrubs from wildlife and equipment.
- Check local ordinances for local buffer requirements.

Bf

REFERENCES

- Ds1 Disturbed Area Stabilization (With mulching only)
- Ds2 Disturbed Area Stabilization (With temporary seeding)
- Ds3 Disturbed Area Stabilization (With permanent seeding)
- Sb Streambank Stabilization (With permanent vegetation)

Cs

COASTAL DUNE STABILIZATION (WITH VEGETATION)

DEFINITION

Planting vegetation on bare dunes or where dunes are to be established.

PURPOSE

- Prevent dune erosion from wind or waves by planting vegetation.
- Provide for the development or enhancement of dunes.

INSTALLATION

- Install in accordance with an approved design/study.
- Install in accordance with all federal, state and local regulations.
- Protect dunes from vehicular and human traffic.
- Irrigate during the first year to obtain good survival.
- Mulch areas to be planted.
- Native plants commercially available that may be planted are included in Table 1.

Cs

Table 1.
Planting Requirements for Native Plants

Species	Stock	Date	Depth
Marshhay Cordgrass (Spartina patens)	Plants	Spring	4"-5"
Bitter Panicum (Panicum amarum)	Rhizomes	Spring	Abt 4"
Coastal Panigrass (Panicum amarum v. amaralum)	Seeds or plants	Spring	1"-3"

Figure 1. Sand Fence and Native Plants

Sand Fences

- Install according to plans, if shown.
- Use posts made of Black Locust, Red or White Cedar, or similarly durable wood.
- Use posts with minimum length of 7 feet and minimum diameter of 3 inches.
- Space posts at a maximum of 10 feet.
- Entrench posts a minimum of 3 feet.
- Attach fence to posts with four 12-gauge galvanized wires.

Cs

- Vegetation must be established immediately following development of the dunes.
- Sand fences should be the same as commercially available snow fence approximately as shown in Figure 2.

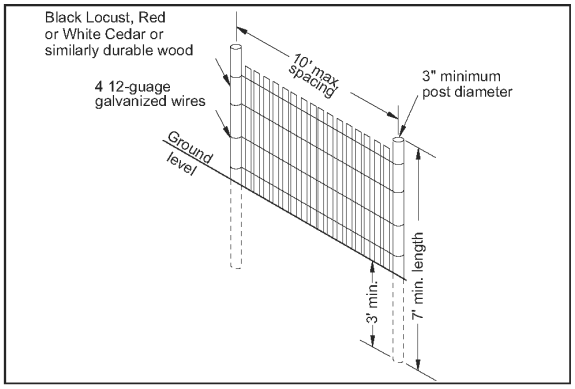

Figure 2. Sand Fence Installation Requirements

MAINTENANCE

- Blowouts and eroded areas should be repaired promptly.
- Add fencing, if needed, or use equipment to make repairs.
- Replant lost or destroyed vegetation.
- Apply 50 pounds of nitrogen/acre/year.
- Protect dunes from traffic by using paved paths, elevated or roll-up walks.

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Ds1

DISTURBED AREA STABILIZATION (WITH MULCHING ONLY)

DEFINITION

A temporary cover of plant residues applied to the soil surface for a period of six (6) months or less when seeding is not practical.

PURPOSE

- Reduce runoff, erosion, and sedimentation.
- Reduce dust.
- Conserve moisture.
- Prevent surface compaction and crusting.
- Control undesirable vegetation.

INSTALLATION

- Install all other required BMPs first.
- Grade site, if possible, to permit the use of equipment for applying and anchoring mulch.
- Loosen compacted soil, if possible, to a depth of three (3) inches.
- Apply straw or hay uniformly, as shown in Table 1, by hand or mechanical equipment, and anchor by pressing into soil or using netting.

10

Ds1

- Mulch on slopes greater than 3% should be anchored with emulsified asphalt (Grade AE-5 or SS-1) or other suitable tackifier.
- Wood waste on slopes flatter than 3:1 do not need anchoring.
- Mulch shall be applied to all disturbed areas left inactive for fourteen days.

Table 1. Mulching Application Requirements

Material	Rate	Depth
Straw or hay	-	2" to 4"
Wood waste, chips, sawdust, bark	-	2" to 3"
Cutback asphalt	1200 gal./acre, 1/4 gal./sq. yd. or See manufacturer's recommendations	---
Polyethylene film	Secure with soil, anchors, weights	---
Geotextiles, jute matting, netting, etc.	See manufacturer's recommendations	---

MAINTENANCE

- Add mulch as needed to maintain the suggested depth.
- If organic mulch is to be left and incorporated into the soil, apply 20-30 pounds of Nitrogen in addition to the fertilizer required for vegetation.

REFERENCES

- Mb Erosion Control Matting and Blankets

Ds2

DISTURBED AREA STABILIZATION (WITH TEMPORARY SEEDING)

DEFINITION

A temporary vegetative cover with fast growing seedings for up to a 12-month period or until permanent vegetation is established.

PURPOSE

- Reduce runoff, erosion, and sedimentation.
- Improve wildlife habitat.
- Improve aesthetics.
- Improve tilth and organic matter.

INSTALLATION

- Install all E&SC measures prior to applying temporary vegetation.
- Grading or shaping are not required if slopes can be planted with a hydroseeder or by hand-seeding.
- Seedbed preparation is not required if soil is loose and not sealed by rain.

Ds2

- When the soil is sealed or crusted, it should be pitted, trenched or scarified to provide a place for seed to lodge and germinate.
- Agricultural lime is not required.
- Fertilize low fertility soils prior to or during planting at the rate of 500-700 pounds per acre of 10-10-10 fertilizer or equivalent (12-16 pounds/1000 square feet).
- It is imperative that you check the tag on the bag of seed to verify the type and germination of the seed to be planted.

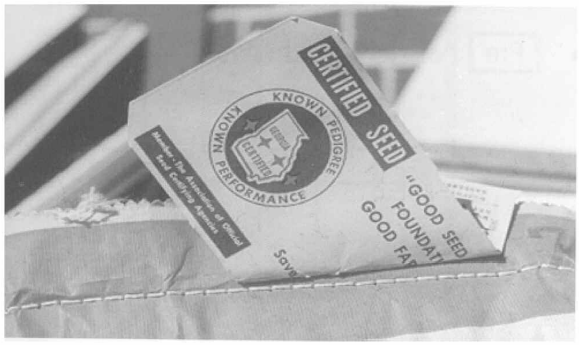

Figure 1. Typical Tag on Bag of Seed

- Apply seed by hand, cyclone seeder, drill or hydro-seeder. Seed planted with a drill should be planted 1/4"-1/2" deep. Refer to Pure Live Seed (PLS) in the Glossary.
- Apply in accordance with specifications on the E&SC plan. If information is not available, select a temporary cover from Table 1.
- Temporary cover shall be applied to all disturbed areas left idle for fourteen days. (If an area is left idle for 6 months, permanent cover shall be applied.)

Ds2

MAINTENANCE

- Re-seed areas where an adequate stand of temporary vegetation fails to emerge or where a poor stand exists.

REFERENCES

- Mb Erosion Control Matting and Blankets
- Ds1 Disturbed Area Stabilization (With mulching only)
- Pm Polyacrylamide (PAM)

Ds2

Table 1. Some Temporary Plant Species, Seeding Rates and Planting Dates

Species	Rates Per 1,000 sq. ft.	Rates per Acre	Planting Dates by Region		
			M - L	P	C
Barley Alone Barley In mixtures	3.3 lbs. .6 lbs.	3 bu. .5 bu.	9/1-10/31	9/15-11/15	10/1-12/31
Lespedeza, Annual Lespedeza In Mixtures	0.9 lbs. 0.2 lbs.	40 lbs. 10 lbs.	3/1-3/31	3/1-3/31	2/1-2/28
Lovegrass, Weeping Lovegrass In Mixtures	0.1 lbs. .05 lbs.	4 lbs. 2 lbs.	4/1-5/31	4/1-5/31	3/1-5/31
Millet, Browntop Millet In Mixtures	.9 lbs. .2 lbs.	40 lbs. 10 lbs.	4/15-6/15	4/15-6/30	4/15-6/30
Millet, Pearl	1.1 lbs.	50 lbs.	5/15-7/15	5/1-7/31	4/15-8/15

1. Unusual site conditions may require heavier seeding rates.
2. Seeding dates may need to be altered to fit temperature variations and local conditions.
3. For Major Land Resource Areas (MLRAs), see page 50.
4. Seeding rates are based on pure live seed (PLS).

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Ds2

Table 1. Some Temporary Plant Species, Seeding Rates and Planting Dates (continued)

Species	Rates Per 1,000 sq. ft.	Rates per Acre	Planting Dates by Region		
			M - L	P	C
Oats Alone Oats In Mixtures	2.99 lbs. .7 lbs.	4 bu. 1 bu.	9/15-11/15	9/15-11/15	9/15-11/15
Rye (Grain) Alone Rye In Mixtures	3.9 lbs. .6 lbs.	3 bu. .5 bu.	8/15-10/31	9/15-11/30	10/1-12/31
Ryegrass	0.9 lbs.	40 lbs.	8/15-11/15	9/1-12/15	9/15-12/31
Sudangrass	1.4 lbs.	60 lbs.	5/1-7/31	5/1-7/31	4/1-7/31
Triticale Alone Triticale In Mixtures	3.3 lbs. .6 lbs.	3 bu. .5 bu.	NA	NA	10/15-11/30
Wheat Alone Wheat In Mixtures	4.1 lbs. .7 lbs.	3 bu. .5 bu.	9/15-11/30	10/1-12/15	10/15-12/31

1. Unusual site conditions may require heavier seeding rates.
2. Seeding dates may need to be altered to fit temperature variations and local conditions.
3. For Major Land Resource Areas (MLRAs), see page 50.
4. Seeding rates are based on pure live seed (PLS).

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Ds2

Table 2. Fertilizer Requirements for Temporary Vegetation

Types of Species	Planting Year	Fertilizer (N-P-K)	Rate (lbs./acre)	N Top Dressing Rate (lbs./acre)
Cool season grasses	First Second Maintenance	6-12-12 6-12-12 10-10-10	1500 1000 400	50-100 --- 30
Cool season grasses & legumes	First Second Maintenance	6-12-12 0-10-10 0-10-10	1500 1000 400	0-50 --- ---
Temporary cover crops seeded alone	First	10-10-10	500	30
Warm season grasses	First Second Maintenance	6-12-12 6-12-12 10-10-10	1500 800 400	50-100 50-100 30

Ds3

DISTURBED AREA STABILIZATION (WITH PERMANENT SEEDING)

DEFINITION

A permanent vegetative cover using grasses, trees, shrubs or legumes on highly erodible or critically eroded lands.

PURPOSE

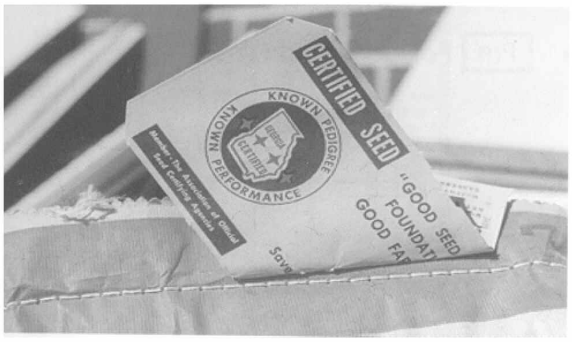
- Reduce runoff and erosion.
- Improve wildlife habitat.
- Improve aesthetics.
- Improve tilth and organic matter.
- Reduce downstream complaints.
- Reduce likelihood of legal action.
- Reduce likelihood of work stoppage due to legal action.
- Increase “good neighbor” benefits.

INSTALLATION

- Use conventional planting methods, if possible.
- Apply according to approved plan, if shown, or refer to Table 1.

- Check the tag on the bag of seed to verify the type and germination of the seed to be planted and the date of the test.

Figure 1. Typical Tag on a Bag of Seed



- Scarify, pit or trench sealed or crusted soil.
- Fertilize based on soil tests or as shown in Table 2.
- Apply agricultural lime as prescribed by soil tests or at a rate of 1 to 2 tons per acre.
- Apply seed by hand, cyclone seeder, drill or hydro-seeder. Seed planted with a drill should be planted 1/4"-1/2" deep.
- Straw or hay mulch shall be applied at a rate of 2 or 2.5 tons per acre.
- Irrigation should be used to supplement rainfall, but not to the extent to cause erosion.

Ds3

Table 1. Some Permanent Plant Species, Seeding Rates, and Planting Dates

Species	Rates per Acre	Rates per 1,000 sq. ft	Planting Dates by Region			Remarks
			M-L	P	C	
Bahia, Pensacola Alone or with temporary cover With other perennials	60 lbs. 30 lbs.	1.4 lbs. 0.7 lb.	---	4/1-5/31	3/1-5/31	Low growing; sod producing; will spread into Bermuda lawns.
Bahia, Wilmington Alone or with temporary cover With other perennials	60 lbs. 30 lbs.	1.4 lbs. 0.7 lb.	3/15-5/31	3/1-5/31	---	Same as above.
Bermuda, Common (Hulled seed) Alone With other perennials	10 lbs. 6 lbs.	0.2 lb. 0.1 lb.	---	4/1-5/31	3/15-5/31	Quick cover; low growing; sod forming; needs full sun.
Bermuda, Common (Unhulled seed) With temporary cover With other perennials	10 lbs. 6 lbs.	0.2 lb. 0.1 lb.	---	10/1-2/28	11/1-1/31	Plant with Winter annuals. Plant with Tall Fescue
Bermuda Sprigs Common lawn and forage hybrids	40 cu. ft. Sod plugs 3'x3'	0.9 cu. ft.	4/15-6/15	4/1-6/15	4/1-5/31	1 cu. ft. = 650 sprigs; 1 bu. = 1.25 cu. ft. or 800 sprigs

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Ds3

Table 1. Some Permanent Plant Species, Seeding Rates, and Planting Dates (continued)

Species	Rates per Acre	Rates per 1,000 sq. ft	Planting Dates by Region			Remarks
			M-L	P	C	
Centipede	Block Sod Only	Block Sod Only	-	11/1-5/31	11/1-5/31	Drought tolerant. Full sun or partial shade.
Crown Vetch With winter annuals or cool season grasses	15 lbs.	0.3 lb.	9/1-10/15	9/1-10/15	---	Mix with 30 lbs. Tall Fescue or 15 lbs. Rye; inoculate seed; plant only North of Atlanta.
Fescue, Tall Alone With other perennials	50 lbs. 30 lbs.	1.1 lbs. 0.7 lb.	3/1-4/15 or 8/15-10/15	9/1-10/15	---	Can be mixed with perennial Lespedezas or Crown Vetch; not for droughty soils or heavy use areas.
Lespedeza, Sericea Scarified	60 lbs.	1.4 lbs.	4/1-5/31	3/15-5/31	3/1-5/15	Widely adapted and low maintenance; takes 2-3 years to establish; inoculate seed with EL inoculant.; mix with Weeping Lovegrass, Common Bermuda, Bahia or Tall Fescue.

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Ds3

Table 1. Some Permanent Plant Species, Seeding Rates, and Planting Dates (continued)

Species	Rates per Acre	Rates per 1,000 sq. ft	Planting Dates by Region			Remarks
			M-L	P	C	
Lespedeza, Sericea (cont.)						
Unscarified	75 lbs.	1.7 lbs.	9/1-2/28	9/1-2/28	9/1-2/28	Mix with Tall Fescue or winter annuals.
Seed-bearing hay	3 tons	138 lbs.	10/1-2/28	10/1-1/31	10/15-1/15	Cut when seed is mature but before it shatters. Add Tall Fescue or winter annuals.
Lespedeza, Ambro Virgata or Appalow						
Scarified	60 lbs.	1.4 lbs.	4/1-5/31	3/15-5/31	3/1-5/15	Spreading growth with height of 18"-24"; good in urban areas; slow to develop good stands; mix with Weeping Lovegrass, Common Bermuda, Bahia Tall Fescue or winter annuals; do not mix with Sericea Lespedeza; inoculate seed with EL inoculant.
Unscarified	75 lbs.	1.7 lbs.	9/1-2/28	9/1-2/28	9/1-2/28	

Ds3

Table 1. Some Permanent Plant Species, Seeding Rates, and Planting Dates (continued)

Species	Rates per Acre	Rates per 1,000 sq. ft	Planting Dates by Region			Remarks
			M-L	P	C	
Lespedeza, Shrub (Lespedeza Bicolor or Lespedeza Thumbergii) Plants	3'x3' spacing		10/1-3/31	11/1-3/15	11/15-2/28	Plant in small clumps for wildlife food and cover.
Lovegrass, weeping						
Alone	4 lbs.	0.1 lbs.	4/1-5/31	3/15-5/31	3/1-5/31	Quick cover; drought tolerant; grows well with Sericea Lespedeza on road-banks and other steep slopes; short lived.
With other perennials	2 lbs.	0.05 lbs.				
Maidencane sprigs	2'x3' spacing		2/1-3/31	2/1-3/31	2/1-3/31	For very wet sites such as riverbanks and shorelines. Dig sprigs locally.
Panicgrass, Atlantic Coastal	20 lbs.	0.5 lbs.	---	3/1-4/30	3/1-4/30	Grows well on coastal sand dunes; mix with Sericea Lespedeza but not on sand dunes.

Ds3

Table 1. Some Permanent Plant Species, Seeding Rates, and Planting Dates (continued)

Species	Rates per Acre	Rates per 1,000 sq. ft	Planting Dates by Region			Remarks
			M-L	P	C	
Reed Canary Grass With other perennials	50 lbs. 30 lbs.	1.1 lbs. 0.7 lbs.	8/15-10/15	9/1-10/15	---	Grows similar to Tall Fescue; for wet sites.
Sunflower, Aztec Maximillian	10 lbs.	0.2 lbs.	4/15-5/31	4/15-5/31	4/1-5/31	Mix with Weeping Lovegrass or other low growing grasses or legumes.

1. Rates are for broadcasted seed. If a seed drill is used, reduce the rates by one-half.
2. PLS is an abbreviation for Pure Live Seed. Refer to the Glossary for an explanation of this term.
3. The resource areas are defined in the Glossary. See page 50 for your Resource Area.
4. Seeding rates are based on pure live seeds (PLS).

Ds3

Table 2. Fertilizer Requirements for Temporary Vegetation

Types of Species	Planting Year	Fertilizer (N-P-K)	Rate (lbs./acre)	N Top Dressing Rate (lbs./acre)
Cool season grasses	First Second Maintenance	6-12-12 6-12-12 10-10-10	1500 1000 400	50-100 --- 30
Cool season grasses & legumes	First Second Maintenance	6-12-12 0-10-10 0-10-10	1500 1000 400	0-50 --- ---
Warm season grasses	First Second Maintenance	6-12-12 6-12-12 10-10-10	1500 800 400	50-100 50-100 30
Warm season grasses and legumes	First Second Maintenance	6-12-12 0-10-10 0-10-10	1500 1000 400	50 --- ---

Ds3

Figure 2. Crown Vetch

Figure 3. Sericea Lespedeza

MAINTENANCE

- Re-seed areas where an adequate stand of vegetation fails to emerge or where a poor stand exists.
- Apply fertilizer per Table 2.
- Apply one ton of agricultural lime or as indicated by soil test every 4-6 years.
- Mow Bermuda and Bahia as desired. Mow Sericea Lespedeza only after frost to ensure seeds are mature.
- Maintain 6" or more of top growth.

REFERENCES

- Mb Erosion Control Matting and Blankets
- Ds1 Disturbed Area Stabilization (With mulching only)
- Ds2 Disturbed Area Stabilization (With temporary seeding)

Ds4

DISTURBED AREA STABILIZATION (WITH SODDING)

DEFINITION

A permanent vegetation using sods on highly erodible or critically eroded lands.

PURPOSE

- Establish immediate ground cover.
- Reduce runoff and erosion.
- Improve aesthetics and land value.
- Reduce dust and sediments.
- Stabilize waterways and critical areas.
- Filter sediments, nutrients and bugs.
- Reduce downstream complaints.
- Reduce likelihood of legal action.
- Reduce likelihood of work stoppage due to legal action.
- Increase “good neighbor” benefits.

INSTALLATION

- Bring soil surface to final grade. Clear surface of trash, woody debris, stones and clods larger than 1". Apply sod to soil surfaces only and not frozen surfaces, or gravel type soils

- Topsoil properly applied will help guarantee a stand. Don’t use topsoil recently treated with herbicides or soil sterilants.
- Mix fertilizer into soil surface. Fertilize based on soil tests or Table 1. For fall planting of warm season species, half the fertilizer should be applied at planting and the other half in the spring.

Table 1. Fertilizer Requirements for Soil Surface Application

Fertilizer Type (lbs./acre)	Fertilizer Rate (lbs./sq. ft.)	Fertilizer Rate	Season
10-10-10	1000	.025	Fall

- Agricultural lime should be applied based on soil tests or at a rate of 1 to 2 tons per acre.
- Lay sod with tight joints and in straight lines. Don’t overlap joints. Stagger joints and do not stretch sod.
- On slopes steeper than 3:1, sod should be anchored with wooden or biodegradable pins or other approved methods.
- Installed sod should be rolled or tamped to provide good contact between sod and soil.
- Irrigate sod and soil to a depth of 4" immediately after installation.
- Sod should not be cut or spread in extremely wet or dry weather.
- Irrigation should be used to supplement rainfall for a minimum of 2-3 weeks.

MATERIALS

- Sod selected should be certified. Sod grown in the general area of the project is desirable.

Ds4

- Sod should be machine cut and contain 3/4" ±1/4" of soil, not including shoots or thatch.
- Sod should be cut to the desired size within ±5%. Torn or uneven pads should be rejected.
- Sod should be cut and installed within 36 hours of digging.
- Avoid planting when subject to frost heave or hot weather if irrigation is not available.
- The sod type should be shown on the plans or installed according to Table 2. See page 50 for your Resource Area.

Table 2. Sod Planting Requirements

Grass	Varieties	Resource Area	Growing Season
Bermudagrass	Common Tifway Tifgreen Tiflawn	M-L, P,C P,C P,C P,C	Warm weather
Bahiagrass	Pensacola	P,C	Warm weather
Centipede	---	P,C	Warm weather
St. Augustine	Common Bitterblue Raleigh	C	Warm weather
Zoysia	Emerald Myer	P,C	Warm weather
Tall Fescue	Kentucky 31	M-L, P	Cool weather

MAINTENANCE

- Re-sod areas where an adequate stand of sod is not obtained.

Ds4

- New sod should be mowed sparingly. Grass height should not be cut less than 2"-3" or as specified.
- Apply one ton of agricultural lime as indicated by soil test or every 4-6 years.
- Fertilize grasses in accordance with soil tests or Table 3.

Table 3. Fertilizer Requirements for Sod

Types of Species	Planting Year	Fertilizer (N-P-K)	Rate (lbs./acre)	Nitrogen Top Dressing Rate (lbs./acre)
Cool season grasses	First Second Maintenance	6-12-12 6-12-12 10-10-10	1500 1000 400	50-100 --- 30
Warm season grasses	First Second Maintenance	6-12-12 6-12-12 10-10-10	1500 800 400	50-100 50-100 30

REFERENCES

- Mb Erosion Control Matting and Blankets
- Ds1 Disturbed Area Stabilization (With mulching only)
- Ds2 Disturbed Area Stabilization (With temporary seeding)
- Ds3 Disturbed Area Stabilization (With permanent seeding)

Du

DUST CONTROL ON DISTURBED AREAS

DEFINITION

Controlling surface and air movement of dust on land-disturbing activities.

PURPOSE

- Prevent the movement of dust from exposed soil surfaces.
- Prevent the movement of airborne substances that may be harmful to health.

INSTALLATION

- Apply according to approved plan, if shown.
- Mulch disturbed areas and tackify with resins such as asphalt, Curasol or Terratack according to manufacturer's recommendations.
- Stabilize disturbed areas with temporary or permanent vegetation.
- Irrigate disturbed areas until surface is wet.
- Cover surfaces with crushed stone or gravel.

- Apply calcium chloride at a rate to keep surfaces moist.
- Apply spray-on adhesives to mineral soils (not muck soils) as described in Table 1.

Table 1. Spray-On Adhesive Application Requirements

Adhesive	Water Dilution	Nozzle Type	Application (Gal./Acre)
Anionic asphalt emulsion	7:1*	Coarse spray	1,200
Latex emulsion	12.5:1 *	Fine spray	235
Resin-in-water emulsion	4:1*	Fine spray	300

*Use manufacturer's recommendations when available.

MAINTENANCE

- Prohibit traffic on surface after spraying.
- Supplement surface covering as needed.

REFERENCES

- Ds1 Disturbed Area Stabilization (With mulching only)
- Ds2 Disturbed Area Stabilization (With temporary seeding)
- Ds3 Disturbed Area Stabilization (With permanent seeding)
- Ds4 Disturbed Area Stabilization (With sodding)
- Tb Tackifiers and Binders

Mb

EROSION CONTROL MATTING AND BLANKETS

DEFINITION

A protective covering (blanket) or soil stabilization mat used to establish permanent vegetation on steep slopes, channels, or shorelines.

PURPOSE

- Reinforce turf.
- Reduce erosion.
- Reinforce channels.
- Provide protective covering.

INSTALLATION

- Install on slopes steeper than 2.5:1 and greater than 10 feet in height and in areas of concentrated flow.
- Install according to approved plan, if shown.
- All mats and netting should be appropriately staked to prevent shifting.
- These materials must be installed according to the manufacturer's specifications.

Jute or Excelsior (Wood Fiber) Matting

- Seed area.
- Cover an area completely with a heavy, uniform, jute yarn or organic mulch.
- Apply on areas with steep slopes, watercourses or where vegetation needs to be quickly established.

Figure 1. Installation of Jute Matting

Fiberglass Roving

- Seed area.
- Apply fiberglass with a compressed air ejector, at a rate of 1/2-1 ton per acre and tack with emulsifier (asphalt) at a rate of 25-35 gal/1000 ft^2 or as recommended by the manufacturer.
- Place in watercourses or on moderate slopes for stabilization and to provide a suitable microclimate for seeds.

Bonded Fiber Matrix

- A hydraulically applied bonded fiber matrix which upon drying shall adhere to the soil in the form of a continuous 100 per cent coverage biodegradable blanket.
- The bonded matrix shall not be applied on saturated soils.
- See manufacturer's specifications for installation instructions.

Mb

Turf Reinforcement Mats

- See manufacturer's specifications for installation instructions.

- Other geotextiles include silt fence, geoblocks, weight-bearing fabric, etc.
- All blanket and matting materials shall be on the Georgia Department of Transportation Qualified Products List (QPL #62 for blankets and QPL #49 for matting).

Figure 2. Geotextile Installed to Control Erosion in a Concentrated Flow Area

MAINTENANCE

- Inspect periodically and after each rainstorm until vegetation is completely established.
- Eroded or exposed areas should be seeded and stabilized with mulch as quickly as possible.

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Pm

POLYACRYLAMIDE (PAM)

DEFINITION

The land application of a product containing anionic polyacrylamide (PAM) acting as a temporary soil binding agent to reduce soil erosion.

PURPOSE

PAM is used to reduce erosion from wind and water on construction sites and agricultural lands. Other benefits may include improved water quality, infiltration, soil fertility, and visibility.

INSTALLATION

- Apply according to approved plan, if shown.
- These materials should be applied according to the manufacturer's specifications. These products are site specific.
- Use setbacks when applying anionic PAM near natural waterbodies.
- Never add water to PAM, add PAM slowly to water. If water is added to PAM, "globs" may form which can clog dispensers.
- NOT ALL POLYMERS ARE PAM.
- Only anionic PAM shall be used. Cationic PAM is toxic and shall not be used.

MAINTENANCE

Maintenance will consist of reapplying PAM to disturbed areas including high use traffic areas, which interfere in the performance of this practice.

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Sb

STREAMBANK STABILIZATION (USING PERMANENT VEGETATION)

DEFINITION

The use of readily available native plant materials to maintain and enhance streambanks, or to prevent, or restore and repair small streambank erosion problems.

PURPOSE

- Lessen the impact of rain directly on the soil.
- Trap sediment from adjacent land.
- Form a root mat to stabilize and reinforce the soil on the streambank.
- Provide wildlife habitat.
- Enhance the appearance of the stream.
- Lower summertime water temperatures for a healthy aquatic population.

NOTE: Careful thought, planning and execution is required to assure that the streambank stabilization project is done efficiently and correctly. Please refer to SSWCC's Guidelines for Streambank Restoration for more detailed information.

Sb

SELECTED MEASURES

- Revegetation includes seeding and sodding of grasses, seeding in combination with erosion control fabrics, and the planting of woody vegetation (shrubs and trees).
- Use jute mesh and other geotextiles to aid in soil stabilization and revegetation.

Live Stake

- Fresh, alive woody plant cuttings tamped into the ground as stakes, intended to root and grow into mature shrubs that will stabilize soils and restore the riparian zone habitats.
- Willow species work best.
- Provides no immediate streambank stabilization.

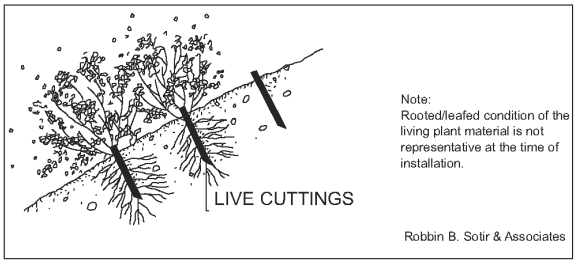

Figure 1. Illustration of a Live Stake

Joint Planting

- Installation of live willow stakes between rock previously placed along the streambank.
- Rock needs to be loosely dumped or hand placed and no thicker than 2 feet.
- Enables a bank previously installed with conventional rip-rap to become naturalized.

Sb

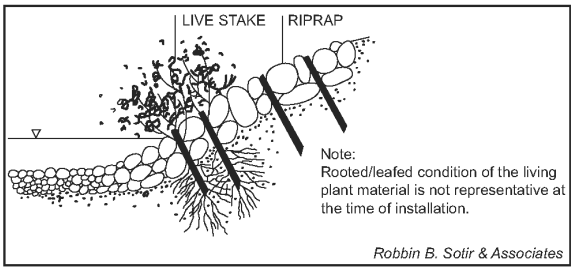

Figure 2. Illustration of Joint Planting

Live Fascine

- Sausage-like bundles of live cut branches placed into trenches along the streambank.
- Willow species work best.
- Provides immediate protection from erosion when properly used and installed.
- Creates very little site disturbance as com-pared to other systems.
- Works especially well when combined with surface covers such as jute mesh or coir fabrics.

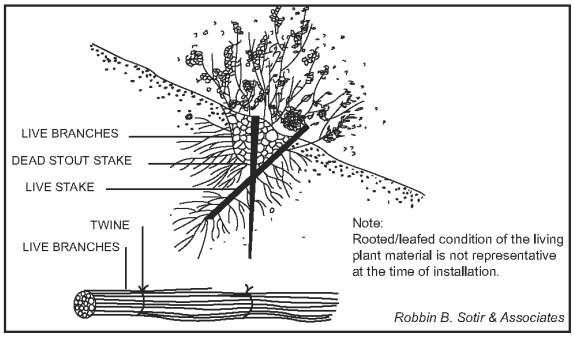

Figure 3. Illustration of a Live Fascine

Sb

Brushmattress

- Combination of living units that form an immediate protective surface cover over the streambank.
- Living units used include live stakes, live fascines, and a mattress branch cover (long, flexible branches placed against the bank surface).
- Requires a great deal of live material.
- Complicated and expensive to evaluate, design, and install.
- Captures sediment during flood conditions.
- Produces habitat rapidly, and quickly develops a healthy riparian zone.

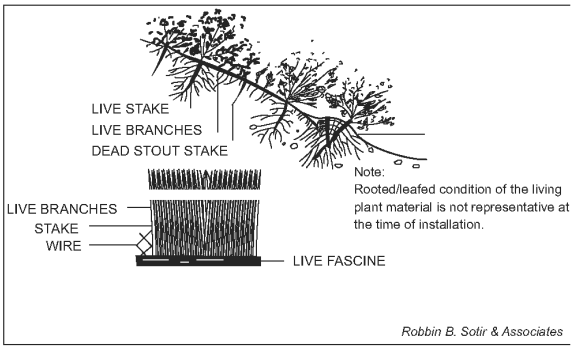

Figure 4. Illustration of a Brushmattress

Live Cribwall

- A rectangular framework of logs or timbers, rock, and woody cuttings.
- Requires a great deal of assessment and understanding of stream behavior.
- Can be complicated and expensive if a supply of wood and some volunteer help is not available.
- Develops a natural streambank or upland slope appearance after it has begun to grow.

Sb

- Provides excellent habitat for a variety of fish, birds, and animals.
- Very useful where space is limited on small, narrow stream corridors.

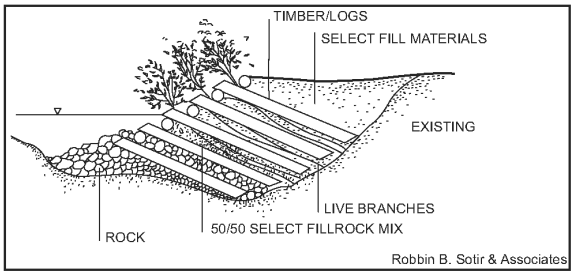

Figure 5. Illustration of a Live Cribwall

Branchpacking

- Process of alternating layers of live branches and soil, incorporated into a hole, gully, or slumped-out area in a slope or streambank.
- Moderate to complex level of difficulty for construction.
- Produces an immediate filter barrier, reducing scouring conditions, repairing gully erosion, and providing habitat cover and bank reinforcement.
- One of the most effective and inexpensive methods for repairing holes in earthen embankments along small stream sites.

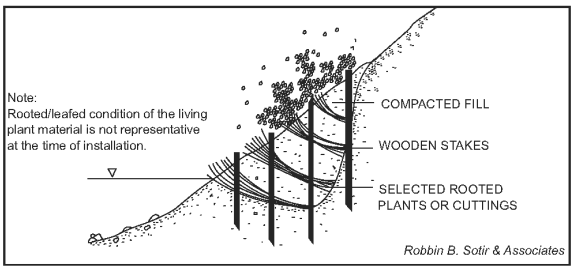

Figure 6. Illustration of Branchpacking

Table 1. Streambank Erosion Protection Measures Relative Costs and Complexity

Measure	Relative Cost	Relative Complexity
Live stake	Low	Simple
Joint planting	Low*	Simple*
Live fascine	Moderate	Moderate
Brushmattress	Moderate	Moderate to Complex
Live cribwall	High	Complex
Branchpacking	Moderate	Moderate to Complex
Conventional vegetation	Low to Moderate	Simple to Moderate
Conventional bank armoring (riprap)	Moderate to High	Moderate to Complex

*Assumes rock is in place.

MAINTENANCE

- Check banks after every high-water event, fixing gaps in the vegetative cover at once with structural materials or new plants, and mulching if necessary.
- Fresh cuttings from other plants may be used for repairs.
- When fertilizer is applied on the surface, it is best to apply about one-half at planting, one-fourth when new growth is about two inches tall, and one-fourth about six weeks later.

Sb

REFERENCES

- Mb Erosion Control Matting and Blankets
- Ds1 Disturbed Area Stabilization (With mulching only)
- Ds2 Disturbed Area Stabilization (With temporary seeding)
- Ds3 Disturbed Area Stabilization (With permanent seeding)
- Ds4 Disturbed Area Stabilization (With sodding)
- Guidelines for Streambank Restoration, Georgia Soil and Water Conservation Commission

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STRUCTURAL BEST MANAGEMENT PRACTICES

Cd CHECK DAM

DEFINITION

A small temporary barrier constructed across a swale, drainage ditch, or area of concentrated flow.

PURPOSE

- Reduce velocity.
- Filter sediment.
- Stabilize grade.

INSTALLATION

- Install according to approved plan, if shown.
- Place in small, open channels, **not in live streams**.
- Construct center at least 9 inches lower than outer edges.
- Extend across entire width of ditch or swale.
- Make side slopes 2:1 or flatter.
- Toe of the upstream dam should be at the same elevation as the top of the downstream dam.
- Seed and mulch area beneath the dam after its removal.

Cd

Stone Check Dams (Cd-S)

- Drainage area not to exceed 2 acres.
- Constructed of graded size 2"-10" stone.
- 2 feet maximum dam height measured to center of check dam.
- Place a suitable geotextile between the rock and its soil base and abutments.

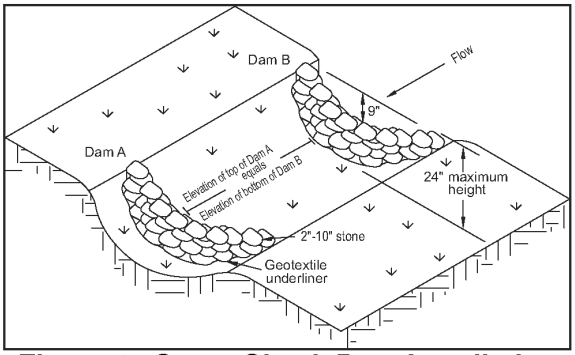


Figure 1. Stone Check Dam Installation Requirements

MAINTENANCE

- Periodic inspection and maintenance required.
- Remove sediment when it reaches a depth of one-half the original dam height.
- Remove at the completion of its useful life.

REFERENCES

- Ds1 Disturbed Area Stabilization (With mulching only)
- Ds2 Disturbed Area Stabilization (With temporary seeding)
- Ds3 Disturbed Area Stabilization (With permanent seeding)
- Ds4 Disturbed Area Stabilization (With sodding)

Ch

CHANNEL STABILIZATION

DEFINITION

Improving, constructing, or stabilizing an open channel or waterway.

PURPOSE

- Prevent erosion and sediment deposition.
- Provide adequate capacity for flood water, drainage, or other water management practices.

INSTALLATION

- Install according to approved plan, if shown.
- Drainage area not to exceed one square mile.
- Establish or install immediately after construction or as soon as weather permits.

Vegetative Lining (Ch-V)

- Permanent or temporary vegetation may be used.
- Install erosion control blankets, if required.

Ch

Rock Riprap Lining Ch-Rp

- Slopes should be 1.5:1 or less.
- Place a filter blanket, at least 6 inches thick, of sand, gravel, and/or geotextile material between the riprap and the base material.

Concrete Lining Ch-C

- For channels where velocities exceed 10 feet per second.

Grade Stabilization Structure

- Constructed of concrete, rock, masonry, steel, aluminum or treated wood.
- Provide adequate outlet for discharge.
- Do not compromise the environmental integrity of the area.
- Vegetate all disturbed areas immediately.

MAINTENANCE

Periodic inspection and maintenance required.

REFERENCES

- Gr Grade Stabilization Structure
- Ds1 Disturbed Area Stabilization (With mulching only)
- Ds2 Disturbed Area Stabilization (With temporary seeding)
- Ds3 Disturbed Area Stabilization (With permanent seeding)
- Ds4 Disturbed Area Stabilization (With sodding)

Co

CONSTRUCTION EXIT

DEFINITION

A stone-stabilized pad located at any point where traffic will be leaving a construction site to a public right-of-way, street, alley, sidewalk, or parking area.

PURPOSE

Reduce or eliminate the transport of mud from the construction area.

INSTALLATION

- Install according to approved plan, if shown.
- Use 1.5"-3.5" stone.
- Minimum pad thickness of 6 inches.
- Minimum pad width of 20 feet.
- Minimum pad length of 50 feet.
- Excavate footprint 3 inches.
- If tire washing is required, route runoff from washing to an approved sediment trap or sediment basin.
- Install filter fabric under the entire pad.

Co

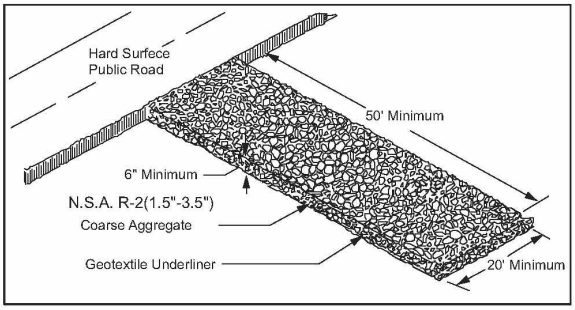


Figure 1. Crushed Stone Construction Exit Installation Requirements

Figure 2. Geotextile Underliner Under Gravel Pad

MAINTENANCE

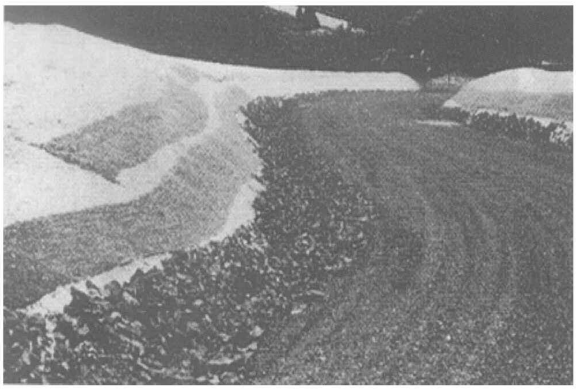
- Periodically dress with 1.5"-3.5" stone.
- Maintain in a condition that will prevent tracking or flow of mud onto public rights-of way.
- Immediately remove mud and debris tracked or spilled onto roadways.

Cr

CONSTRUCTION ROAD STABILIZATION

DEFINITION

A travel way constructed as part of a construction plan including access roads, subdivision roads, parking areas, and other on-site vehicle transportation routes.



PURPOSE

To provide a fixed route of travel for construction traffic and to reduce erosion and subsequent regrading of permanent roadbeds between time of initial grading and final stabilization.

INSTALLATION

- Install according to approved plan.
- Temporary roads shall follow the contours of the natural terrain to minimize disturbance of drainage patterns.
- If a temporary road must cross a stream, the crossing must be designed, installed and maintained according to temporary stream crossing (Sr) specifications.

Cr

- Grades for temporary roads should not exceed 10 per cent except for short lengths with a maximum of 20 per cent for special uses.
- Temporary roadbeds shall be at least 14 feet wide for one-way traffic, 20 feet wide for two-way traffic, and 24 feet wide for trailer traffic.
- All cut and fills shall have side slopes at a maximum of 2:1 or 3:1 if mowing is planned.
- Drainage channels shall be designed to be on stable grades or protected with structures or linings for stability.
- Geotextile should be applied to the roadbed for additional stability according to the design manual specifications.
- A 6-inch layer of coarse aggregate shall be applied immediately after grading.

MAINTENANCE

Roads and parking areas may require a periodic top dressing of gravel to maintain the gravel depth at 6 inches. Vegetated areas should be checked periodically to ensure a good stand of vegetation is maintained. Remove any silt or other debris causing clogging of roadside

REFERENCES

- Sr Temporary Stream Crossing

Dc

STREAM DIVERSION CHANNEL

DEFINITION

A temporary channel constructed to convey flow around a construction site while a permanent structure is being constructed in the stream channel.

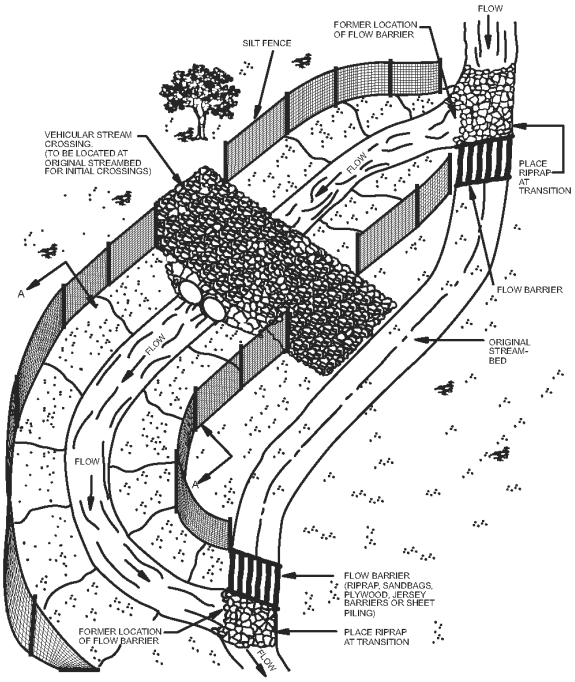


Figure 1. Stream Diversion Channel (Perspective View)

PURPOSE

To protect the streambed from erosion and allow work “in the dry”.

Dc

INSTALLATION

- Install according to approved plan.
- Drainage area not to exceed one square mile (640 acres).
- The bottom width of the stream diversion shall be a minimum of six feet or equal to the bottom width of the existing streambed, whichever is greater.
- Side slopes of the stream diversion channel shall be no steeper than 2:1.
- Depth and grade of the channel shall be sufficient to ensure continuous flow of water in the diversion.
- The channel shall be lined to prevent erosion of the channel and sedimentation in the stream. The lining is selected based upon the expected velocity of bankfull flow. The linings are as follows:
  1) Geotextile, polyethylene film or sod (Dc-A) for a velocity range of 0-2.5 fps.
  2) Geotextile alone (Dc-B) for a velocity range of 2.5-9.0 fps.
  3) Class I riprap and geotextile (Dc-C) for a velocity range of 9.0-13.0 fps.
- The channel shall be excavated, constructing plugs at both ends.
- Silt fence or berms shall be placed along the sides of the channel to prevent unfiltered runoff from entering the stream.
- The channel surface shall be smooth (to prevent tearing of the liner) and lined with the material specified in the plans.
- The plugs are removed when the liner installation is complete, removing the downstream plug first.

Dc

- As soon as construction in the streambed is complete, the diversion shall be replugged and backfilled.
- Upon removal of the lining, the stream shall immediately be restored and properly stabilized.
- All other appropriate agencies, including the COE, must be contacted to ensure compliance with other Laws.

MAINTENANCE

The stream diversion channel shall be inspected at the end of each day to make sure that the construction materials are positioned securely. This will ensure that the work area stays dry and that no construction materials float downstream. All repairs shall be made immediately.

REFERENCES

- Mb Erosion Control Matting and Blankets

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Di

DIVERSION

DEFINITION

A ridge of compacted soil, constructed above, across, or below a slope.

PURPOSE

- Reduce slope lengths.
- Intercept and divert storm runoff to a stable outlet at a non-erosive velocity.

INSTALLATION

- Install according to approved plan, if shown.
- Remove trees, brush, stumps and other objectionable material.
- Compact all fills.
- Channel cross-section should be trapezoidal or parabolic in shape.
- Side slopes should be 2:1 or flatter.
- Excavate narrow, deep channels on steep slopes and broad, shallow channels on gentle slopes.
- Adequate outlet must be present.

Di

- Stabilize channel and outlet with vegetation (mulch required for all seeded or sprigged channels), riprap, or pavement.
- Dispose of and/or stabilize unneeded excavated material.

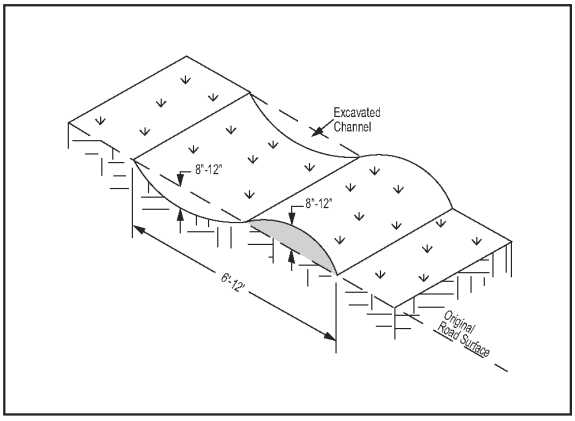

Figure 1. Typical Diversion Across Road

MAINTENANCE

Inspect frequently and after each rainfall and make necessary repairs.

REFERENCES

- Ds1 Disturbed Area Stabilization (With mulching only)
- Ds2 Disturbed Area Stabilization (With temporary seeding)
- Ds3 Disturbed Area Stabilization (With permanent seeding)
- Ds4 Disturbed Area Stabilization (With sodding)

Dn1

TEMPORARY DOWN DRAIN STRUCTURE

DEFINITION

A temporary structure used to convey storm water down the face of cut or fill slopes.

PURPOSE

- Transport storm runoff from one elevation to another.
- Reduce slope erosion.

INSTALLATION

- Install according to approved plan, if shown.
- Install heavy-duty, flexible materials such as non-perforated, corrugated plastic pipe.

Dn1

Table 1. Pipe Diameter for Temporary Downdrain

Maximum Drainage Area per Pipe (acres)	**Pipe Diameter** (inches)
0.3	10
0.5	12
1.0	18

- Place on undisturbed soil or well-compacted fill.
- Install tee, “L” or flared end section inlet at the top of the slope.
- Entrance sloped 1/2" per foot toward inlet.
- Compact a dike ridge no less than one foot above the top of the pipe.
- Anchor with hold-down grommets or stakes at intervals not to exceed 10 feet.
- Ensure connections are watertight.
- Extend pipe beyond the toe of the slope.
- Direct outlet uphill.
- Stabilize outlet with tee, riprap or other suitable material.
- Vegetate all disturbed areas immediately.
- See Figure 1.

MAINTENANCE

- Inspect drain and diversion after every rainfall and promptly make necessary repairs.
- Remove once the permanent water disposal system is installed.

REFERENCES

- St Storm Drain Outlet Protection

Dn1

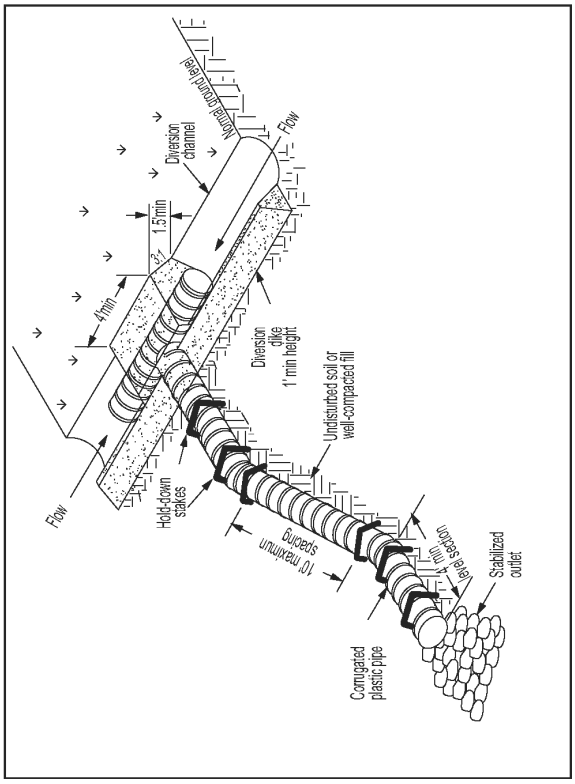

Figure 1. Temporary Downdrain and Inlet Detail

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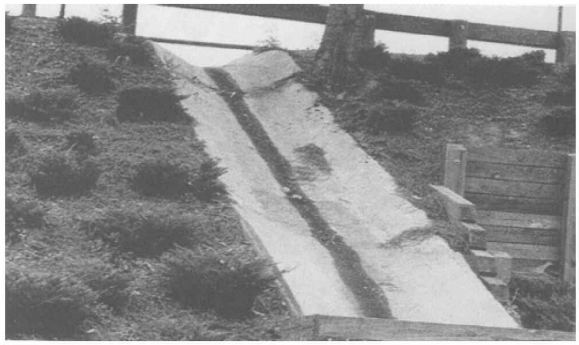
Dn2

PERMANENT DOWN DRAIN STRUCTURE

DEFINITION

A permanent structure to safely convey surface runoff from the top of a slope to the bottom of the slope.



PURPOSE

Minimize erosion due to concentrated storm runoff on cut or fill slopes.

INSTALLATION

- Install according to approved plan, if shown.
- Types of Structures
  - Paved flume: parabolic, rectangular, or trapezoidal cross section.
  - Pipe: steel, plastic, etc.
  - Sectional: a prefabricated sectional conduit of half-round or third-round pipe.
- Slopes must have sufficient grade to prevent sediment deposition.
- Stabilize outlet according to plans.
- Vegetate all disturbed areas immediately.

Dn2

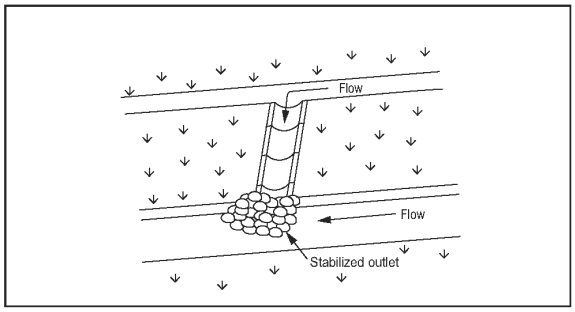


Figure 1. Typical Concrete Paved Flume

MAINTENANCE

Periodic inspection and maintenance required.

REFERENCES

- St Storm Drain Outlet Protection
- Ds1 Disturbed Area Stabilization (With mulching only)
- Ds2 Disturbed Area Stabilization (With temporary seeding)
- Ds3 Disturbed Area Stabilization (With permanent seeding)
- Ds4 Disturbed Area Stabilization (With sodding)

Fr

FILTER RING

DEFINITION

A temporary stone barrier constructed at storm drain inlets and pond outlets.

PURPOSE

This structure reduces flow velocities, preventing the failure of other sediment control devices. It also prevents sediment from leaving the site or entering drainage systems, prior to permanent stabilization of the disturbed area.

INSTALLATION

- Filter rings shall be used in conjunction with other sediment control measures, except where other practices defined in this manual are not appropriate.
- The filter ring shall surround all sides of the structure receiving runoff from disturbed areas.
- The ring should be placed a minimum of 4 feet from the structure.
- If the ring is utilized above a retrofit structure, it should be a minimum of 8 to 10 feet from the retrofit.
- When utilized at inlets with diameters less than 12 inches, the filter ring shall be constructed of stone no smaller than 3-5 inches (15-30 lbs).
- When utilized at pipes with diameters greater than 12 inches, the filter ring shall be constructed of stone no smaller than 10-15 inches (50-100 lbs).
- The filter ring shall be constructed at a height no less than 2 feet above grade.

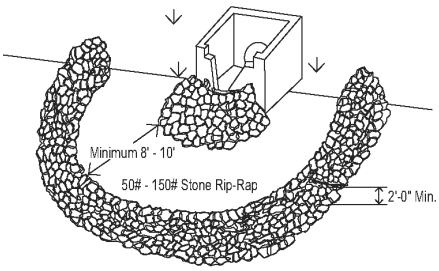
Fr

MAINTENANCE

The filter ring must be kept clear of trash and debris. This will require continuous monitoring and maintenance, which includes sediment removal when one-half full. These structures are temporary and should be removed when the land-disturbing project has been stabilized.

REFERENCES

- Rt Retrofit
- Sd3 Temporary Sediment Basin
- St Storm Drain Outlet Protection



STONE FILTER RING

Ga

GABION

DEFINITION

Large, multi-celled, rock-filled wire mesh boxes used in channel revetments, retaining walls, abutments, check dams, etc.

PURPOSE

- Construction of erosion control structures.
- Stabilize steep or highly erosive slopes.

INSTALLATION

- Install according to approved plan, if shown.
- Foundations must be smooth and level.
- Only galvanized or PVC coated wire should be used.
- Set individual baskets into place, wire them together in courses, and fill with rock to form flexible monolithic building blocks.
- Rock should be durable and adequately sized (normally 4"-8") to be retained in the baskets.
- “Key” structure securely into foundations and abutment surfaces.

Ga

MAINTENANCE

Periodically inspect for signs of undercutting or excessive erosion at transition areas, and make necessary repairs immediately.

75

Gr

GRADE STABILIZATION STRUCTURE

DEFINITION

A structure to stabilize the grade in natural or artificial channels.

PURPOSE

- Stabilize the grade in natural or artificial channels.
- Prevent the formation or advancement of gullies.
- Reduce erosion and sediment pollution.

INSTALLATION

- Install according to approved plan, if shown.
- Construct with concrete, rock, masonry, steel, aluminum, or treated wood.
- Dewater excavations prior to filling.
- Construct minimum top width of 10 feet with side slopes of 3:1 or flatter on earthfill embankments that are constructed in 6" to 8" horizontal lifts.
- Compact fill to approximately 95 percent of standard density.
- Construct keyway 8 or more feet wide and 2 feet deep along centerline of the structure and embankment.

76

Gr

- Provide adequate outlet for discharge.
- Apply protective cover immediately after completion of the structure.
- Vegetate all disturbed areas immediately.
- All other appropriate agencies, including the COE, must be contacted to ensure compliance with other Laws.

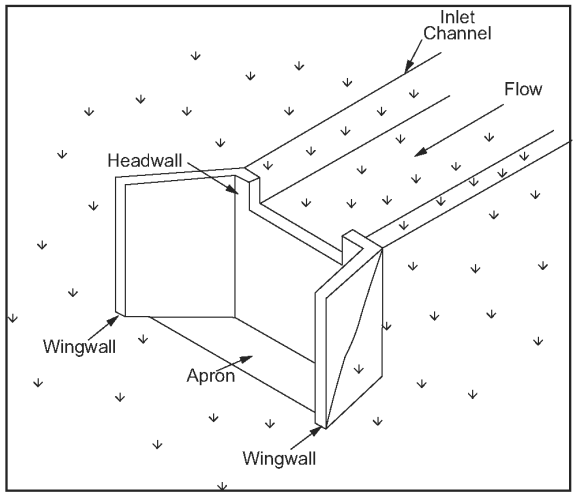


Figure 1. Typical Drop Spillway Structure

MAINTENANCE

Periodic inspection and maintenance required.

REFERENCES

- St Storm Drain Outlet Protection
- Ds1 Disturbed Area Stabilization (With mulching only)
- Ds2 Disturbed Area Stabilization (With temporary seeding)
- Ds3 Disturbed Area Stabilization (With permanent seeding)
- Ds4 Disturbed Area Stabilization (With sodding)

Lv

LEVEL SPREADER

DEFINITION

An outlet device constructed at zero grade across the slope where concentrated runoff may be discharged at non-erosive velocities onto undisturbed areas stabilized by existing vegetation.

PURPOSE

- Minimize erosion.
- Convert concentrated storm runoff to sheet flow.
- Guide storm runoff to an undisturbed, vegetated area.

INSTALLATION

- Install according to approved plan, if shown.
- Grade the channel no greater than 1% for the last 15 feet of the dike or diversion.
- Construct on undisturbed soil that is stabilized with vegetation.
- Minimum width of 6 feet.
- Minimum, uniform depth of 6 inches as measured from the lip.
- Uniform depth across the entire length.

Lv

- Level lip constructed on zero percent grade.
- Discharge onto an undisturbed, stabilized area at zero grade.
- Provide a smooth outlet.
- Prevent water from concentrating below point of discharge.
- Vegetate all disturbed areas immediately.

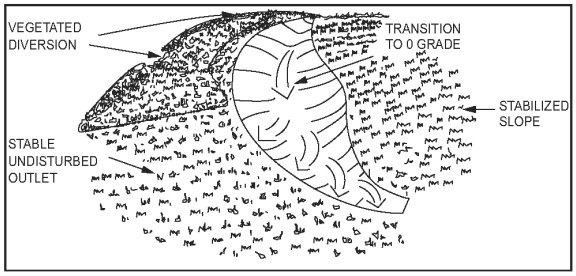


Figure 1. Level Spreader Installation Requirements

MAINTENANCE

Periodic inspection and maintenance is required.

REFERENCES

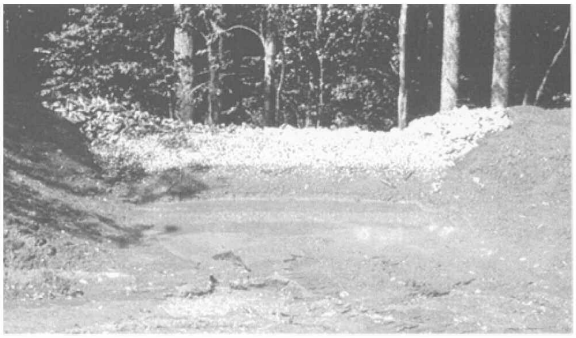
- Ds1 Disturbed Area Stabilization (With mulching only)
- Ds2 Disturbed Area Stabilization (With temporary seeding)
- Ds3 Disturbed Area Stabilization (With permanent seeding)
- Ds4 Disturbed Area Stabilization (With sodding)

Rd

ROCK FILTER DAM

DEFINITION

A temporary stone filter dam installed across small streams or drainageways.



PURPOSE

- Capture and filter sediment for removal when working in a stream or water body.
- Reduce velocity of water.

INSTALLATION

- Install according to approved plan, if shown.
- For use in small channels with drainage areas of 50 acres or less.
- Must be used in conjunction with other appropriate sediment control measures.
- Use below culvert installations, dam construction, or any project that may involve grading activity directly in a stream.
- Not intended to substantially impound water.
- Use at the upstream end of ponds or lakes.
- Edges should not be higher than the channel banks.

Rd

- Center should be at least 6 inches lower than the outer edges of the dam at the channel banks.
- Height should not exceed elevation of upstream property line.
- Side slopes should be 2:1 or flatter.
- Top width should be greater than 6 feet.
- Extend completely across the channel and securely tie into both channel banks.
- All other appropriate agencies, including the COE, must be contacted to ensure compliance with other Laws.

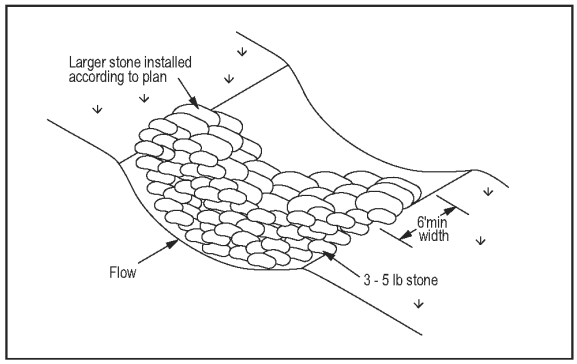


Figure 1. Rock Filter Dam Installation Requirements

MAINTENANCE

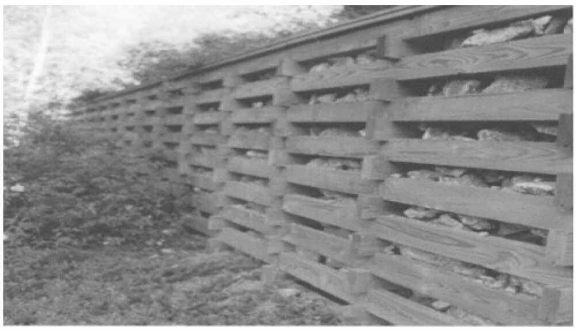
- Requires periodic inspection and maintenance.
- Sediment removed when it reaches one-half of the original dam height.
- Remove at the completion of its useful life.

Re

RETAINING WALL

DEFINITION

A constructed wall of one or more of the following: concrete masonry, reinforced concrete cribbing, treated timbers, steel pilings, gabions, stone drywall, rock riprap, etc.



PURPOSE

To assist in stabilizing cut or fill slopes where stability could only be obtained with the use of a wall.

INSTALLATION

Retaining walls require *specific designs* which are within the capabilities of a design engineer or a licensed architect. Close supervision is required to ensure proper installation.

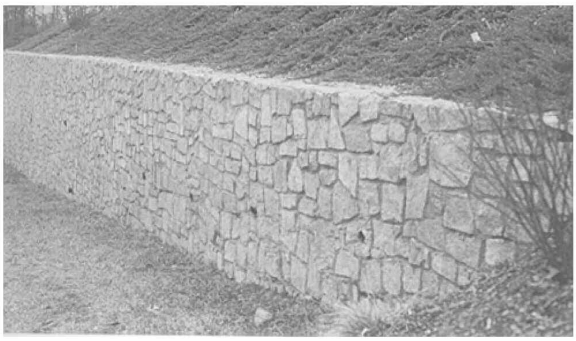


Figure 1. Typical Stone Retaining Wall

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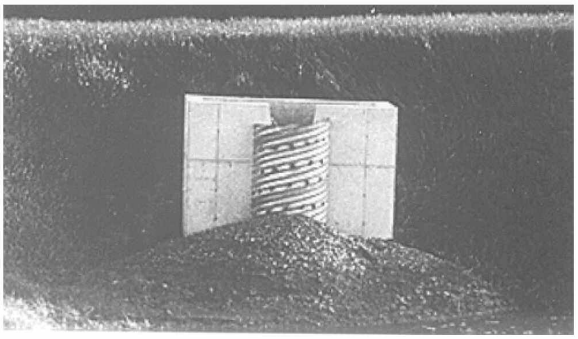
Rt

RETROFITTING

DEFINITION

A device placed in front of an outlet structure to temporarily filter sediment.



PURPOSE

Allow stormwater detention basins to function as temporary sediment retention basins.

INSTALLATION

- Install according to approved plan, if shown.
- Prohibited in detention basins on live streams.
- Install on approximately 1/2 the height of the outlet structure.

Perforated Half-Round Pipe with Stone Filter

Rt-P

- Half-round pipe diameter should be 1.5 times the diameter of the principal pipe outlet or wider than the greatest width of the concrete weir.
- Attach to the outlet structure, but never use on exposed pipe end or winged headwall.
- Drainage area not to exceed 30 acres.
- See Figures 1 and 2.

Rt

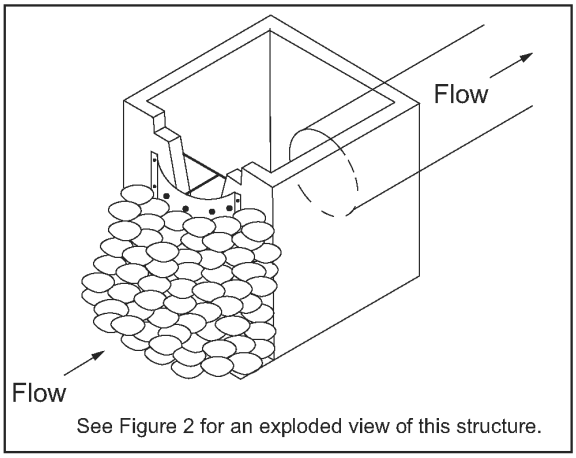


Figure 1. Perforated Half-Round Pipe Retrofit with Stone Filter.

Stone Filter Ring

- Use in conjunction with half-rounds or board dams.
- Minimum height of 2'.
- Minimum distance of 8' to 10' between retrofit and ring.
- Pipe with diameter larger than 12" requires 10"-15" stone, faced with smaller filter stone.

85

Rt

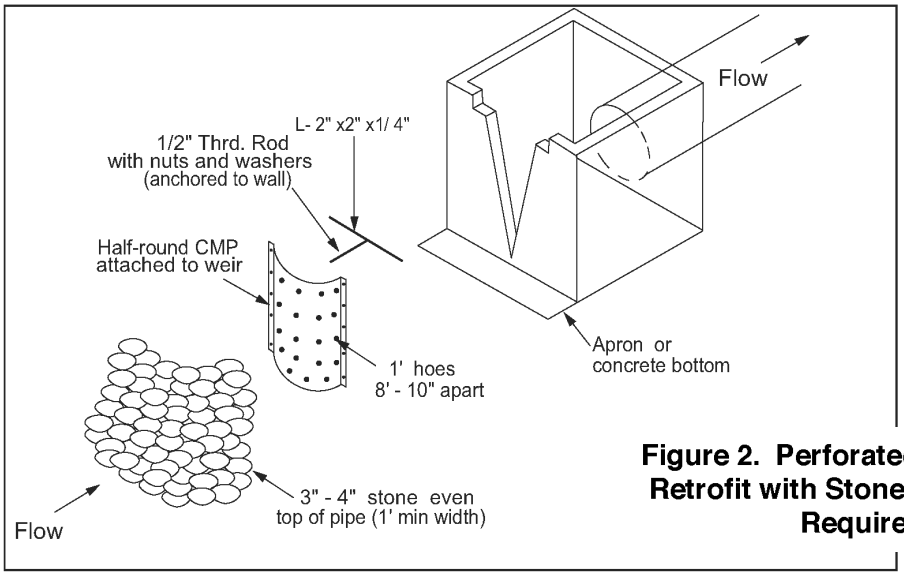


Figure 2. Perforated Half-Round Pipe Retrofit with Stone Filter Installation Requirements

86

Rt

Slotted Board Dam with Stone (Rt-B)

- Can be used with open pipe ends, winged headwalls, or concrete weir outlets.
- Install with 4x4" or larger posts with 0.5" to 1" spacing.
- Drainage area not to exceed 100 acres.
- Can excavate in front of the retrofitted outlet structure or raise the outlet structure to obtain required sediment storage.

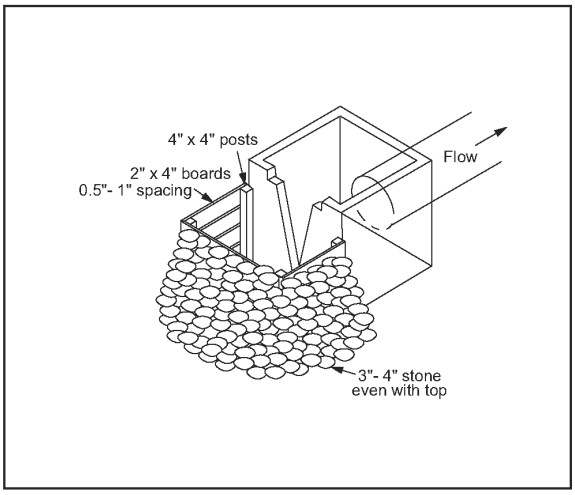


Figure 3. Slotted Board Dam Installation Requirements

MAINTENANCE

- Clean-out when one-third sediment storage capacity is lost. Indicate this elevation with a mark on the outlet structure or a post inserted in the pond.
- Remove all trash and debris.
- Remove retrofit and accumulated sediment when the project is completed.
- Stabilize all disturbed areas immediately with permanent vegetation.

Sd1

SEDIMENT BARRIER

DEFINITION

A temporary structure made of silt fence supported by steel or wood posts, sandbags, straw bales or other filtering material.

PURPOSE

- Slow the velocity of runoff and cause sediment deposition at the structure.
- Filter sediment from runoff.

INSTALLATION

- Install according to approved plan, if shown.
- Install along contours with ends pointing uphill.
- Do not place in waterways or areas of concentrated flow.

Sandbags (Sd1-S)

- Flow under or between bags should be minimal.
- Anchoring with steel rods may be required if height exceeds two bags.

Sd1

Hay or Straw Bales (Sd1-Hb)

- Place in a single row, lengthwise, on the contour.
- Embed in the soil to a depth of 4 inches.
- Secure with stakes or bars driven through the bales or by other adequate means.
- Place in areas of low rate sheet flow.
- For use on projects with a duration of three months or less.

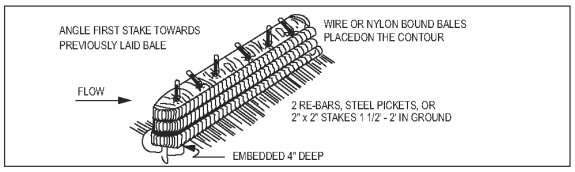


Figure 1. Straw Bale Barrier Installation Requirements

Brush (use during timber clearing operations) (Sd1-Bb)

- Pile in a row along the perimeter of land-disturbing activities.
- Windrow on the contour as close as possible.
- Compaction may be required.
- Filter fabric may be placed on the construction side of the brush barrier for added filtering capacity. Lower edge must be entrenched 4 to 6 inches deep. The upper edge must be fastened to the brush barrier.

Silt Fence (Sd1-A) (Sd1-B) (Sd1-C)

- Install where sheet flow conditions exist.
- Drainage area is not to exceed 1/4 acre per 100 ft. of silt fence.

Sd1

- Verify fabric by inspection of fabric name printed every 100 ft. of silt fence.
- Start post installation at the center of the lowest point with remaining posts spaced according to Figures 2, 3, or 4.
- If non-erosive outlets are provided, slope length may be increased beyond that shown in Table 1.

Table 1. Criteria for Sediment Barrier Placement

Land Slope (percent)	**Maximum Slope Length behind Fence** (feet)
<2	100
2 to 5	75
5 to 10	50
10 to 20	25
>20	15

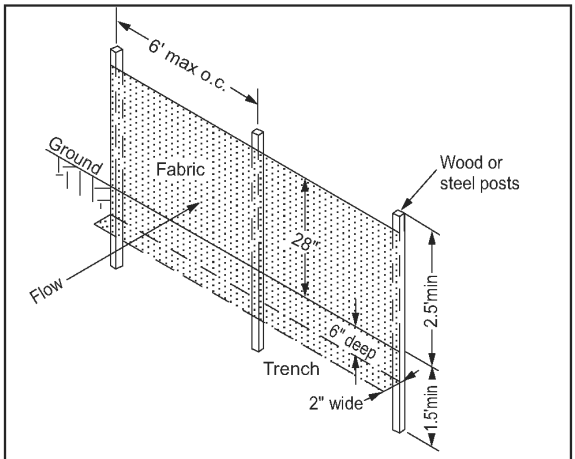
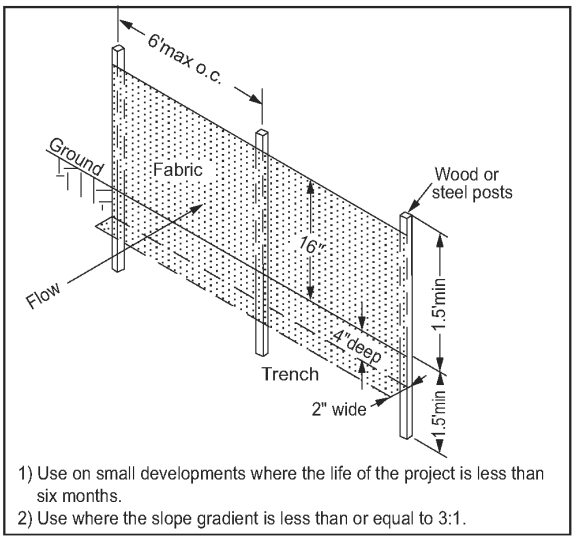


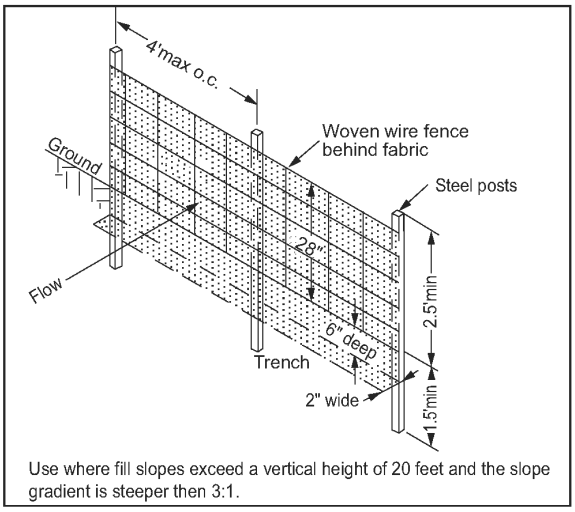
Figure 2. Type "A" Silt Fence (Sd1-A)

Sd1



1) Use on small developments where the life of the project is less than six months.
2) Use where the slope gradient is less than or equal to 3:1.

Figure 3. Type "B" Silt Fence (Sd1-b)



Use where fill slopes exceed a vertical height of 20 feet and the slope gradient is steeper then 3:1.

Figure 4. Type "C" (Sd1-C) Wire-Reinforced Silt Fence

Sd1

Figure 5. Typical Type "C" Silt Fence

MAINTENANCE

- Inspect barriers at the end of each working day, or after each rain, and repair or clean as necessary.
- Remove sediment from barrier when one-half full.
- Dispose of sediment and stabilize it with vegetation.
- Replace filter fabric when deteriorated.
- Design life of a synthetic silt fence is approximately 6 months.
- Maintain until the project is vegetated or otherwise stabilized.
- Remove barriers and accumulated sediment and stabilize the exposed area when the project is stabilized.
- Approved silt fence fabrics are listed in the Georgia Department of Transportation Qualified Products List #36 (QPL-36).

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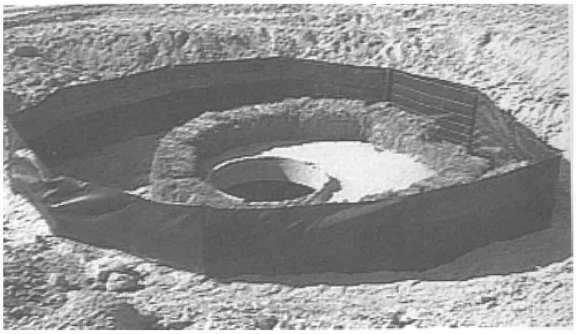
Sd2

INLET SEDIMENT TRAP

DEFINITION

A temporary sediment barrier placed around a storm drain drop inlet.



PURPOSE

Prevent sediment from entering storm drainage systems.

INSTALLATION

- Install according to approved plan, if shown.
- Do not install where vehicular traffic will be affected.
- Install at or around all storm drain drop inlets that receive runoff from disturbed areas.
- Construct on natural ground surface, excavated surface, or on machine compacted fill.

Excavated Sediment Traps

- Minimum of 1.5 feet of sediment storage in excavated sediment traps.
- Must be self-draining unless otherwise protected.

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Sd2

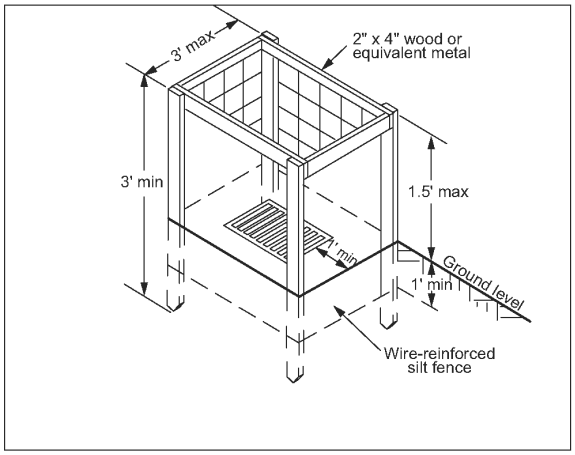

Figure 1. Fabric and supporting Frame for Inlet Protection (Sd2-F)

Block and Gravel Drop Inlet Protection

Sd2-Bg

- Excavate foundation at least 2 inches below the crest of the storm drain.
- On each side of the structure, place one block in the bottom row on its side to allow pool drainage.
- Place the bottom row of blocks against the edge of the storm drain.
- Add support by placing 2"x4" wood studs through block openings.
- Fit hardware cloth or wire mesh with 1/2 inch openings over all block openings to hold gravel in place.
- Place clean gravel 2 inches below the top of the block on a 2:1 or flatter slope and smooth it to an even grade. DOT #57 stone is recommended.

Sd2

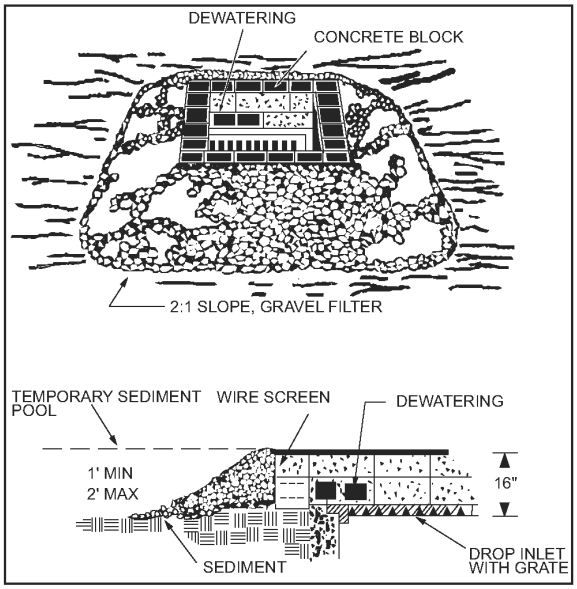

Figure 2. Block and Gravel Drop Inlet Protection Installation Requirements (Sd2-Bg)

Gravel Drop Inlet Protection (Gravel Donut)

Sd2-G

- 3:1 or flatter slope toward the inlet.
- Create a minimum 1-foot wide level stone area between the structure and the inlet to prevent gravel from entering the inlet.
- Place stone 3 inches in diameter, or larger, on the slope toward the inlet.
- Place 1/2" to 3/4" gravel on the slope away from the inlet at a minimum thickness of 1 foot.

Sd2

Curb Inlet Filter (Pigs-in-a-Blanket") Sd2-P

- Install filter after asphalt pavement installation.
- Wrap 8" concrete blocks in filter fabric and span across catch basin inlet.
- Face openings in blocks outward.
- Leave a gap of approximately 4 inches between the curb and the filters to allow for overflow to prevent hazardous ponding.
- Install outlet protection below storm drain outlets.

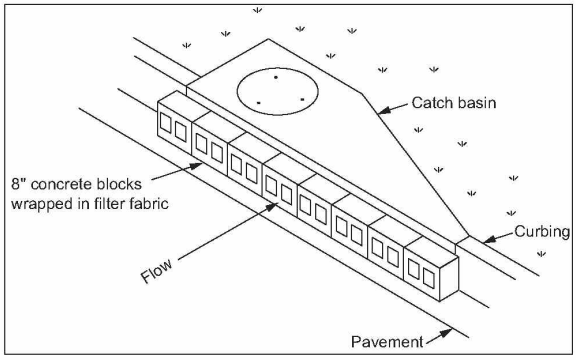

Figure 3. Curb Inlet Filter Installation Requirements (Sd2-P)

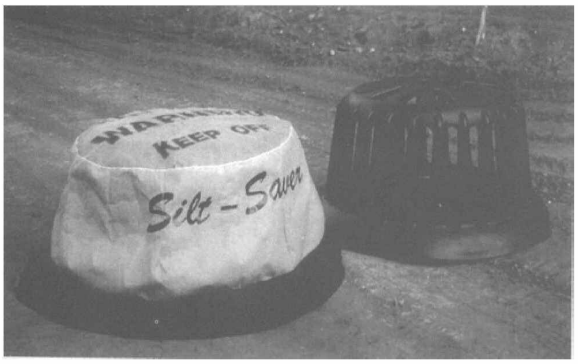

Figure 4. Alternative Inlet Sediment Trap

Sd2

MAINTENANCE

- Inspect, clear, and/or repair trap at the end of each working day.
- Do not remove inlet protection and wash sediment into the storm drain.
- Remove sediment from the trap and stabilize it with vegetation.
- Remove all materials and any unstable soil once the contributing drainage area has been adequately stabilized.
- Appropriately stabilize all bare areas around the inlet.

REFERENCES

- Sd1 Sediment Barrier

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Sd3

TEMPORARY SEDIMENT BASIN

DEFINITION

A basin created by excavation or the construction of a dam for sediment collection.

PURPOSE

- Detain runoff waters and trap sediment.
- Protect properties and drainageways below the basin from damage by excessive sedimentation and debris.

INSTALLATION

- Install according to approved plan, if shown.
- Length to width ratio shall be greater than 2:1, where length is the distance between the inlet and outlet.

Sd3

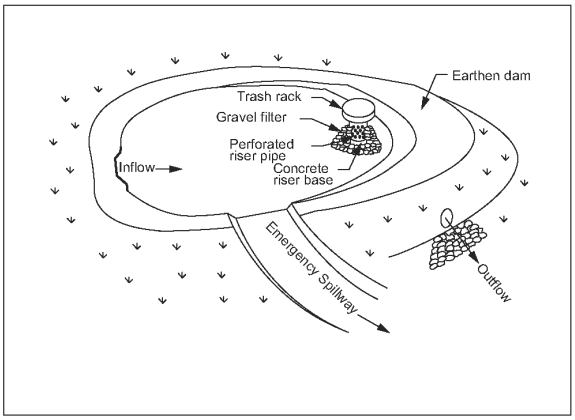

Figure 1. Components of a Typical Temporary Sediment Basin

Location

- Must never be placed in a live stream.
- Storm drains should discharge into the basin.
- Install on sites where (1) failure will not result in loss of life or interruption of use or service of public utilities and (2) the drainage area does not exceed 150 acres.

Principal Spillway

- Join vertical pipe or box type riser to a pipe that extends through the embankment and exits beyond the downstream toe of the fill.
- Perforate lower half of riser with 1/2 inch holes spaced approximately 3 inches, and cover with two feet of 1/2 to 3/4 inch aggregate.
- Install pipe with a minimum diameter of 8 inches.
- Equip with a trash rack and anti-vortex device.

Sd3

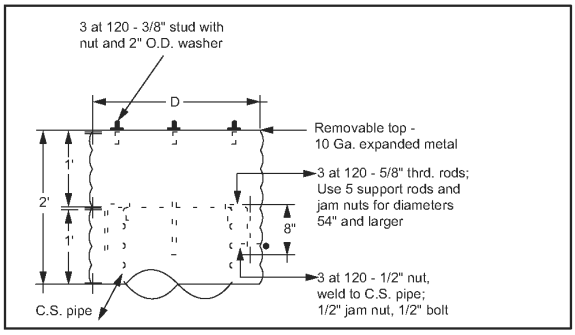

Figure 2. Typical Sediment Basin Trash Rack

- Attach riser to the base with a watertight connection. Embed riser 9 inches into an 18" thick concrete base.
- The riser and all pipe connections shall be completely watertight.

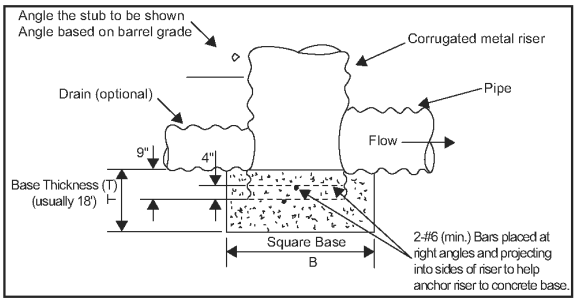

Figure 3. Concrete Riser Base Detail

Emergency Spillway

- Constructed in undisturbed ground (not fill).
- Excavate a trapezoidal channel with minimum bottom width of 8 feet.
- Stabilize with vegetation, riprap, asphalt, or concrete.

Sd3

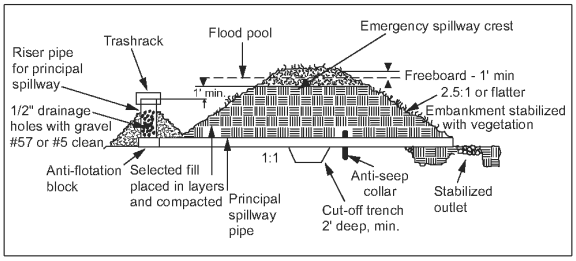

Figure 4. Section Through Embankment and Typical Features

Table 1. Sediment Basin Dam Width Requirements

Fill Height	Minimum Top Width
Less than 10 feet	8.0 feet
10 to 15 feet	10.0 feet

Entrance of Runoff into Basin

- Install dikes, swales, or other water control devices to direct runoff into the basin.
- Locate points of entry as far away from the riser as possible.

- Stabilize with permanent vegetation immediately following construction.

MAINTENANCE

- Remove sediment when storage volume has been reduced by one-third.
- Dispose and stabilize sediment beyond the reach of the pond.
- Do not deposit sediment downstream from the embankment, adjacent to a stream or floodplain.

Sd3

- Indicate clean-out elevation with a mark on the riser or by a marked post near the riser.
- Do not remove basin until the sediment-producing area is permanently stabilized.

REFERENCES

- St Storm Drain Outlet Protection
- Ds1 Disturbed Area Stabilization (With mulching only)
- Ds2 Disturbed Area Stabilization (With temporary seeding)
- Ds3 Disturbed Area StabilizationI (With permanent seeding)
- Ds4 Disturbed Area Stabilization (With sodding)

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105

Sr

TEMPORARY STREAM CROSSING

DEFINITION

A temporary structure installed across a flowing stream or watercourse for use by construction equipment.

PURPOSE

Protect streams from damage and erosion.

INSTALLATION

- Install according to approved plan, if shown.
- Includes bridges (Sr-B), round pipes or pipe arches (Sr-C).
- Drainage area not to exceed one square mile.
- Minimize clearing and excavation of the streambed and banks.
- Cross very small streams with armored, protected fords, such as rock riprap.
- Elevate crossing to reduce the possibility of washout from a 25-year peak discharge.
- Convey full bank flow without appreciably altering or restricting stream flow habits.

106

Sr

- Washout protection may include elevation of bridges above adjacent flood plain lands, crowning of fills over pipes, or the use of diversions, dikes or island type structures.

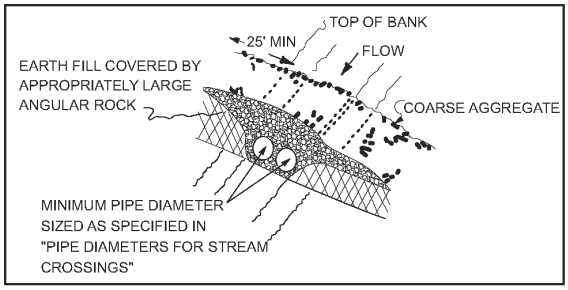

Figure 1. Temporary Stream Crossing Installation Requirements

Table 1. Pipe Diameters for Stream Crossings (inches)

Drainage Area (acres)	Average Slope of Watershed			
	1%	4%	8%	16%
1-25	24	24	30	30
26-50	24	30	36	36
51-100	30	36	42	48
101-150	30	42	48	48
151-200	36	42	48	54
201-250	36	48	54	54
251-300	36	48	54	60
301-350	42	48	60	60
351-400	42	54	60	60
401-450	42	54	60	72
451-500	42	54	60	72
501-550	48	60	60	72
551-600	48	60	60	72
601-640	48	60	72	72

Sr

- Remove when no longer necessary for project construction.
- Properly reshape the stream and its banks to the original cross-section after removal of the crossing.
- Stabilize denuded areas with appropriate vegetation.
- All other appropriate agencies, including the COE, must be contacted to ensure compliance with other Laws.

MAINTENANCE

- Inspect structure after every rainfall and at least once a week.
- Repair all damages immediately.

REFERENCES

- Ds1 Disturbed Area Stabilization (With mulching only)
- Ds2 Disturbed Area Stabilization (With temporary seeding)
- Ds3 Disturbed Area Stabilization (With permanent seeding)
- Ds4 Disturbed Area Stabilization (With sodding)

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St

STORM DRAIN OUTLET PROTECTION

DEFINITION

Paved and/or riprapped channel sections placed below storm drain outlets.

PURPOSE

- Reduce the velocity of flow from storm drain outlets.
- Reduce erosion of receiving channels.
- Stabilize grades.

INSTALLATION

- Install according to approved plan, if shown.
- Place a filter blanket or filter fabric between riprap and soil foundation.
- Install a graded gravel layer if geotextile is not used.
- Line with riprap, grouted riprap, or concrete. Use field or quarry stone with minimum diameter of 6 inches for riprap.
- Minimum apron thickness should be 1.5 times the maximum stone diameter.
- Extend apron length to at least six times the outlet pipe diameter.

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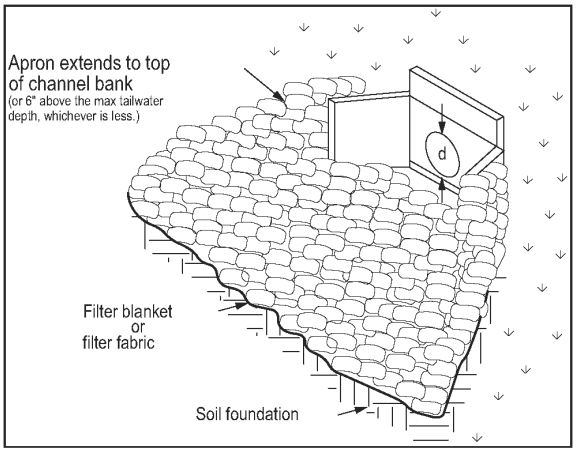

Figure 1. Outlet Protection for a Well-Defined Channel

Apron Width for a Well-Defined Channel

- Side slopes of the channel no steeper than 2:1.
- Apron extends across the channel bottom.
- Apron extends up the channel banks to an elevation one foot to the top of the bank.

Apron Width for a Flat Area

- Upstream width three times the diameter of the outlet pipe.
- Downstream width three times the diameter of the outlet pipe plus the length of the apron.
- Construct apron at zero grade with no overfall at the end.
- Conform to bottom grade of receiving channel.

St

- Locate to prevent bends in horizontal alignment.
- Place necessary curves in the upper section of the apron.
- Vegetate all disturbed areas immediately.

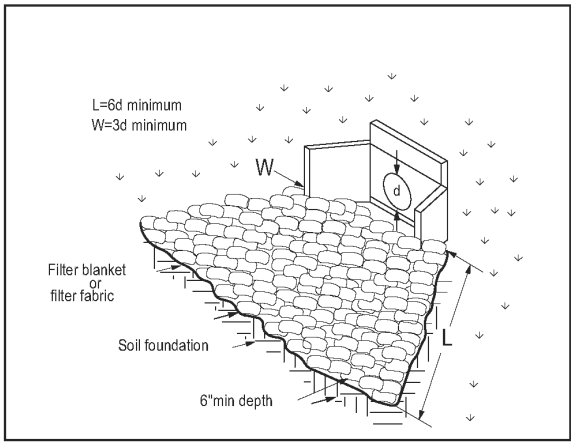

Figure 2. Outlet Protection for a Flat Area

MAINTENANCE

- Inspect after heavy rains for erosion and dislodged stones.
- Make all repairs immediately.

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Su

SURFACE ROUGHENING

DEFINITION

Providing a rough soil surface on the contour.

PURPOSE

- Aid in establishment of vegetative cover with seed.
- Reduce runoff velocity and increase infiltration.
- Reduce erosion and provide for sediment trapping.

INSTALLATION

- Apply according to approved plan, if shown.
- Not required on slopes with a stable rock face.
- Stair-step, groove, furrow, or track slopes that are to be vegetated.
- Lightly roughen and loosen soil to a depth of 2"-4" on slopes 3:1 or flatter.
- Slopes requiring mowing shall not be steeper than 3:1.
- Groove or maintain roughness of fill slopes steeper than 3:1.
- Stair-step or groove cut slopes steeper than 3:1.

Su

Stair-Step Grading

- Particularly good for slopes with soft rock.
- Vertical cut distance to horizontal distance shall be less than 1:1. Horizontal portion of the "step" shall slope toward the vertical wall.
- Individual vertical cuts are not to exceed 30 inches on soft materials and not more than 40 inches in rocky materials.

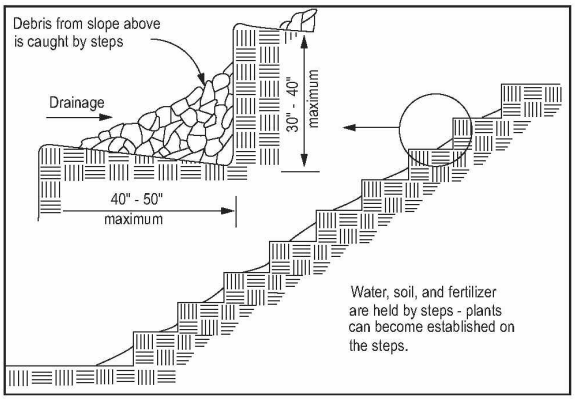

Figure 1. Stair-Stepping Cut Slopes

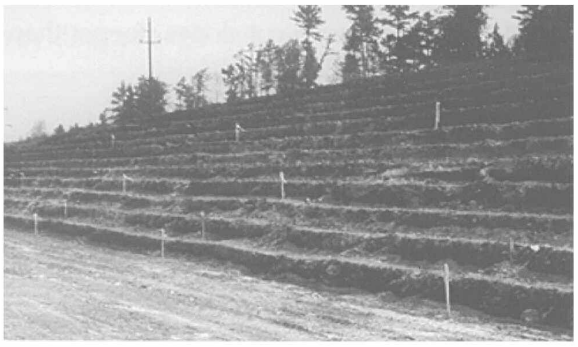

Figure 2. Typical Stair-Step Grading

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Grooving

- Use discs, tillers, spring harrows, or the teeth on a front-end loader.
- On unmowed slopes, minimum groove depth of 3 inches and maximum groove spacing of 15 inches.
- On mowed slopes, minimum depth of one inch and maximum groove spacing of 12 inches.

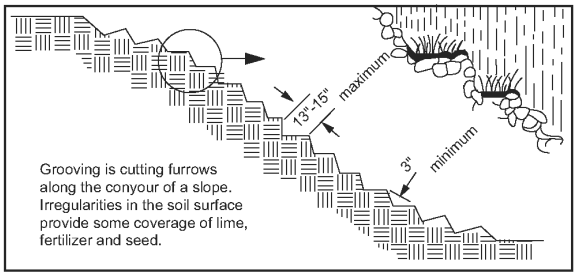

Figure 3. Grooving Slopes

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Tracking

- Not recommended unless no alternatives are available.
- Minimize machine passes to minimize compaction.

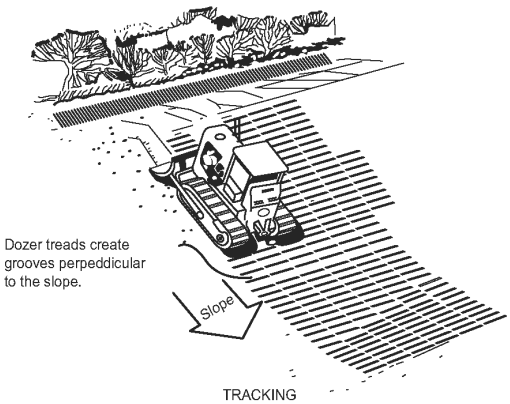

Figure 4. Roughening with Tracked Machinery

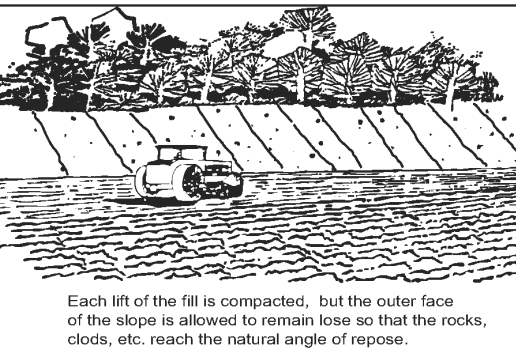

Figure 5. Fill Slope Treatment

- Seed and mulch roughened areas as soon as possible.

Tp

TOPSOILING

DEFINITION

Stripping-off the fertile top soil, storing it, then spreading it over the disturbed area after construction is completed.

PURPOSE

Provide a suitable soil medium for vegetative growth on low fertility areas.

SPECIFICATIONS

- Apply according to approved plan, if shown.
- Recommended for sites with slopes 2:1 or flatter where:
  - the texture of the exposed subsoil or parent material is not suitable to produce adequate vegetative growth,
  - the root zone is too shallow, or
  - the soil to be vegetated contains material toxic to plant growth.
- Topsoil should be friable and loamy, free of debris, objectionable weed and stones, and contain no toxic substance that may be harmful to plant growth.

Tp

- Stripping depth of 4 to 6 inches is common and should be confined to the immediate construction area.
- Stockpiles may be vegetated and should not obstruct natural drainage or cause off-site environmental damage.
- If subsoil is composed of heavy clays, lime shall be spread at the rate of 100 pounds per 1,000 square feet.
- Subsoil should be loosened by discing or scarifying to a minimum depth of 3 inches to permit bonding of the topsoil to the subsoil. Tracking by a bulldozer is also adequate.
- Topsoil should be applied at a uniform depth of 5 inches (unsettled), but may be adjusted at the discretion of the engineer or landscape architect.

Table 1. Cubic Yards of Topsoil Required for Application to Various Depths

Depth (inches)	Per 1,000 Square Feet	Per Acre
1	3.1	134
2	6.2	268
3	9.3	403
4	12.4	537
5	15.5	672
6	18.6	806

Wt

VEGETATED WATERWAY OR STORMWATER CONVEYANCE CHANNEL

DEFINITION

A waterway that is shaped or graded to required dimensions and stabilized with vegetation.

PURPOSE

- Dispose of stormwater runoff.
- Prevent erosion.
- Reduce sedimentation.

INSTALLATION

- Install according to approved plan, if shown.
- Remove all woody growth, obstructions and other objectionable material.
- Waterway cross-section may be parabolic or trapezoidal in shape.
- Maximum permissible velocity within a vegetated channel is approximately 5 feet per second without geosynthetic material.

Wt

Table 1. Permissible Velocities for Vegetated and Rock-Lined Waterways

Vegetative Cover	Maximum Permissible Velocity (fps)
Bermuda	5
Bahia	4
Tall Fescue	4
Sericea Lespedeza Weeping Lovegrass	3
Stone center	Design required

- Maximum bottom width of 50 feet unless multiple or divided waterways or other means are provided to control meandering of low flows within this limit.

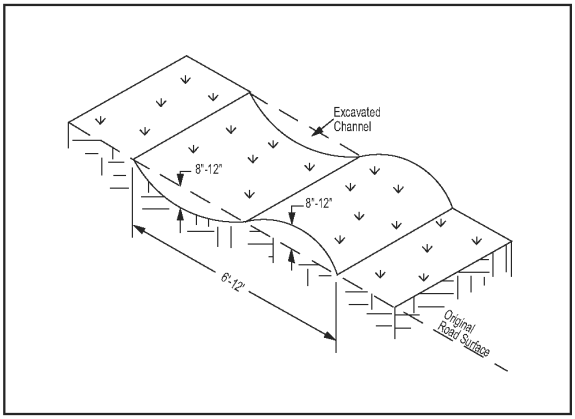

Figure 1. Typical Vegetated Waterway or Stormwater Conveyance Channel

- Tile or other subsurface drainage measure shall be provided for sites having high water tables or seepage problems. Where there is base flow, a stone center or lined channel may be required.

Wt

- Disturbed areas must be stabilized with vegetation immediately following construction.
- Mulching is required for all seeded or sprigged channels.
- Erosion control fabrics which are designed to protect seed and slopes during the establishment of vegetation shall be used.
- If conditions permit, water should be temporarily diverted from the channel, or otherwise disposed of, during the establishment of vegetation.

REFERENCES

- Ds1 Disturbed Area Stabilization (With mulching only)
- Ds2 Disturbed Area Stabilization (With temporary seeding)
- Ds3 Disturbed Area Stabilization (With permanent seeding)
- Ds4 Disturbed Area Stabilization (With sodding)

NOTES

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Resource Information

Commonly Used Acronyms

BMP: Best Management Practices

COE: US Army Corps of Engineers (Federal)

CWA: Clean Water Act

DNR: Department of Natural Resources (Federal)

EPA: Environmental Protection Agency (Federal)

EPD: Environmental Protection Division (State)

ES & PC Plan: Erosion, Sedimentation and Pollution Control Plan

FEMA: Federal Emergency Management Agency (Federal)

GESA: Georgia Erosion and Sediment Control Act

GSWCC: Georgia Soil & Water Conservation Commission

LDA: Land Disturbing Activity

LIA: Local Issuing Authority

MLRA: Major Land Resource Areas

NOI: Notice of Intent

NOT: Notice of Termination

NPDES: National Pollution Discharge and Elimination System

NRCS: Natural Resource Conservation Service (Federal)

NTU: Nephelometric turbidity unit

O.C.G.A.: Official Code of Georgia, Annotated

SWCD: Soil and Water Conservation District (State)

USDA: United States Department of Agriculture (Federal)

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VEGETATIVE EROSION CONTROL IN GEORGIA

VEGETATIVE MEASURES

Additional information on the topics discussed in this document is available in “Manual for Erosion and Sediment Control in Georgia”, henceforth called the Manual.

LEARNING OBJECTIVES

1. Understand the soil erosion process
2. Understand how vegetation can reduce soil erosion and sedimentation
3. Understand the basic agronomic principles used for vegetative erosion control
4. Be able to select and plan appropriate vegetative practice measures for various soil, site, and land use conditions

SOIL EROSION ON CONSTRUCTION SITES

Soil erosion can be a problem with any land use, but the highest rates of soil erosion occur on construction sites. Soil erosion rates on construction sites can be hundreds of times more than that occurring on cropland, forestland, and pastureland. Although much work has been done to reduce soil erosion, sediment remains the #1 non-point source pollutant in the United States.

Soil erosion is the wearing away of the earth's surface by water, wind, ice, gravity, and other forces. Water causes more soil erosion in Georgia than the other forces. No matter the cause, the soil erosion process follows the same three basic steps: (1) detachment, (2) transport, and (3) deposition.

Detachment (or splash erosion) is the process in which soil particles are separated from each other. It occurs when raindrops hit bare soil. The separated soil particles are then **transported** down the slope by runoff and **deposited** elsewhere.

Detachment or 'splash erosion'

Photo courtesy of USDA-NRCS

When ample vegetation is present, the plants intercept the energy of the falling raindrops and eliminate detachment of the soil particles. Therefore, the key to reducing soil erosion and sedimentation is good vegetative cover.

Soil erosion is a natural process that is greatly affected by man. Land clearing and soil disturbance activities create many problems that result in increased soil erosion and sedimentation, onsite and offsite. The problems that result in increased soil erosion are:

Removal of the protective cover
Exposing soil that is more erodible than the surface layer
Changes in topography
Increased soil compaction
Reduced water infiltration
Increased runoff
Increased concentrated water flow

HOW VEGETATION REDUCES SOIL EROSION AND SEDIMENTATION

Vegetation is the most effective and most economical way to reduce soil erosion and sedimentation. The entire plant helps to reduce soil erosion. The living plant canopy, and the dead plant residue that lies on the soil surface, protect the soil from raindrops and the roots help by holding soil particles in place.

Some types of cover provide more soil protection than others. For example, a 3:1 slope in Gwinnett County will average this much soil erosion based on the type of cover:

Type of Cover	Soil Erosion Rate (Tons/acre/year)
Bare soil	**794**
Straw (2 T/A, 75% cover)	**87**
Grass (95% canopy cover)	**10**
Trees (95% canopy cover)	**0.5**

Photo courtesy of USDA-NRCS

OTHER BENEFITS OF VEGETATION

In addition to reducing soil erosion and sedimentation, well established and maintained vegetative practices can provide many additional benefits. Among these are increased water infiltration; less runoff; reduced velocity of runoff; sediment, nutrients, and other pollutants are cleaned from runoff; the soil has more water and nutrients for plant use; improved wildlife habitat; increased soil organic matter; and improved soil quality.

Better soil quality improves the physical, chemical, and biological properties of the soil resulting in better plant growth, more biomass production, cleaner water, cleaner air, and other benefits.

Vegetative Practices Benefit Structural Measures

Vegetative and structural measures are needed on most construction sites to adequately reduce soil erosion. Each type of measure has a role to play. Vegetative cover may reduce the maintenance requirements of applied structural measures and the need for some structural practices may be eliminated if adequate vegetative cover is established and maintained properly.

Benefits of Maintaining Existing Vegetation

Do land clearing in a timely manner. By carefully scheduling the removal of unwanted existing vegetation, we can reduce the soil's exposure to soil erosion and the cost of additional vegetative measures. Also, clear only the land that needs to be cleared.

We should always consider utilizing the existing vegetation on construction sites. Existing vegetation usually provides good protective cover and the plants are either native to the area or have adapted to site conditions. Replacing the existing vegetation with different species may be difficult and very expensive.

WHY ESTABLISHING AND MAINTAINING VEGETATION IS DIFFICULT

We are not normally dealing with ideal soil conditions on construction sites. Most construction sites have several problems that make them inhospitable for optimum plant establishment and growth. Among these problems are steep slopes, compacted soils, poor soil fertility, acid soils, low soil moisture, and concentrated flow areas.

And, if adequate planning and maintenance are lacking, the problems are more difficult to solve. Because of the problems, some people call construction sites 'critical areas'.
Examples of critical areas are:

Coastal dunes	Grassed waterways	Road banks
Cut and fill slopes	Gullies	Severely eroded areas
Dams	Landfills	Stream banks
Diversions	Mined land	

Normal pasture and lawn planting methods are not adequate on construction sites. Intensive planning, treatment, and maintenance are required.

DEVELOPING A VEGETATIVE PLAN

The vegetative plan is a very important component of the overall plan for a site. A serious problem is the lack of a good plan. It is said that "if you fail to plan, you plan to fail". Vegetation should not be afterthought.

There are no 'cook book recipes' for vegetative plans because all construction sites are different. Vegetative plans must be site specific, based on the land use, soil, site, climate, and other

conditions. Several questions must be answered in the process of developing a vegetative plan for a construction site. Among the questions are:

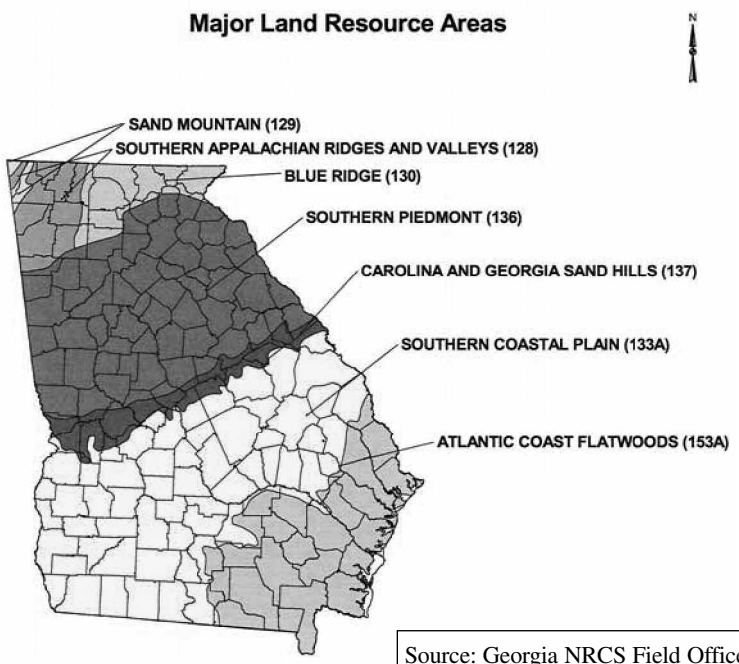
What is the projected land use of the site?
Are the desired plants adapted to the site?
Are the plants temporary or permanent?
Do the plants have aesthetic value?
What planting method will to be used?
What are the optimum planting rates?
Are companion/nurse plants needed?
How much fertilizer is needed?
How will the mulch be anchored?
What are the maintenance requirements?
What are the desired plants?
Will the plants reduce soil erosion?
Are the plants easily established?
Are the plants beneficial to wildlife?
What are the optimum planting dates?
Are inoculants needed?
How much agricultural lime is needed?
What type of mulch will be used?
Are other measures needed?

Georgia Soils

We have many types of soil and they differ in texture, fertility, pH, slope, permeability, water-holding capacity, erodibility, and other characteristics that affect plant growth. Although most of our soils are acid and not naturally fertile, most respond to treatment. Adequate plant biomass can be grown and maintained on most construction sites with proper management. Soils vary across the State and on most construction sites. Know what soil you are working with. Soil surveys can provide valuable information.

Major Land Resource Areas of Georgia

Georgia can be divided into 7 soil provinces, also called Major Land Resource Areas (MLRA). Each MLRA is a geographical area that has a particular combination of soils, climate, topography, water, and land use.



Source: Georgia NRCS Field Office Technical Guide

128- Southern Appalachian Ridges and Valleys MLRA

This area of Northwest Georgia is highly diversified and consists of many parallel limestone, sandstone, and shale ridges with gently sloping valleys. Cities located in this MLRA include Calhoun, Dalton, Ringgold, Rome, and Summerville. Elevations range from 600 to 1,500 feet above sea level. The soils are underlain by limestone cherty limestone, sandstone, and shale. Most of the soils are well drained, strongly acid, highly leached. They range from shallow on the sandstone and shale ridges to very deep in the valleys and on the large limestone formations. Land slopes range from 0 to 60 per cent.

The maximum precipitation is in midwinter and midsummer, the minimum is in autumn.

129 – Sand Mountain MLRA

This MLRA occurs in the northwest corner of the State and is deeply dissected and consists mainly of a series of rather narrow valleys, steep escarpments, and broad plateaus that are underlain by sandstone and shale. The dominant soils are mostly moderately fine textured to fine textured and are over sandstone and shale.

Precipitation is somewhat unevenly distributed. The maximum rainfall is in midwinter, decreasing gradually from spring to autumn and increasing slightly in midsummer.

130 – Blue Ridge MLRA

The MLRA is located in the northeastern part of Georgia. It includes the cities of Blairsville, Blue Ridge, Clayton, and Hiawassee. The area has steep mountain slopes and narrow valleys. Elevation ranges from 700 feet to more than 4,800 feet above sea level. The dominant soils of this MLRA are moderately deep and medium textured. Most of the slopes in the area are generally too steep for row crop production. Soils have slopes from 2 to 90 per cent, are acid, and have low fertility.

Annual precipitation is as much as 80 inches on the highest peaks. Precipitation is somewhat unevenly distributed and the maximum rainfall is in midsummer and midwinter and the minimum is in autumn.

136 – Southern Piedmont MLRA

It stretches from the middle of the State to the foot hills of the Appalachian Mountains. Cities in this MLRA include Athens, Atlanta, Carrollton, Gainesville, Hartwell, and Madison. Elevation ranges from 500 feet to 1,500 feet above sea level. Drainage patterns are well defined and the topography is gently rolling to steep. The dominant soils have mostly clayey subsoils.

A large portion of the MLRA was previously used to grow row crops, especially cotton.
Much of the original topsoil has eroded away leaving exposed clayey subsoil. The soils are acid and low in nitrogen and phosphorus. Precipitation is almost evenly distributed throughout the year, but the lowest is in autumn.

137 – Carolina and Georgia Sand Hills MLRA

The MLRA is a narrow belt of deep sandy soils that extend from Augusta to Macon to Columbus. The topography is rolling and hilly. Elevation ranges from 350 to 500 feet above sea level. The area is dissected rolling to hilly upland and contains stabilized dunes with very irregular slopes. Local relief is mainly several yards, but a few hills are 75 to 150 feet above the adjacent areas.

Most of the soils are infertile and droughty and have high infiltration rates and low waterholding capacity. The soils are best suited to drought resistant grasses. Maximum precipitation is in mid-summer and the minimum is in autumn.

133A – Southern Coastal Plain MLRA

This area is located south of the Sand Hills and extends to the Atlantic Coast Flatwoods. Cities include Albany, Americus, Bainbridge, Dublin, Moultrie, Perry, Tifton, and Waynesboro. Elevation ranges from 250 to 500 feet above sea level. It is divided into two distinct areas: nearly level to rolling valleys and gently sloping to steep uplands.

Dominant soils are deep with a loamy or sandy surface layer and loamy or clayey subsoil. The soils are diverse, respond well to good management, and are suited for a wide range of plants. In the east portion, maximum precipitation is in midsummer and in the west it is in winter and spring. Minimum precipitation is in autumn throughout the MLRA.

153A – Atlantic Coast Flatwoods MLRA

The MLRA extends from the Southern Coastal Plain to the Atlantic Ocean. The cities of Baxley, Brunswick, Jesup, Savannah, and Waycross plus the Okefenokee Swamp are located in this MLRA. Elevation ranges from sea level to about 300 feet.

The area has nearly level topography and poorly drained soils which are underlain by marine sands, loams, and/or clays. Maximum precipitation is in the summer.

(Reference: *"Land Resource Regions and Major Land Resource Areas of the U.S.",* USDA-SCS Handbook 296)

Annual Precipitation and Rainfall Erosivity

The average annual precipitation is generally adequate throughout Georgia although short dry periods and extended drought can reduce plant growth and development. The erosive potential of rainfall, the rainfall erosivity, varies throughout the year. A rainstorm's energy is a function of the amount of rain and of the storm's intensity. Raindrop size and the velocity of falling raindrops increase with rain intensity. Thunderstorms have greater potential for causing soil erosion than lesser storm events.

Although storm events occur anytime of the year in Georgia, the highest erosivity is typically in the summer when thunderstorms are more frequent. The average rainfall erosivity per month for most locations will closely follow this or a very similar pattern:

Month	% of the Average Annual Rainfall Erosivity occurring each month
January	4 %
February	4
March	8
April	9
May	10
June	12
July	20
August	14
September	6
October	4
November	4
December	5

(Source: *USDA Agriculture Handbook #537*)

The rainfall erosivity pattern in Georgia has great influence on plant establishment. Cool season plants such as rye, ryegrass, and tall fescue should be planted in early fall. We are fortunate that this coincides with low rainfall erosivity. Planting in early fall especially aids plant establishment in diversions, grassed waterways, and other concentrated flow areas because there should be less runoff during this period.

A large part of the year's erosive rainfall occurs in the summer, about 1/5 of it occurs in the month of July alone. Plant establishment with seed is especially difficult in concentrated flow areas during the summer because the increased runoff causes major problems. If possible, try to avoid seeding vegetation in diversions, grassed waterways, and other concentrated flow areas in the summer. The use of sod is a good alternative.

Future Land Use

The planned land use of a site is also very important. For instance, if the vegetation on a steep slope is going to be mowed on a regular basis, use a grass that will withstand mowing. Do not use plants that do not respond well to regular mowing. If the site is going to be used for an athletic field, a sod-forming grass (like bermuda) should be used. Do not use bunch grasses (such as tall fescue) on athletic fields.

If temporary vegetation is needed on a site that will be disturbed again in the near future, use plants that germinate and grows quickly such as rye, ryegrass, or browntop millet. Do not use plant species that are slow to become established, such as bahia grass.
Plant Selection

Plant selection should be based many factors. Select plants that suitable for the site. Because of Georgia's soils and climate, we have many plant options that can be used on construction sites. Many grasses, legumes, vines, ground covers, shrubs, and trees perform well. There are many suitable annuals, perennials, single plantings, and seeding mixtures used.

The site location is also very important. Some plants can be grown statewide while other plants only grow in certain areas. Tall fescue grows well in North Georgia, but will not survive in South Georgia. Some plants that do well in South Georgia will not perform well in other parts of the State. Some plants will persist in a certain area, but not on an adjacent droughty site. Some plants do well in shade while others require full sun.

Some plants are long-lasting and can be used for permanent cover, while others should be used only for temporary cover. Some species germinate and grow quickly and can be planted alone. Others develop slowly and should be planted in seeding mixtures. Some plants need to be planted in the spring while others should be planted in the fall.

Maintenance Requirements

Construction sites are usually high or low maintenance areas. The maintenance needed for different plants varies by species. The maintenance needed for vegetation in an upscale neighborhood will be different than that for the plants used on a secluded road bank, abandoned landfill, or other area that will probably receive much less treatment.

Low maintenance plants should be used on most construction sites because the cover is often neglected once the vegetation becomes established. For permanent cover, use hardy, long-lived perennials that can withstand conditions such as low soil pH, poor fertility, and drought while still providing adequate soil protection.

Soil Tests

The pH and fertility of our soils will vary. Without soil tests we are guessing how much lime and fertilizer are needed. If proper pH and adequate soil fertility are lacking, plant growth can be reduced to the point that the vegetative practices are ineffective and reseeding or even re-grading and other expensive practices may be required.

The application of excess lime and fertilizer is an unnecessary expense. And, the loss of the excess nutrients can cause environmental problems on-site and off-site.

Soil tests are conducted by University of Georgia Soil, Plant, and Water Analysis Laboratory and private labs. But, test results are no better than the soil samples given to the lab. It is very important that soil samples are taken and handled correctly. Publications on how to properly take soil samples are available from your local county agent.

Soil pH and Lime

Most Georgia soils have low soil pH and are considered to be acidic. The pH of the soil greatly affects plant growth. The harmful effects of low soil pH on plant growth are reduced availability of needed plant nutrients such as phosphorous (P), calcium (Ca), magnesium (Mg), and molybdenum (Mo); increased leaching and loss of potassium (K); aluminum (Al), iron (Fe), and manganese (Mn) can reach toxic levels; and there are fewer soil organisms and reduced nitrogen (N) fixation by legumes.

Most plants used on construction sites in Georgia need a soil pH of 6.0 - 6.5. The benefits of proper soil pH are increased availability of Ca, Mg, Mo, & P; reduced leaching of K; decreased availability of Al, Fe, and Mn; improved soil structure and other physical properties; plants have better root growth and reduced susceptibility to drought; and there is increased growth of soil organisms

Acidic soil conditions can be corrected by applying appropriate amounts of agricultural lime ($CaCO_3$). Agricultural lime should be applied according to a soil test. Without a soil test, apply 1 to 2 tons/acre, preferably 2 tons/acre. In Georgia, dolomitic limestone is recommended because in also contains Mg, an important nutrient for plant growth.

Lime Application

Lime is not very mobile in the soil, does not move readily down through the soil profile, and should be applied properly or it will wash off of construction sites. Best results are achieved when agricultural lime is mixed into the soil. For areas to be planted with conventional planting methods, evenly distribute agricultural lime on the soil surface and mix it well into the top 4-6 inches of soil during seedbed preparation prior to planting.

On hydroseeded sites, apply agricultural lime after there is protective cover of mulch or growing plants on the soil. On hydroseeded sites, apply lime either (1) after the straw or hay mulch is applied, (2) with topdressing fertilizer, or (3) with the second year fertilizer.

Sixteen Essential Nutrients are Needed by Plants

The exposed soil material on most graded construction sites has low soil fertility. Plants need 16 essential elements for optimum growth and each has a specific function within plants. If one or more of the nutrients are lacking, the deficiency reduces plant growth. Excessive nutrients applications can also cause problems, including plant toxicity and death. Follow a nutrient management plan and avoid haphazard nutrient applications.

Structural nutrients are non-mineral, are acquired by plants from air and water, and are the building blocks of all living organisms. They are not nutrients in the strict sense, but the products of photosynthesis. They are: Carbon (C), Hydrogen (H), and Oxygen (O)

Major nutrients, needed in largest quantities, are acquired by plants from the soil. They usually become deficient first. They are: Nitrogen (N), Phosphorous (P), Potassium (K), Sulfur (S), Magnesium (Mg), and Calcium (Ca).

Micronutrients are also acquired by plants from the soil and are used in small quantities. They are: Iron (Fe), Copper (Cu), Zinc (Zn), Molybdenum (Mo), Boron (B), Manganese (Mn), and Chloride (Cl).

Fertilization

A fertilizer is any substance added to the soil or sprayed on plants to supply those chemical elements required for plant growth. A mixed fertilizer contains two or more of the three macronutrients: Nitrogen (N), Phosphorous (P), and Potassium (K).

Numbers such as 6-12-12 tell you the contents of a bag of fertilizer. The numbers represent how much total N, available P, and available K are in the bag. For example:

6-12-12 fertilizer contains 6% N, 12% P_2O_5, and 12% K_2O.
0-20-20 fertilizer contains no N, 20% P_2O_5, and 20% K_2O
34-0-0 fertilizer contains 34% N, no P_2O_5, and no K_2O

All of the material in a bag of fertilizer is not plant food. A 50 LB bag of 6-12-12 contains 3 LB of N, 6 LB of P_2O_5, and 6 LB of K_2O. The other 70% (35 LB) is filler material. A ton of 6-12-12 contains 600 LB of plant food and 1,400 LB of filler material.

It is very important that we use proper and timely applications of fertilizer to grow vegetation on construction sites. The fertilizer type and application rate are based on soil tests and the target plant species. Temporary cover of grass species such as browntop millet, rye, and ryegrass needs initial N-P-K fertilizer applied at or before planting and also N topdressing about 6 weeks after planting.

Permanent cover needs initial, topdressing, second-year, and maintenance fertilization. Grasses need different fertilizer than legumes. Permanent grasses need initial N-P-K fertilization, N top-dressing, second year N-P-K fertilization, and maintenance N-P-K fertilizer applications. Perennial legume are seeded with grass in mixtures and should receive initial N-P-K, N topdressing, P-K in the second year, and maintenance P-K applications. Legumes are the target species and they get the N they need from the nitrogen-fixing bacteria if the seed are inoculated properly.

Fertilizer rates for the various plants used on construction sites are listed in the Manual.

Planting Methods

Many planting methods are used to establish temporary and permanent vegetation on construction sites. Among the planting methods are conventional, hydroseeding, no-till, and hand planting.

Conventional planting should be the first choice used to plant temporary and permanent vegetation because the lime and initial fertilizer are incorporated into the soil where they are needed, seeding is done on a freshly prepared seedbed, there is good seed-to-soil contact, and many other reasons. A cultipacker, drill, rotary seeder, other mechanical seeder, and hand seeding can be used to distribute the seed uniformly over a prepared seedbed. After seeding, cover the seed lightly with soil with suitable equipment.

Hydroseeding is commonly used on steep slopes and other hard to reach areas to plant temporary and permanent vegetation. The seed, wood cellulose/pulp fiber/paper mulch, fertilizer, and water are mixed in a slurry and spread uniformly over the area treated. The slurry should be applied within one hour after the seed are placed in the hydroseeder.

No-till seeding is done with a no-till drill to plant temporary and permanent vegetation. Adequate dead plant residue is needed on the soil surface. An example is planting perennials into a mature temporary cover of rye or millet.

Hand planting of individual plants such as shrubs, vines, grass sprigs, and trees is done with a appropriate planters or hand tools. Dibbles are used to plant bare root tree seedlings. Individual plants should be placed in the soil at the same level or slightly higher than they we grown at the nursery. The old saying of "Plant them low, they won't grow; plant them high, they won't die" is true with shrubs and trees.

Seedbed Preparation

Stumps, limbs, construction debris, and other trash must be removed from all areas to be vegetated. For conventional planted sites, lime and initial fertilizer will be applied prior to seedbed preparation. The soil should be tilled to a minimum of 4 to 6 inches to alleviate surface compaction, incorporate lime and fertilizer, prepare a seedbed, and allow for the anchoring of straw or hay mulch if a mulch crimper is to be used. All tillage operations should be done on the contour. On soil too steep for the safe operation of tillage equipment, the soil should be pitted or trenched across the slope with appropriate hand tools.

Seedbed preparation is not normally required on areas hydroseeded.

For individual plants, excavate holes, open furrows, or use dibble planting. Holes should be large enough to accommodate plant roots without crowding.

Planting Dates

The optimum planting time for a plant species depends on the plant's growth habit.
Some plants need to be planted in the spring while others should be planted in the fall.

Warm Season Plants

Warm season plants (annuals and perennials that grow during the warm seasons of the year) are best planted in early spring. This allows the plants to germinate, develop a root system, and start growth before the hot summer temperatures and dry periods occur. Examples are bahia grass, common bermuda grass (hulled seed), browntop millet, sericea lespedeza (scarified seed), and weeping lovegrass.

Some of the above mentioned warm season plants can also be seeded successfully in the fall and winter along with companion/nurse plants. Examples are common bermuda grass (unhulled seed), bahia grass, and sericea lespedeza (unscarified seed).

Cool Season Plants

Cool season plants (annuals and perennials that grow during the cool seasons of the year) should be planted in early fall. This allows them time to develop a good root system before the cold winter temperatures occur. Frozen moisture on clay soils can heave young plant seedlings up out of the soil if they do not have an adequate root system. This is a common problem with late planted stands.

Common examples of cool season plants that should be planted in early fall are rye, ryegrass, tall fescue, and wheat.

Plan for the Entire Year

Construction is not always completed on time because of weather delays, breakdowns, and other reasons. We should always develop a vegetative plan for the entire year so we will be prepared to plant, no matter what time of the year the project is completed.

Winter is especially difficult to establish annual and perennial vegetation. Mid-summer is difficult also because of the increased probability of intensive thunderstorms, hot temperatures, and the possibility of short-term and long-term drought. Here are examples of year-round seeding plans for construction sites in North and South Georgia:

North Georgia site	**South Georgia site**
September 1 - October 15	
Sericea lespedeza (unscarified), 75 LB/AC	Common bermuda (unhulled), 10 LB/AC
Tall fescue, 30 LB/AC	Rye, ½ BU/AC (28 LB)
October 15 – January 1	
Sericea lespedeza (unscarified), 75 LB/AC	Common bermuda (unhulled), 10 LB/AC
Tall fescue, 30 LB/AC	Rye, ½ BU/AC (28 LB)
Rye, 1/2 BU/AC (28 LB)	

January 1 – March 1

Sericea lespedeza (unscarified), 50 LB/AC*	Common bermuda (unhulled), 10 LB/AC
Sericea lespedeza (scarified), 30 LB/AC	Rye, 1/2 BU/AC (28 LB)
Tall fescue, 30 LB/AC	
Rye, 1/2 BU/AC (28 LB)	
Common bermuda (unhulled), 6 LB/AC	

March 1 – June 1

Sericea lespedeza (scarified), 60 LB/AC	Common bermuda (hulled), 10 LB/AC**
Weeping lovegrass, 2 LB/AC	

June 1 – September 1

Sericea lespedeza (scarified), 60 LB/AC	Common berumda (hulled), 10 LB/AC
Weeping lovegrass, 2 LB/AC	Browntop millet, 10 LB/AC
Browntop millet, 10 LB/AC	

* It is common to use a seeding mixture of several species during this period hoping that one or more of them will germinate and grow well enough to provide adequate vegetative cover in a timely manner. Some call this "the shotgun approach".

** When planting species that will germinate and grow quickly during optimum dates, there is normally no need to include seed of a companion/nurse crop with the seeding. Use caution when using companion or nurse plants in seeding mixtures. Companion plants act like weeds and compete with the target plant species for water, nutrients, sunlight, and growing space. Commonly used companion plants that are annuals tend to be more vigorous than perennial species.

Planting Dates for Ground Covers, Shrubs, and Trees

The person who said "fall is for planting" probably had ground covers, shrubs, and trees in mind because their chance of survival is much better when planted in the fall. Fall planting allows you to take advantage of lower temperatures and expected rainfall. The amount of water you need to use is reduced with fall planting. The plants establish a stronger root system before hot weather occurs, resulting in quicker plant growth.

The next best time to plant ground covers, shrubs, and trees is in late winter and early spring. Late spring and summer plantings should be avoided because they result in the need for more maintenance, especially frequent watering for plant survival and growth.

SEED QUALITY

All seed are not equal. Seed are one of the cheapest items used in erosion and sediment control. Good seed are needed anytime you plant something, especially on construction sites. A poor stand will result if the seed used are not good.

Too often we do not determine if the seed we are planting on construction sites is of good quality. It is common to grab a bag of seed and start planting without investigating to see if the seed are good or not. First, before purchasing seed, look on the seed tag for the date the germination test was done. The Georgia Seed Law states requires that 'any seed sold or offered for sale in Georgia must have had a germination test done within the past 9 months'. If the germination test recorded on the seed tag does not meet these guidelines, you need to look for other seed.

For all bags of seed, consider this, (1) all of the material in a bag of seed is not seed, (2) all of the seed in a bag are not seed of the desired species, and (3) all seed of the desired species in the bag are not good. Scary, isn't it? Most bags of seed contain seed of the target species plus other items: plant stems, seed pods, weed seed, soil, rocks, and other material. We need to determine what part of the material in the bag are good seed of the desired species. Once we answer this, we can quickly calculate the seeding rate needed for a good stand. What we are looking for is the 'Pure Live Seed' (PLS) seeding rate of the seed. The PLS value is used to determine the actual seeding rate of any seed that we plan to use.

The PLS value of any seed used is a valuable tool and it can be calculated in 3 easy steps:

Step 1. Determine the % purity and % germination of the seed in the bag. Look at the seed tag and find these two items: % purity and % germination. The % purity represents what part of the material in the bag is seed of the desired species. The % germination tells you how many of the desired seed are good.

Step 2. Calculate the PLS value of the seed. Simply multiply the % purity x the % germination to get the PLS value. (For instance, if a bag of tall fescue seed has a purity of 90% and the germination is 90%, the PLS = 0.90 x 0.90 or 0.81.) This means that only 81% of the material in the bag is tall fescue seed that will germinate and grow. The other 19% are inferior seed, weed seed, and other material.

Step3. Determine the PLS seeding rate. When planting tall fescue alone on construction sites, we use a PLS seeding rate of 50 LB/AC. Since our bag of seed has a PLS of 81%, we simply divide the seeding rate (50 LB/AC) by the PLS (0.81) to calculate the PLS seeding rate of the seed we purchased. The answer is 62 LB/AC. Therefore, in order to plant an equivalent of 50 LB/AC of good tall fescue seed, a seeding rate of 62 LB/AC of this seed is needed.

Note: Seed with a low PLS value has low plant vigor and will not grow properly. If the seed you have on hand or intend to purchase has low PLS, it is best to obtain other seed to plant. The use of seed with a low PLS should be the last alternative chosen.

All of the seeding rates in the *Manual* are based on PLS seeding rates.

VEGETATIVE MEASURES

Below are descriptions of vegetative measures used on construction sites. Additional information on each measure is in the *Manual*.

BUFFER ZONE (Bf)

The Georgia Water Quality Control Act defines a 'buffer' as the area of land immediately adjacent to the banks of state waters in its natural state of vegetation. No construction activities shall be conducted within 25 feet along the banks of all state waters or within 50 feet along the banks of any state waters classified as 'trout streams'.

Vegetative practice Buffer Zone (Bf), as defined in the Manual, is a strip of undisturbed, original vegetation, enhanced or restored existing vegetation, or the re-establishment of vegetation surrounding an area of disturbance or bordering streams, ponds, wetlands, lakes, and coastal waters. Buffer Zones serve many purposes. Among them are reduced runoff, reduced noise, improved aesthetics, filtered runoff, increased infiltration, cooler water in streams, flood protection, and improved wildlife habitat.

The *Manual* describes two types of buffers: general buffers and vegetated stream buffers.

General buffers are the undisturbed land surrounding a disturbed site. They filter and infiltrate runoff, act as a screen, and reduce construction noise.

Vegetated stream buffers are adjacent to and border streams. A vegetated stream buffer 50 feet wide or wider can protect waters from excess sedimentation. Surface water pollution can be reduced with a vegetative stream buffer that is 100 feet wide or wider. A multipurpose riparian buffer consists of three zones that have trees, shrubs, and grasses.

The width of buffers is determined by site characteristics. Approved plants for buffer reestablishment and enhancement are listed in the *Manual*.

COASTAL DUNE STABILIZATION with Vegetation (Cs)

Coastal dune stabilization with vegetation is 'planting vegetation on dunes that are denuded, artificially constructed, or re-nourished'. The purposes of this practice are to stabilize existing dunes and to allow development of dunes that have been damaged or destroyed.

Coastal dunes are subject to regulations from local, state, and federal regulations and permits must be acquired from all appropriate jurisdictions before work is performed. Human, livestock, and vehicular traffic must be kept off dunes if vegetation is to succeed and crosswalks should be installed where beach access is needed.

Native coastal plant species should be used. Irrigation is needed during the first growing season in order to obtain good survival. Among the commercially available plants commonly used on Georgia dunes are:

1. 'FLAGEO' Marshhay cordgrass *(Spartina patens)* is a perennial warm season grass that grows on salt marshes and sandy meadows from Quebec, Canada to Florida and Texas. The grass is especially tolerant of salt and is planted in late winter or early spring.

2. Bitter panicum *(Panicum amarum)* is a perennial warm season grass found on coastal dunes and sandy shores from New Jersey to Florida to Texas. Plant in late winter or early spring.

3. Coastal panicgrass *(Panicum amarum v. amaralum)* is a strong, perennial salt-spray tolerant grass that grows on coastal dunes throughout the south Atlantic and Gulf regions. Plantings should be made in the spring.

Sand fences may be used to build or enlarge sand dunes. As sand collects over the fence, additional fences can be constructed over the original fence until the desired dune height is obtained. Vegetation must be established soon following dune development or allowed to develop naturally from existing stands.

DISTURBED AREA STABILIZATION with Mulching only (Ds1)

This practice is applying plant residues or other suitable materials, produced on the site if possible, to the soil surface. It applies to areas where plantings may not have a suitable growing season to produce adequate cover, but can be stabilized with mulch.

The benefits of using this practice are to reduce erosion, conserve moisture, prevent soil compaction, control undesirable vegetation, and to increase biological activity in the soil. The mulch shall be applied to all exposed areas within 14 days of disturbance and the applied practice will be maintained so that at least 90% of the soil surface is covered. Mulch can be used as a single erosion control device for up to six months.

The site will be graded to permit the use of mulch application and anchoring equipment. Compact soil will be loosened to a minimum depth of 3 inches. Additional erosion control practices will be applied if needed. One of the following materials will be used:

Dry small grain straw or dry hay at a depth of 2 – 4"
Wood waste (chips, sawdust, or bark) at a depth of 2 – 3"
Cutback asphalt at a rate of 1,200 gallons/acre
Polyethylene film over banks and stockpiled soil

The materials will be applied uniformly and anchored immediately after application.

DISTURBED AREA STABILIZATION with Temporary Seeding (Ds2)

Temporary seeding, an alternative to mulch, can be used on rough graded areas that will be exposed for less than 6 months. (If the area is expected to be undisturbed for longer than 6 months, permanent vegetative cover shall be used.) Temporary seeding shall be applied to all exposed areas within 14 days of disturbance.

Excessive runoff shall be reduced with practices such as closed drains, ditches, dikes, diversions, sediment barriers, and others. No shaping or grading is required if the slopes can be stabilized in their present condition. When planting will be done with conventional methods, seedbed preparation may not be needed. But, if the soil has a crust or consists of smooth cut slopes, the soil shall be tilled, pitted, trenched, or otherwise scarified to provide a place for seed to lodge and germinate. Seedbed preparation is not required if hydroseeding is used.

Agricultural lime at the rate of 1 ton/acre is required unless soil test results indicate otherwise. On reasonably fertile soils, fertilizer is not required. For soils with low fertility, 500-700 LB/AC of 10-10-10 or equivalent shall be applied. For conventional seeding, the lime and fertilizer should be applied before seedbed preparation and incorporated into the soil with a disk harrow, ripper, or chisel plow. For hydroseeding, the fertilizer will be applied at seeding.

Select a grass or grass-legume mixture that will germinate quickly and provide ample protective cover for that area and season of the year. In most cases, temporary vegetation can be established without mulch. This may not be true on steep slopes and in concentrated flow areas.

DISTURBED AREA STABILIZATION with Permanent Vegetation (Ds3)

This practice includes the planting of perennial vegetation such as grasses, legumes, ground covers, shrubs, trees, or vines, on exposed areas for final permanent stabilization. The purposes of this practice are to protect the soil from erosion, to reduce sediment and runoff damage downstream, to improve wildlife habitat, and to improve aesthetics.

This practice shall be applied immediately to rough graded areas that will be undisturbed for longer than 6 months. This practice or sodding shall also be applied immediately to all areas at final grade. Low maintenance and native plant species appropriate for the region shall be planted, established, and maintained so that at least 70% of the soil is covered with perennial vegetation for long-term erosion control.

Grading and Shaping

For conventional planting methods, grading and shaping will be done so that equipment can be used safely during lime and fertilizer applications, seedbed preparation, planting, mulching, and maintenance. Grading and shaping may not be required where hydroseeding is used. Concentrated water will be diverted to a safe outlet.

Lime and Fertilizer

For adequate plant growth, the soil must have proper pH and ample plant food. For additional guidance, see the topics titled “Soil Tests”, “Soil pH and Lime”, “Lime Application”, and “Fertilization” on pages 9-11 in this document. Application rates, analysis, and timing of fertilizer applications for the respective plant species are provided in the *Manual*.

Approved Plant Species

Approved perennial plant species, seeding rates, seeding dates, and other valuable information are listed in the *Manual*.

Seed Inoculation

All legume seed must be inoculated correctly with the proper strain of bacteria.

Planting Methods

Permanent vegetation may be planted with several methods. See the section titled “Planting Methods” on page 11 in this document.

Mulching

Suitable mulch is required for all sites planted with permanent vegetation, except where erosion control blankets or block sod are used. One of the following mulch materials can be used on construction sites:

1. Dry small grain straw or dry hay of good quality and free of competing weed seeds can be used on conventionally planted and most hydroseeded sites. The straw will be applied at rate of 2 tons/acre and the hay at a rate of 2 ½ tons/acre within 24 hours after planting. This will cover about 75% of the soil surface and will allow young plant seedlings to emerge and develop.

2. Wood cellulose mulch, pulp fiber, or paper mulch will be used during hydroseeding. These mulches will not contain germination or growth inhibiting factors. They will contain a dye to allow visual metering of applications.

   a. On slopes flatter than ¾ to 1, apply 500 LB/AC of one of the mulch materials in the slurry that contains the seed and fertilizer. Following hydroseeding, the area will be mulched with small grain straw or hay as mentioned in Item 1 above.

   b. On slopes ¾ to 1 and steeper, 1,000 LB/AC of the mulch will be applied in the slurry that contains the seed and fertilizer. A tackifier/binder will be included in the slurry to anchor the mulch on the steep slopes.

3. Sericea lespedeza hay that contains mature seed will be applied at a rate of 3 tons/acre. The hay will be applied within 24 hours of seeding.

4. Bedding material will be used around nursery plants, ornamentals, shrubs, and bare areas on lawns. (Note the materials used at these rates are not applicable to seeded areas. The mulch would be too thick for most young seedlings to emerge and grow.) The suitable bedding materials are:

   Pine straw at a thickness of 3”
   Pine bark at a thickness of 3”
   Small grain straw at a thickness of 4 – 6”
   Hay at a thickness of 4 – 6”

5. Bituminous treated roving applied according to Georgia Department of Transportation (GDOT) specifications may be applied on planted areas on slopes, in ditches, and in dry waterways to prevent erosion.

Anchoring Mulch

Straw or hay mulch will be anchored immediately after application with one of the following methods:

1. Where a seedbed is prepared, a ‘packer disk’ or ‘mulch crimper’ can be used to press the straw or hay into the soil without cutting it, leaving most of it in an erect position. The mulch will not be plowed into the soil.

2. Synthetic tackifiers or binders approved by GDOT shall be applied with the straw or hay during the mulch application process or immediately after application. See “Tackifiers and Binders (Tb)” on page 24 for more information.

3. Plastic mesh or netting with openings no larger than 1” x 1” may be used to anchor straw/hay on steep slopes, unstable soils, and concentrated flow areas.

4. Emulsified asphalt can be sprayed uniformly onto the mulch as it is ejected from the mulch blower or sprayed on the mulch immediately following mulch application when the mulch is spread by methods other than with special blower equipment. Protect humans, adjacent property, state waters, pavement, curbs, sidewalks, road signs, and other structures from asphalt applications.

5. Rye or wheat seed at a rate of ? to ? BU/AC can be included with fall and winter plantings to stabilize straw and hay mulch.

Wood cellulose, fiber mulch, or paper mulch applied with hydroseeding on slopes 3/4 to 1 and steeper will be anchored with a tackifier/binder.

Irrigation

See the topic titled “Irrigation” on page 26 in this document.

Management and Maintenance of Permanent Vegetation

Remember the saying “the squeaky wheel gets the grease”? Too often the vegetation on critical areas is abandoned immediately after establishment. Why is management and maintenance so important? The plants need regular care. Without adequate maintenance, vegetative cover can deteriorate to the point that it will have to be reestablished.

Among the management and maintenance items needed by permanent vegetation are:

1. Fertilization. Maintenance applications of fertilizer are very important to sustain adequate vegetative cover. Follow soil tests and a nutrient management plan.

2. Liming. Maintenance agricultural lime applications are needed by most plant species used on construction sites. Follow soil test recommendations or apply 1 ton/acre every 4 – 6 years on grasses and legumes.

3. Traffic Control. Limit vehicular and foot traffic, especially on steep slopes.

DISTURBED AREA STABILIZATION with Sodding (Ds4)

This practice is establishing permanent vegetative cover using sod on highly erodible or critically eroded soils. Sod allows you to establish immediate ground cover, reduce runoff and erosion, improve aesthetics and land value, reduce dust and sediment, and stabilize waterways and other critical areas. Sodding is more expensive than seeding, but the benefits justify the increased cost. There is reduced plant failure compared to planting with seed and sod can also be installed year-round.

Bermuda grass, bahia grass, centipede, St. Augustine, tall fescue, and zoysia sod are used in Georgia. The species used will be based on the site location, planned land use, and maintenance. Apply the sod to the soil surface only and not to frozen soil or gravel type soils. Do not lay sod in extremely wet or dry weather. Anchor the sod on slopes steeper than 3%. Irrigate sod and soil to a depth of 4” immediately after installation. Irrigation should be applied as needed for a minimum of 2 – 3 weeks and also later during drought.

Mow according to the species used. Re-sod areas that do not have a good stand. Apply agricultural lime as indicated by soil tests or 1 ton/ac every 4-6 years. Fertilize according to soil tests or the recommendations in the *Manual*.

DUST CONTROL ON DISTURBED AREAS (Du)

This practice is controlling surface and air movement of dust on construction sites, roads, and demolition sites. Temporary methods of treatment are: Mulch - Standard Ds1; Synthetic Resins - Standard Tb; Vegetation - Standard Ds2; tillage with appropriate equipment that will roughen the soil surface; irrigation generally done as emergency treatment; barriers like fences, crate walls, and bales of hay; and calcium chloride.

Permanent methods of treatment are: Vegetation - Standard Ds3 and Stone - Standard Cr.

EROSION CONTROL MATTING AND BLANKETS (Mb)

A protective covering (blanket) or soil stabilization mat is used to establish permanent vegetation on steep slopes, channels, or shorelines. The purposes are to provide a microclimate which protects young vegetation and to reinforce turf to resist the forces of erosion.

Concentrated flow areas, all slopes steeper than 2.5 to 1 with a height of 10' or greater, and cuts and fills within stream buffers shall be stabilized with appropriate erosion control matting or blankets. Matting and blankets are also used on other areas where the erosion hazard is high and the vegetative cover is expected to be slow to develop.

Choose the type of matting or blanket which is most appropriate for the specific needs of the project. All materials used will be non-toxic to vegetation and shall not be injurious to the unprotected skin of humans. All matting and blanket materials used shall be on approved GDOT lists. Follow manufacturer's recommendations for laying and stapling.

The soil surface must be smooth to ensure proper application of the products. Temporary blankets will be applied immediately after liming, fertilization, and seeding have been completed. They will be anchored with U-shaped staples. Mats will be applied after liming and fertilization have been completed. They will then be anchored with U-shaped staples and wooden stakes, backfilled, and the area will be seeded.

All installed mats and blankets should be inspected periodically after storm events until the areas become permanently stabilized with vegetation. Any dislocation or failure should be repaired immediately.

POLYACRYLAMIDE (PAM)

Anionic polyacrylamide (PAM) is applied to the soil surface as temporary soil binding agent to reduce soil erosion on construction sites and agricultural land. PAM also helps to improve water quality, infiltration, soil fertility, and visibility. PAM is used on sites where the timely establishment of vegetation may not be feasible or where vegetative cover is absent or inadequate. PAM is not intended for application to surface waters.

Applications shall comply with all federal, state, and local laws governing PAM and will follow all Material Safety Data Sheet requirements and manufacturer's recommendations.

Additional Best Management Practices are also required. The use of seed and mulch for vegetative protection beyond the life of PAM is recommended. Repeat the application of PAM if land disturbance occurs within the treated area.

These recommendations may enhance the use of PAM and help to avoid problems with its use:

1. Use setbacks when applying the product near natural water bodies.
2. Consider that decreased performance can occur due to ultra-violet light and time.
3. The effectiveness of PAM decreases in concentrated flow channels.
4. Mulch to protect seed if vegetation is planted with along with PAM.
5. Never add water to PAM. Add PAM slowly to water.
6. Not all polymers are PAM.

The product will be applied uniformly. The maximum application rate of PAM, in pure form, shall not exceed 200 LB/ac/yr. Avoid drift to non-target areas. The products and mixtures used shall be environmentally benign, harmless to fish, wildlife, and plants. Products used will be non-combustible. Maintenance will consist of reapplying anionic PAM to disturbed areas, including high use traffic areas.

STREAMBANK STABILIZATION using Permanent Vegetation (Sb)

This practice is the use of readily available native plants to maintain and enhance streambanks, or to prevent or repair small streambank erosion problems to reduce soil detachment, trap sediment, stabilize soil on streambanks, provide wildlife habitat, and lower summer water temperatures in streams.

Careful thought, planning, and execution is required for a successful streambank stabilization project. Refer to *SSWCC's Guidelines for Streambank Restoration,* and the *NRCS Engineering Field Handbook,* Chapters 16 and 18 for more detailed information. Local, state, and federal permits may be needed. Streambank stabilization includes several measures, including seeding and sodding of grasses, the use of erosion control fabrics, and the planting of woody vegetation (shrubs and trees). Refer to practices Ds3, Ds4, Bf, and Mb. Among the measures used in Sb are:

Live Stakes – Fresh, live woody plant cuttings are tamped into the soil. Although they provide no immediately protection, the stakes will root and grow into mature shrubs or trees, stabilize soils, and restore riparian zone habitats. Willow species work best.

Joint Plantings – Live willow stakes are installed between rip-rap previously placed on streambanks. The rock should be no thicker than 2'. Joint planting allows streambanks to become naturalized as the willows hide the rip-rap.

Live Fascines – Sausage-like bundles of live cut branches are placed into trenches along streambanks. They provide immediate protection and willow species work best. Live fascines work well when combined with jute mesh or coconut fiber fabric.

Brushmattresses – A combination of living units of live stakes, live fascines, and branches provide immediate protective cover. They require a lot of live material and are complicated as well as expensive to evaluate, design, and install. They quickly produce habitat and a healthy riparian zone.

Live Cribwalls – These are rectangular frameworks of logs or timbers, rock, and woody cuttings and are very useful where space is limited on small, narrow stream corridors. They require a great deal of
assessment and understanding of stream behavior and can be complicated and expensive. They develop a natural appearance after the plants begin to grow and provide excellent habitat for a variety of fish, birds, and other animals.

Branchpacking – This is the process of alternating layers of live branches and soil, incorporated the vegetative material into a hole, gully, or other cavity on slopes or streambanks. Branchpacking is one of the most effective and inexpensive methods for repairing holes on streambanks. There is a moderate to
complex level of difficulty for construction. They provide an immediate filter barrier, reduce scouring, repair gullies, provide habitat cover, and stream reinforcement.

When fertilizer is applied on the soil surface for these measures, apply ½ of it at planting, ¼ when new growth is 2" tall, and ¼ six weeks later. Check sites after each high-water event and repair problem areas at once with fresh cuttings, new plants, and mulch.

TACKIFIERS AND BINDERS (Tb)

Synthetic tackifiers and binders are used to anchor straw or hay mulch, wood cellulose, wood pulp fiber, and other mulch materials to the soil surface. They also increase the performance of mulch materials. They will be mixed and applied according to the manufacturer's recommendations. Approved tackifiers and binders are:

Product or Trade Name	**Recommended Application Rate**
A500 HYDRO-STIK	40 LB/AC
Agro Tack MP	PMR (per manufacturer's recommendations)
CONWED CON-TAC	40 LB/AC
EcoTak-OP	PMR
EcoTak-SATII	PMR
Emulsified Asphalt	100 gallons of SS-1h or CSS-1h and 100 gallons of water per ton of mulch
Hercules Soilloc-E	PMR
HYDRO-BOND	35 LB/AC
RMB-plus	80 – 120 LB/AC
TACPAC GT	PMR
TERRA-MULCH	
TACKING AGENT III	PMR

ADDITIONAL TOOLS FOR SUCCESS

1. Subsoiling.

   Compacted soils do not readily infiltrate water and can prevent plant root growth. Shallow soil compaction on or near the soil surface will be alleviated with chisel plows or other suitable tillage equipment during seedbed preparation. Deeper compacted soil layers will be eliminated with a subsoiler.

   These tillage operations will be done on the contour. Where trees are to be planted, subsoiling will be done 4 – 6 months in advance to allow the soil time to settle. Otherwise, small tree seedlings will be buried with soil when heavy rainfall occurs.

2. Stockpiling and Utilizing Topsoil.

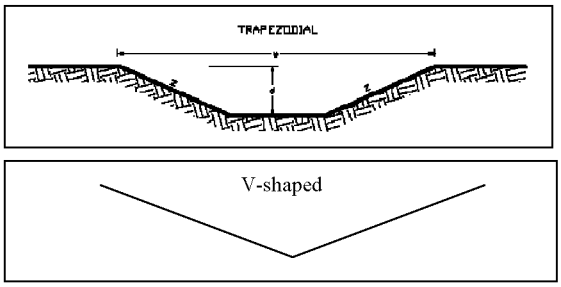
   Too often on construction sites, valuable topsoil is buried in fill during land clearing and grading operations and is rarely ever available again to aid plant growth. Available topsoil should be saved, stockpiled, and spread as topdressing on sites to be vegetated.

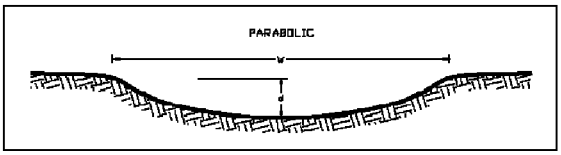
   Even a small amount of topsoil on construction sites aids plant growth. Topsoil is especially beneficial where ornamental plants or high-maintenance turf will be grown, on shallow soils, soils with critically low pH, and soils containing potentially toxic materials. Use the following guidelines if topsoil is to be stockpiled and used later as topdressing on construction sites:

   1. Topsoil should be removed from areas where further excavation will occur as soon as clearing and grubbing are completed.
   2. Stockpile topsoil during stripping operations.
   3. Adjust stripping equipment so that the topsoil is not mixed with the subsoil.
   4. Stockpile the topsoil so that it does not interfere with other work on the site.
   5. Make sure that the stockpile is stabilized during the construction phase.
   6. The topsoil must be adequately bonded to the sub grade. Prior to spreading the topsoil on the areas to be planted, scarify the sub grade to a depth of at least 3”.
   7. Spread it uniformly. (It takes about 12 yards of topsoil to cover 1,000 square feet at a depth of 4”.)
   8. Do not spread topsoil that is excessively wet.
   9. Do not place topsoil on areas that are excessively wet or extremely dry.
   10. Do not compact topsoil. Correct surface conditions where water could stand.
   11. Leave the area smooth, firm, and suitable for planting.
   12. Immediately begin to establish vegetation upon completion of topsoil placement.

3. Shape of Grassed Waterways

It is difficult to establish vegetation on structural measures that have concentrated water flow. The shape of channels influences the establishment and growth of plants. Grassed waterways are normally built with one of three shapes: trapezoidal, parabolic, or vshaped. Those installed with trapezoidal shapes are easier to establish in vegetation because they have level bottoms (horizontally) and there is sheet flow of water in them. Sheet flow causes fewer problems than if the water is concentrated in a small area. Parabolic are the next easiest. V-shaped ones are the most difficult to establish in vegetation.

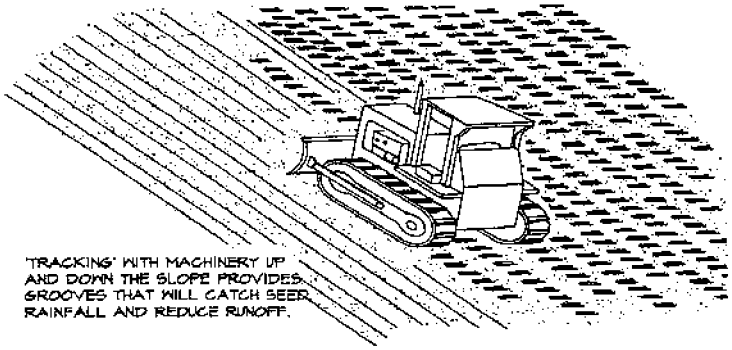




Source: New Brunswick Dept. of Ag., Canada

4. Tracking with Bull Dozier Tracks

Sometimes seed and young plant seedlings need a little additional help in order to keep from being washed down the slope. Roughening steep slopes with tracked machinery (like a bull dozier) leaves small horizontal depressions in the soil. Seed, fertilizer, mulch, and moisture collect in the depressions. Often times, this tool greatly aids vegetative establishment on steep slopes. Make as few passes as necessary to minimize soil compaction.



Source: *Florida Erosion and Sediment Control Inspector's Manual*

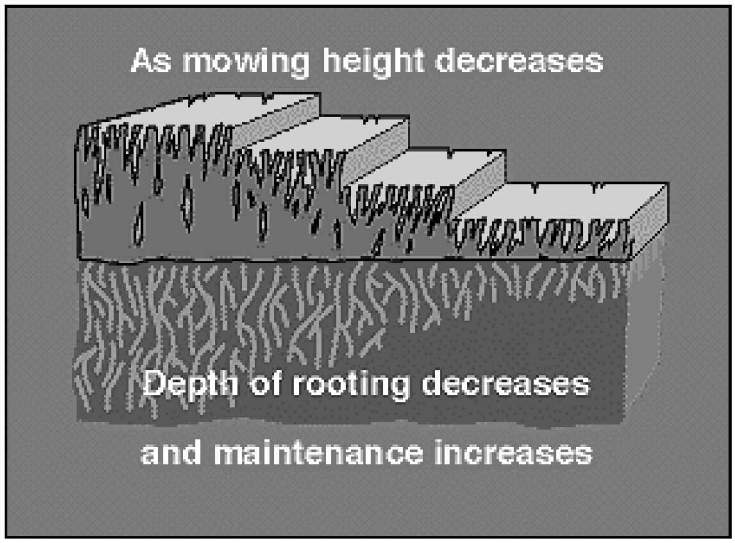
5. Irrigation

Supplemental irrigation is a useful tool for plant establishment and growth, especially on coastal dunes, during drought, and for getting quicker germination of plants when they are planted late in the season. Irrigation water should be applied at rates that will not result in runoff and additional soil erosion.

6. Proper Mowing Techniques

Modern mowing equipment has the capacity to do a very good job of close mowing, even on steep slopes. Mowing helps to control weeds, woody vegetation, and other competing plants, but over mowing causes major problems on construction sites. In order for grasses to survive on construction sites, we need to maintain at least 6" of top growth under any use and management.

Over mowing is a serious problem, especially on uneven slopes. Removing too much plant canopy with one mowing can cause plant death. Never remove more than ½ of the existing leaf area at any one time. If we remove more than this, we severely injure plants and reduce their ability to withstand drought and additional environmental stresses. Use sharp mower blades. Dull blades tear and bruise leaf tips instead of cutting. Shredded leaves suffer greater water loss and are more susceptible to disease.



Source: University of Minnesota

Don't mow sericea lespedeza until after the first killing frost each fall. This insures that the current year's seed crop is mature. Do not mow critical areas during the bird nesting season, which is May through September in Georgia.

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Georgia Department of Transportation

Office of Materials and Research
Qualified Products List

Following is a list of Silt Fence Fabrics that have been evaluated by the Office of Materials and Research and have proven their capability of meeting the requirements of Sub-section 881.2.07 of the Standard Specifications and have satisfied the requirements of SOP-17 Physical and Chemical, "Acceptance of Miscellaneous Construction Items."

QPL-36
Silt Fence Fabric

Physical / Chemical Branch
15 Kennedy Dr.
Forest Park, GA 30297
Office Phone: 404-363-7606
Office Fax: 404-363-7684

Note: Filter fabric used in the construction of Type "A" and "B" fences may be either the woven or non-woven type. In the construction of woven fabrics, slit tape yarns will be allowed in one direction (warp or fill) only. Filter Fabric used in the construction of Type "C" fences shall be a non-calendared woven fabric constructed with mono filament yarns only.
All Trade Names are Registered Trademarks of the appropriate company.
Ending Source # is 018

Source	Source # / Location	Address	Contact	Product	Type
ACF Environmental	/ USA 2831	Cardwell Road Richmond, VA 23234 www.acfenvironmental.com	800-223-9021 800-448-3636	LSGA A LSGA C	A C
Belton Industries, Inc.	002 / USA	P.O. Box 127 1205 Hamby Road Belton, SC 29627 www.beltonindustries.com	864-338-5711 800-845-8753 800-848-9608	BELTECH 935 BELTECH 936- High Visibility Orange	A & B A & B
Carthage Mills, Inc.	004 / USA	4243 Hunt Road Cincinnati, OH 45242 www.carthagemills.com	513-794-1600 800-543-4430	Carthage 15%	C
Cherokee Manufacturing	018 / USA	300 Relihan St. Pearson, GA 31639 www.cherokeemfg.com	912-422-6321 800-876-5218	CF1200A	A
Construction Fabrics and Supply, LLC	013 / USA	1603 James P. Rogers Drive Valdosta, GA 31601 www.siltfenceUSA.com	229-244-0004 800-686-1862	ConFab GATA	A & B
DDD Erosion Control	017 / USA	812 E. Golden Road Tifton, GA 31794	229-388-8661	DDDGA36-A Pro-3D/DOT A DDDGA36-C Pro-3D/DOT C	A A C C
Firstline Corporation	003 / USA	Azalea City Industrial Park P.O. Box 1128 Valdosta, GA 31643 www.firstlinecorp.com	912-422-3298 800-765-9629	20-CSF 350 36” 20-CSF 350 24”	A B

Office of Materials and Research
Qualified Products List

Source	Source # / Location	Address	Contact	Product	Type
Geo Fabrics, LLC	011 / USA	123 Nashville Hwy. P.O. Box 46 Enigma, GA 31749	229-533-5785 229-433-9217	ASH-SFC-36 ASH-SFC-36 (Orange) PSFG-36B PSFG-36B (Orange) GF-55 GEOPAC-A GEOPAC-450 GFG-A GFG-C	C C A & B A & B A & B A & B A & B A C
General Fibers and Fabrics, Inc.	014 / USA	1404 Orchard Hill Road LaGrange, GA 30240	706-882-8801	TTP-A TTP-B 4815-G 4815-O	A B B A
LINQ Industrial Fabrics, Inc.	005 / USA	2550 W. 5th North Street Summerville, SC 29483 www.linqind.com	843-875-8106 800-543-9966	GTF-400EO	C
Propex Fabrics, Inc.	001 / USA	6025 Lee Highway, Suite 425 P.O. Box 22788 Chattanooga, TN 37422 www.geotextile.com	423-899-7619	Geotex 106F *(Formerly:Propex-1198)* Geotex 102F *(Formerly: Propex-2019)* *Geotex 111F* *(Formerly:Geotex 111)*	C A & B C
Skaps Industries	015 / USA	316 S. Holland Drive Pendergrass, GA 30567 www.skaps.com	706-639-3440	M404	C
SunCoast Fabrics	016 / USA	1055 Windward Ridge Pkwy. Suite 170 Alpharetta, GA 30005 www.suncoastfabrics.com	678-339-9942 800-366-5003	SCF 1200 SCF 1500	A & B C
Tencate Geosynthetics	007 / USA	365 South Holland Drive Pendergrass, GA 30567 www.mirafi.com	706-693-2226	MIRAFI FW 402 (black) (filter weave) Mirafi FW 402-O (orange) (filter weave)	C C
TNS Advanced Technologies	008 / USA	9855 Greenville Highway Spartanburg, SC 29301	864-949-1006 800-867-6181	TNS M404	C
Webtec, Inc.	009 / USA	P.O. Box 19729 Charlotte, NC 28219 www.info@webtecgeos.com	704-398-0954 800-423-0027	TerraTex GASF	A & B
Willacoochee Industrial Fabrics, Inc.	010 / USA	Highway 82 West P.O. Box 599 Willacoochee, GA 31650	912-534-5757	1215 Silt Fence 1216 Silt Fence 2098 Silt Fence	A A C

NOTES

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Field Guide for Determining The Presence of State Waters That Require a Buffer

Georgia Department of Natural Resources
Environmental Protection Division
Watershed Protection Branch
NonPoint Source Program

This guidance is based on the Georgia Erosion and Sedimentation Control Rules (Rules), 391-3-7, promulgated under the Georgia Erosion and Sedimentation Act (Act), O.C.G.A. 12-7.

The Act defines State Waters as "any and all rivers, streams, creeks, branches, lakes, reservoirs, ponds, drainage systems, springs, wells and other bodies of surface or subsurface water, natural or artificial, lying within or forming a part of the boundaries of the State, which are not entirely confined and retained completely upon the property of a single individual, partnership, or corporation."

This guidance only addresses the identification of rivers, streams, creeks and branches that require a buffer. The State-mandated buffer requirements apply to all State Waters that require a buffer (i.e., have wrested vegetation by normal stream flow).

The definition of Normal Stream Flow that is used in this document is found in the definition of Stream Bank in the Rules, and only applies to non-trout streams. Streams that have Normal Stream Flow as defined in the Rules have characteristics that are not normally associated with ephemeral streams.

STEPS FOR DETERMINING THE PRESENCE OF STATE WATERS AND BUFFER REQUIREMENTS ON A SITE

Please note that this guidance is primarily written to assist local issuing authorities with their determinations of State Waters and buffer requirements. However, it is also a tool for plan preparers and environmental consultants to use in the preparation of accurate Erosion, Sedimentation and Pollution Control Plans.

Step 1 Review the topography of the Erosion, Sedimentation and Pollution Control Plan for natural or artificial features that may indicate the presence of State Waters.

Step 2 Walk the site in order to identify State Waters as defined.

Step 3 Begin the inspection at one end of the potential State Waters and walk the entire length of the State Waters until it exits the property.

Step 4 Examine the drainage feature using this field guide to determine whether the feature is perennial, intermittent or ephemeral. If the drainage feature is determined to be perennial or intermittent, then a State-mandated buffer exists. If the drainage feature appears to be ephemeral then go to Step 5 to make a final determination. If the identified feature is a salt marsh, then Georgia Department of Natural Resources (DNR), Coastal Resources Division should be contacted for the delineation of the DNR jurisdictional line (point from which the buffer is measured).

Step 5 If base flows are present during the site inspection, the stream is either perennial or intermittent and will require a buffer. If the site is visited during a dry phase and base flows are not evident, the drainage may be ephemeral or intermittent. If there is no flowing water within 24 hours of a rain event, then the drainage feature is probably ephemeral. NOTE: Ephemeral non-trout streams do not require buffers so great care should be exercised when conducting field investigations for ephemeral and intermittent stream determinations. In such conditions inspections must be accomplished by professionals trained or otherwise familiar with methods used to determine whether the stream is in a season when base flows may not be observable, or if the stream is ephemeral and simply flows in direct response to precipitation. The ephemeral stream guidance should be used to make the final determination as to whether the stream is ephemeral.

Step 6 If there is still a question about base flow after Step 5 is completed, then the "North Carolina Division of Water Quality Stream Identification Method, Version 3.0" (or most current version) should be used to verify whether or not base flow is present.

Step 7 The determination should be documented in writing.

DEFINITIONS

a. "Base Flow" means the discharge that enters a stream channel mainly from groundwater, but also from lakes during periods when no precipitation occurs.

b. "Buffer" means the area of land immediately adjacent to the banks of State Waters in its natural state of vegetation, which facilitates, when properly vegetated, the protection of water quality and aquatic habitat (O.C.G.A. 12-7-3(2)).

c. "Ephemeral Stream" means a stream that typically has no well defined channel, and which flows only in direct response to precipitation with runoff.

d. "Intermittent Stream" means a stream that flows in a well-defined channel during wet seasons of the year but not for the entire year.

e. "Land Disturbing Activity" means any activity which may result in soil erosion and the movement of sediments into State Waters or onto lands within the State, including but not limited to grubbing, dredging, grading, excavating, transporting, and filling of land, but not including those practices to the extent described in O.C.G.A. 12-7-17 (O.C.G.A. 12-7-3(9)).

f. "Normal Stream Flow" for non-trout waters only, means any stream flow that consists solely of base flow or consists of both base flow and direct runoff during any period of the year. Base flow results from ground water that enters the stream channel through the soil. This includes spring flows into streams. Direct runoff is the water entering stream channels promptly after rain falls or snow melts (Rule 391-3-7-.01(w)).

g. "Perennial Stream" means a stream that flows in a well-defined channel throughout most of the year under normal climatic conditions.

h. "State Waters" include any and all rivers, streams, creeks, branches, lakes, reservoirs, ponds, drainage systems, springs, wells, and other bodies of surface or subsurface water, natural and artificial, lying within or forming a part of the boundaries of the State which are not entirely confined and retained completely upon the property of a single individual, partnership, or corporation, except as may be defined in O.C.G.A. 12-7-17(8) (O.C.G.A. 12-7-3 (16)).

i. "Stream Bank" means the confining cut of a stream channel and is usually identified as the point where the normal stream flow has wrested the vegetation (Rule 391-3-7-.01(w)).

j. "Typical/Average Year" means a year in which the observed base flow and rainfall quantity is approximately equal to the long-term average.

k. "Wrested Vegetation" means movement of water that removes soil, debris and vegetation, creating a clear demarcation between water flow and vegetative growth.

Please note the following:

- The definition of Normal Stream Flow that appears in this guidance applies only to non-trout streams. **Ephemeral trout streams are not exempt from buffer requirements, but may be eligible for the General Stream Buffer Variance in 391-3-7-.05(9) of the Erosion and Sedimentation Control Rules.** Refer to the Georgia Water Quality Control Rules (391-3-6-.03) for a listing of trout streams.

- Buffer requirements are included in the General NPDES Permit for Storm Water Discharges from Construction Activities.

- Contact DNR, Coastal Resources Division for guidance involving any land disturbing activity in marshland areas.

- State Waters may also be classified as Waters of the U.S., and may require a U.S. Army Corps of Engineers Section 404 permit.

PERENNIAL STREAM CHARACTERISTICS

North Georgia Perennial

Piedmont Perennial

Coastal Perennial

All perennial streams flow throughout the year in a normal climatic year. Site inspections should result in visually discernible stream flows as evidence of base flow contribution between rain events, even in low flow conditions. After confirming perennial flow regimes, the presence of one or more of the following characteristics indicates that the drainage feature is a perennial stream:

1. Base flow that maintains stream flow throughout the year under normal circumstances.

2. Well-developed stream banks and channels include riffles/pools.

3. A channel that is almost always sinuous (winding, snake-like, etc.). The degree of sinuosity is specific to physiographic regions. For example, in geographic regions that have mountainous terrain, or in the coastal plain where many streams have been channelized, the channels are less sinuous.

4. Evidence of fluctuating high water marks (flood prone width) and/or sediment stained leaves, bare ground, and/or drift lines.

5. Evidence of soil and debris movement (scouring) in the stream channel. Leaf litter is usually transient or temporary in the flow channel.

6. Wetland or hydrophytic vegetation is usually associated with the stream channel. However, perennial streams with deeply incised or "down-cut" channels will usually have wetland vegetation present along the banks or flood-prone zone. Examples include sedges, rushes, mosses, ferns, and the riparian grasses, shrubs and other woody species.

7. Stream bank soils with hydric conditions, including dominant black/gray colors evident in the exposed stream bank profiles at or above the low flow conditions.

8. Exposure of rock or gravel or sand in a continuous or nearly continuous low lying channel.

INTERMITTENT STREAM CHARACTERISTICS

North Georgia Intermittent

Piedmont Intermittent

Coastal Intermittent

After confirming whether base flows are seasonally present, one or more of the following characteristics indicates that the drainage feature is an intermittent stream:

1. Well-developed stream bank and defined channel. Riffles/pools channel morpholgy is evident.

2. Evidence of fluctuating high water marks (flood prone width) and/or sediment deposits, sediment stained leaves, bare ground and/or drift lines.

3. Evidence of soil and debris movement (scouring) in the stream channel. Leaf litter is usually transient or temporary in the flow channel.

4. Wetland or hydrophytic vegetation is usually associated with the stream channel or flow area. Intermittent streams with deeply incised or "down-cut" channel will usually have wetland vegetation present along the banks or flood prone zone. Examples include sedges, rushes, mosses, ferns, and the riparian grasses, shrubs and other woody species.

5. Exposure of rock or gravel or sand in a continuous or nearly continuous low lying channel.

6. In the coastal plain, the soils may be sandy with veins of black.

7. Presence of crayfish burrows or chimneys.

8. The presence of aquatic insects (in any life phase) or fish. (For help identifying insects as aquatic, use the GA Adopt-A-Stream Aquatic Macroinvertebrate Field Guide, www.georgiaadoptastream.com)

9. Presence of buttressed trees.

EPHEMERAL STREAM CHARACTERISTICS

North Georgia Ephemeral

Piedmont Ephemeral

Coastal Ephemeral

The most reliable method for differentiating between intermittent and ephemeral stream types during drier conditions requires investigation of the stream bank (i.e., from the stream bed to the top of the bank).

Intermittent stream banks typically are dominated by soils with hydric indicators, such as: visually confirmed oxidized rhizospheres in the stream bank, matrix of gray or black soils, reducing conditions present and confirmed by a redox meter, or the stream banks otherwise include indicators of hydric soils as determined by the most current list of Regional Indicators of Soil Saturation as produced by the National Technical Committee for Hydric Soils.

Ephemeral streams usually have poor channel development and lack groundwater-induced base flows that normally result in hydric soils dominating the banks of intermittent and perennial streams.

The prerequisite for a drainage feature to be classified as ephemeral is there must be no evidence of base flows in the stream bank (see methods discussed in intermittent stream characteristics). After meeting the prerequisite above, the presence of one or more of the following characteristics indicates that the drainage feature is an ephemeral stream:

1. Poorly developed stream banks.
2. Absence of riffles/pools.
3. A flow area that is almost always straight and either "flattens" out at the bottom of the slope or grades into intermittent or perennial streams.
4. Fluctuating high water marks (flood prone width) and/or sediment transport are usually absent.
5. Evidence of leaf litter and/or small debris jams in the flow areas.
6. Usually sparse or no wetland (hydrophytic) vegetation present.
7. Side slope soils with characteristics typical of the surrounding landscape. Soil texture usually more loamy than the surrounding upslope landscape and usually has a clay subsurface.

BRAIDED CHANNELS

Buffers for braided channels such as those pictured above are measured from the point where vegetation is wrested from the outside channel of the braided system.

CONCRETE CHANNEL

Concrete channels are examples of drainage features that usually do not require a buffer due to lack of "wrested vegetation."

NOTES

- This guidance does not change or modify any requirements in the Erosion and Sedimentation Act of 1975 O.C.G.A. 12-7 or DNR Rules on Buffer Variance Procedures and Criteria 391-3-7-05, as amended.
- Copies of the Georgia Erosion and Sedimentation Act (O.C.G.A. 12-7), the Erosion and Sedimentation Control Rules (391-3-7) and the Water Quality Control Rules (391-3-6) can be found at www.gaepd.org.

Contact Information:
Georgia Department of Natural Resources
Environmental Protection Division
Watershed Protection Branch
NonPoint Source Program
4220 International Parkway, Suite 101
Atlanta, GA 30354

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GEORGIA EROSION & SEDIMENTATION CONTROL
EDUCATION AND TRAINING CERTIFICATION PROGRAM
FACT SHEET
Georgia Environmental Protection Division,
Stakeholder Advisory Board and
Georgia Soil and Water Conservation Commission

As part of House Bill 285, new education and training certification requirements were included in the 2003 amendments to the Georgia Erosion & Sedimentation Act (Act). House Bill 463 recently amended the Act during the 2007 session of the General Assembly. The new education and training certification (E&TC) requirements [Code Section 12-7-19(a)(1)] in the Act state that "persons involved in land development design review, permitting, construction, monitoring or inspection or any land disturbing activity shall meet the education and training certification requirements, dependent on his or her level of involvement with the process, as developed by the Commission in accordance with this code section and in consultation with the Division and the Stakeholder Advisory Board created pursuant to Code section 12-7-20."

The Act (Code Section 12-7-19(a)(2)) also states "for each site on which land disturbing activity occurs, each entity or person acting as either a primary, secondary, or tertiary permittee, as defined in the state general permit, shall have as a minimum one person who is in responsible charge of erosion and sedimentation control activities on behalf of said entity or person and meets the applicable education or training certification requirements…". This Code Section became effective on May 14, 2007. EPD recommends, but does not require, that at least two people from each permittee working at a project or site have completed the E&TC requirement. In the event that an E&TC individual is out due to illness, on vacation or called away on an emergency, then another E&TC individual is available on-site to ensure that erosion and sedimentation control issues are under control, regardless of what situation arises. If an E&TC individual leaves the site and he/she is the only individual on-site that is certified with that permittee, then all land disturbing activities undertaken by that permittee should stop until the certified individual returns.

Code Section 12-7-19(a)(3) of the Act specifies "Persons or entities involved in projects not requiring a state general permit but otherwise requiring certified personnel on site may contract with certified persons to meet the requirements of this chapter."

The Act also states in Code Section 12-7-19(a)(4) that "If a state general permittee who has operational control of land-disturbing activities for a site has met the certification requirements of paragraph (1) of subsection (b) of this code section, then any person or entity involved in land-disturbing activity at that site and operating in a subcontractor capacity for such permittee shall have until December 31, 2007, to meet those educational requirements specified in paragraph (4) of subsection (b) of Code Section 12-7-19 and shall not be required to meet any educational requirements that exceed those specified in said paragraph." The last subsection reference of this passage pertains to the Level 1 Awareness Seminar.

The following is a list of positions/occupations who, if conducting LDA and not otherwise exempt **(see attached Exemptions Table)** will need the required E&TC. The list is not a complete listing of all job titles, but rather is a sample of those that are more common. There may be other titles not included that could benefit from attendance at these E&TC courses. It is useful to consider your specific job responsibilities, and if those responsibilities include involvement with LDA, then your attendance at one or more of these E&TC courses is necessary unless somebody else with your work crew/company/entity has already satisfied this requirement for every project or site. While some LDA is exempt from the Act and its training requirements, many individuals will have to comply with these training requirements due to conditions in the NPDES General Permits.

Subcontractor Awareness Seminar (Level 1)

- Grading personnel, as well as grading and earthmoving equipment operators
- Irrigation system personnel (residence, commercial and industrial sites)
- Landscape personnel
- Utility personnel (excludes entities regulated by the PSC or FERC, and other entities listed in O.C.G.A. 12-7-17(10), if within a Common Development)
- Wastewater personnel installing on-site systems (includes septic tank excavation and drain fields)
- Well drilling personnel (includes directional boring equipment operators)
- Plumbers and electricians (will require certification if conducting a land disturbing activity within a permitted project site).
- Best management practice installation personnel
- Other personnel involved in land disturbing activities acting as a contractor or subcontractor

If you are working in a subcontractor capacity and possess a Level IA certification you are not required to take the Subcontractor Awareness Seminar.

If you are working in a subcontractor capacity and have attended a Level IA course but do not possess a Level IA certification, you will not be required to take the Subcontractor Awareness Seminar. However, you must complete a Subcontractor Awareness application and submit that along with a Proof of Attendance form to receive a Subcontractor card.

Fundamentals Course (Level IA)

- Primary/Secondary/Tertiary Permittees (depending on level of involvement)
- Builders
- Contractors
- Developers
- NPDES monitoring and sampling consultants
- Site superintendents
- Utility contractors (excludes entities regulated by the PSC or FERC, and other entities listed in O.C.G.A. 12-7-17(10), if within a Common Development)
- Others involved in land disturbing activities acting as a Primary, Secondary, or Tertiary Permittee

Advanced Fundamentals Course (Level IB)

- Primary/Secondary/Tertiary Permittees (depending on level of involvement)
- Regulatory enforcement inspectors (city and county staff)
- Non-regulatory personnel inspectors contracted for regulatory work (such as an environmental consultant to a city or county government)

Introduction to Design Course (Level II)

- Primary/Secondary/Tertiary Permittees (depending on level of involvement)
- Design professionals
- Plan reviewers (includes GSWCC and Natural Resources Conservation Service staff)

The ‘dependent on their level of involvement with the process’ phrase is not applicable to: a) minor land disturbing activities, since these activities are exempt under the Act as specified in Section 12-7-17(3); and b) sites under one acre of land disturbance and the land disturbance is more than 200 feet from State Waters, as specified in Section 12-7- 17(8). Therefore, a work crew/company/entity involved in a) or b), as described in the preceding sentence, does not need to have the education and training certification (E&TC) required by the Act. However, if the site is part of a larger “common development,” then the E&TC requirements will apply for an individual or entity at a site with less than one acre of land disturbance. Please note that the determination of whether an activity is minor land disturbing is made by the local issuing authority, or by EPD in areas where there is no local issuing authority.

In summary, it is important to consider "what are my job responsibilities," and if these responsibilities include involvement with land disturbing activities, then your attendance at one or more of these E&TC courses may be necessary. Georgia's E&TC program does not recognize reciprocity with any other state erosion and sedimentation education certification.

The Education and Training Certification Program is administered and implemented by the E&SC Education and Certification Program of the Georgia Soil and Water Conservation Commission, telephone (706) 542-1840. For additional information, access the Commission's website: www.gaswcc.org; click on Education/Certification.

For enforcement inquiries, EPD's Watershed Protection Branch can be reached at (404) 675-6240.

Attachment – Exemptions Table

EDUCATION AND TRAINING CERTIFICATION PROGRAM
FACT SHEET

EXEMPTIONS O.C.G.A § 12-7-17 EROSION AND SEDIMENTATION ACT	APPLICABLE EDUCATION AND TRAINING CERTIFICATION REQUIREMENTS
Surface mining, as the same is defined in Code Section 12-4-72.	All persons involved in the preparation of an ES&PC plan (Level II) and E&SC inspectors (Level IA) for any surface mining project which disturb one or more acres of land subject to the provisions of the state general permit (e.g., office buildings) must complete the appropriate certification course pursuant to Code Section 12-7- 19. Such land-disturbing activities and certification requirements are not regulated by the Local Issuing Authorities.
Granite quarrying and land clearing for such quarrying.	All persons involved in the preparation of an ES&PC plan (Level II) and E&SC inspectors (Level IA) for any granite quarrying project which disturb one or more acres of land subject to the provisions of the state general permit (e.g., office buildings) must complete the appropriate certification course pursuant to Code Section 12-7-19. Such land-disturbing activities and certification requirements are not regulated by the Local Issuing Authorities.
Such minor land-disturbing activities as home gardens and individual home landscaping, repairs, maintenance work, fences, and other related activities that may result in minor soil erosion.	Not Applicable Note: Minor land-disturbing activities are not defined in the state general permit; therefore, this exemption is not applicable to land-disturbing activities occurring within a project subject to the provisions of the state general permit.
Single-family residences, when such construction disturbs less than one acre and is not part of a common development with a planned disturbance equal to or greater than one acre; provided, however, that construction of any such residence shall conform to the minimum requirements in Code Section 12-7-6.	Not Applicable
Agricultural operations as defined in Code Section 1-3-3 to include those practices involving the establishment, cultivation, or harvesting of products of the field or orchard; the preparation and planting of pasture land; farm ponds, dairy operations, livestock and poultry management practices; and the construction of farm buildings.	All persons involved in the preparation of an ES&PC plan (Level II) and E&SC inspectors (Level IA) for any agricultural project which disturb one or more acres of land subject to the provisions of the state general permit (e.g., poultry houses, barns) must complete the appropriate certification course pursuant to Code Section 12-7- 19. Such land-disturbing activities and certification requirements are not regulated by the Local Issuing Authorities.
Forestry land management practices, including harvesting; provided, however, that when such exempt forestry practices result in land-disturbing activities otherwise prohibited in the buffer, as established in Code Section 12-7-6, no other land-disturbing activities, except for normal forest management practices, shall be allowed on the entire property for a period of three years after the completion of such forestry practices.	Not Applicable

Any project carried out under the technical supervision of the Natural Resources Conservation Service of the United States Department of Agriculture.	All persons involved in the preparation of an ES&PC plan (Level II) and E&SC inspectors (Level IA) for any NRCS project which disturb one or more acres of land subject to the provisions of the state general permit must complete the appropriate certification course pursuant to Code Section 12-7-19. Such land-disturbing activities and certification requirements are not regulated by the Local Issuing Authorities.
Any project involving less than one acre of disturbed area; provided that this exemption shall not apply to any land-disturbing activity within a common development with a planned disturbance equal to or greater than one acre or within 200 feet of the banks of any perennial state waters; provided, however, any such land-disturbing activity within 200 feet of the banks of any perennial state waters shall conform to the minimum requirements in Code Section 12- 7-6, and further, a land-disturbing activity permit will be required by the Local Issuing Authority.	All persons involved in the preparation of an ES&PC plan (Level II), construction contractors (Level IA), water quality monitors (Level IA) and E&SC inspectors (Level IA) for any such land-disturbing activity within 200 feet of the banks of any perennial state waters in jurisdictions where there is a certified Local Issuing Authority must complete the appropriate certification course pursuant to Code Section 12-7-19.
Construction or maintenance projects undertaken or financed in whole or part by the Department of Transportation, the Georgia Highway Authority, the State Road and Tollway Authority, or any county or municipality; provided, however, that any construction or maintenance projects which disturb one or more contiguous acres of land shall be subject to the provisions of the state general permit; in addition, the Department of Transportation, the Georgia Highway Authority, or the State Road and Tollway Authority shall conform to the minimum requirements in Code Section 12-7-6 if a secondary permittee for a project located within a common development.	All persons involved in the preparation of an ES&PC plan (Level II) and E&SC inspectors (Level IA) for any project subject to the provisions of the state general permit must complete the appropriate certification course pursuant to Code Section 12-7-19. The Local Issuing Authority shall enforce compliance with the minimum requirements set forth in Code Section 12-7-6 where the permittee is secondary permittee for a project located within a common development.
Any land-disturbing activities conducted by any public utility under the regulatory jurisdiction of the Public Service Commission or the Federal Energy Regulatory Commission, any cable system as defined in Code Section 36-18-1, or any agency of the United States engaged in the generation, transmission, or distribution of power; except where any public utility under the regulatory jurisdiction of the Public Service Commission or the Federal Energy Regulatory Commission, any cable system as defined in Code Section 36-18-1, or any agency of the United States engaged in the generation, transmission, or distribution of power is a secondary permittee for a project within a common development shall conform to the minimum requirements of Code Section 12-7-6.	All persons involved in the preparation of an ES&PC plan (Level II) and E&SC inspectors (Level IA) for any project subject to the provisions of the state general permit must complete the appropriate certification course pursuant to Code Section 12-7-19; except, for E&SC inspectors where the utility company and utility contractors are secondary or tertiary permittees performing only service line installations. The Local Issuing Authority shall enforce compliance with the minimum requirements set forth in Code Section 12-7-6 where the permittee is secondary permittee for a project located within a common development.
Public water system reservoirs.	All persons involved in the preparation of an ES&PC plan (Level II) and E&SC inspectors (Level IA) for any public water system reservoir project which disturb one or more acres of land subject to the provisions of the state general permit must complete the appropriate certification course pursuant to Code Section 12-7-19. Such land-disturbing activities and certification requirements are not regulated by the Local Issuing Authorities.

NOTES

Insert Tab Page:

Sample Forms

Site Inspection Report

Erosion and Sedimentation Inspection Report

Maintain Reports on-site

Site:	**Date:**	**Time:**
Inspector:	**Accompanied By:**	

Stage of Construction:

Site:

Observation:

Recommendations:

Contractors's Corrective Action (and Date):

Site:

Observation:

Recommendations:

Contractors's Corrective Action (and Date):

Storm Water Discharge Data

Site: _____ **LDA No.** _____

Date	Rainfall (in.)	Location	Reading (NTU)	Comments

Daily Rainfall Log

Project Name: _____

Project Location: _____

Month: _____ **Year:** _____

Type of Device Used to Measure Rainfall: _____

Device Location: _____

Daily Rainfall Monitoring Data

Date	Rainfall Amount, Inches	Time	Reported By

Stormwater Monitoring Records

Month_____:Year:_____ **Sheet _____ of _____**

Submit to EPD by 15th of Following Month

Project Name:_____ **Project Location:_____**

Date Sampled	Rainfall Amount, Inches	Exact Location of Samples	Time Sampled	Sampling Technique Manual or Automatic	Sampled By	Date Analysis	Time Analysis	Analyzed By	Analytical Method	Results (NTU)

Sample sheet for requirements under the EPD NPDES Construction Permit for sales between 1 and 250 acres

"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 persons directly responsible for gathering the information, the information is, to the best of my knowledge and belief, true, accurate, and complete.

I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

_____ _____

Signature Date

Inspection Summary

Site: LDA No.

Map Site	Violation	First Date	Date Corrected

Daily Inspection Report

Inspection performed by qualified personnel each day construction activity occurs on-site

Project Information	
Date:	Project Name:
Project Location:	
Inspection Observations	
Rainfall within past 24 hours (inches):	Is rainfall greater than .5”? Inspection Required ☐
Inspection Observations	
Petroleum Product Storage Areas: Are all of the temporary and permanent controls contained in Plan in place? ☐ Yes ☐ No If no, describe the location(s) of deficiencies and corrective actions that must be taken.	
Vehicle Entrances and Exits: Is there tracking of sediment from locations where vehicles enter and leave the project? ☐ Yes ☐ No If yes, describe the location(s) and the corrective actions that must be taken.	
Other Observations	
Is an Erosion, Sedimentation and Pollution Control Plan revision required? ☐ Yes ☐ No	Date of revision:
Corrective Actions and Date:	

Signature of Qualified Personnel

Printed Name of Qualified Personnel

Weekly Inspection Report

Inspection performed by qualified personnel at least once every seven calendar days and within 24 hours of the end of a storm that is 0.5 inches or greater

Project Information

Date:	Project Name:
Project Location:	
Name of Inspector:	

Inspection Event

Regular weekly inspection ☐	Inspection within 24 hours of 0.5” storm event ☐

Inspection Observations

Disturbed areas that have not undergone final stabilization:

Are all of the temporary and permanent controls contained in Plan in place and properly maintained? ☐ Yes ☐ No

If no, describe the location(s) of deficiencies and corrective actions that must be taken.

Corrective Action Taken and Date:

Material storage areas exposed to precipitation:

Are all of the temporary and permanent controls contained in Plan in place and properly maintained? ☐ Yes ☐ No

If no, describe the location(s) of deficiencies and corrective actions that must be taken.

Corrective Action Taken and Date:

Discharge locations or points.

Are erosion control measures preventing impacts to receiving waters? ☐ Yes ☐ No

If no, describe observations:

Structural control measures:

Are all of the temporary and permanent controls contained in Plan in place and properly maintained? ☐ Yes ☐ No

If no, describe the location(s) of deficiencies and corrective actions that must be taken.

Control Measures	Location	Deficiency	Date Corrected
Other observations:			

Is an Erosion, Sedimentation and Pollution Control Plan revision required? ☐ Yes ☐ No Date of revision:

Signature of Qualified Personnel

Printed Name of Qualified Personnel

Monthly Inspection Report

Inspection performed by qualified personnel at least once per month

Project Information	
Date:	Project Name:
Project Location:	
Inspection Observations	
Rainfall within past 24 hours (inches):	Is rainfall greater than .5”? Inspection Required ☐
Inspection Observations	

Areas that have undergone final stabilization:

Are all permanent stabilization controls contained in Plan in place? ☐ Yes ☐ No

If no, describe the location(s) of deficiencies and corrective actions that must be taken.

Other observations:

Are pollutants entering the drainage system or receiving waters? ☐ Yes ☐ No

If yes, describe the location(s) and the corrective actions that must be taken.

Are all erosion and sediment control measures operating properly? ☐ Yes ☐ No

If no, describe the location(s) and the corrective actions that must be taken.

Other Observations

Is an Erosion, Sedimentation and
Pollution Control Plan revision required? ☐ Yes ☐ No Date of revision:

Corrective Actions and Date:

Signature of Qualified Personnel

Printed Name of Qualified Personnel

Construction Checklist of "BMPs" And Minimum Requirements

Project Name: File No. _____

Inspection Date:_____ Time:_____ Inspected by: _____

Stage of Construction

___Pre-Construction Phase

___Construction Phase

___Building Phase

___Final Stabilization

Cd Check Dam

Minimum Requirement	Passed	Failed
CENTER: 9 inches lower than outer edges.		
SIDE SLOPES: 2.1 or flatter		
SPACING: Toe of upstream dam is at same elevation as the top of the downstream dam.		
GEOTEXTILE: Placed between the rock and its soil foundation.		
MAINTENANCE: Sediment removed when depth reaches 1/2 the original dam height. Dam removed and area stabilized when useful life has expired.		

Ch Channel Stabilization

Minimum Requirement	Passed	Failed
INSTALLATION: Channel lining installed immediately after grading and vegetate all bare areas.		
RIPRAP LINING: Graded to 1.5:1 or less. A filter blanket, at least 6" thick, of sand, gravel, and/or geotextile material should be between soil and riprap.		
OUTLET: Adequate outlet for free flow of water from flood plains into channel.		
CLEARING: Objectionable materials removed from channel. As many trees preserved, as possible.		
BUFFERS: Buffers preserved by clearing for spoil placement on one side of channel only. Buffers reestablished with appropriate vegetation.		
MAINTENANCE: Inspected periodically and necessary repairs made immediately.		

Co Construction Exit

Minimum Requirement	Passed	Failed
AGGREGATE SIZE: 1.5 to 3.5 inches		
PAD THICKNESS: 6-inch minimum.		
PAD WIDTH: 20 foot minimum.		
PAD LENGTH: 50 feet minimum.		
LOCATION: At all entrance/exit points.		
GEOTEXTILE: Placed full length and width of the entrance/exit.		
MAINTENANCE: Periodic top dressing with 1.5 to 3.5 inch stone as conditions demand.		

Cr Construction Road Stabilization

Minimum Requirement	Passed	Failed
AGGREGATE SIZE: 1.5 to 3.5 inches.		
PAD THICKNESS: 8-10-inches.		
PAD WIDTH: 14 feet minimum.		
MAINTENANCE: Periodic top dressing with 1.5 to 3.5 inch stone as conditions demand.		

Dc Stream Diversion Channel

Minimum Requirement	Passed	Failed
SIZE: Channel width should be a minimum of 6 feet with side slopes no steeper than 2:1.		
LINING: The liner should consist of Geotextile (Dc-B) or class I riprap (Dc-C).		
MAINTENANCE: Inspected daily for construction material positioning.		

Di Diversion

Minimum Requirement	Passed	Failed
SITE PREPARATION: Trees, brush, stumps and other objectionable material have been removed.		
FILLS: All fills compacted. Unneeded excavated material disposed of and stabilized. Ridge should be at least 10 feet wide. Add 10% to height for settlement.		
STABILIZATION: Channel outlets require adequate vegetation, riprap, or pavement.		
MAINTENANCE: Inspected frequently and after each rainfall with necessary repairs made immediately		

Dn Downstream Structure Dn2

Minimum Requirement	Passed	Failed
LOCATION: On undisturbed soil or well-compacted fill.		
OUTLET: Stabilized with rock riprap.		
PIPE: Heavy-duty flexible tubing staked at 10-foot intervals (Temporary Structure Dn1). Joints well- connected and watertight.		
MAINTENANCE: Checked after every rainfall with necessary repairs made promptly. Temporary structure removed when no longer needed. Exposed areas stabilized.		

Fr Filter Ring

Minimum Requirement	Passed	Failed
SIZE: At inlets with diameters less than 12 inches, the stone size should be 3-5 inches.		
SIZE: At inlets with diameters greater than 12 inches, the stone size should be 10-15 inches.		
HEIGHT: The filter ring should have a minimum height of 2 feet from grade.		
MAINTENANCE: The ring should be kept clear of trash and debris, and the sediment should be removed when one-half full.		

Ga Gabion

Minimum Requirement	Passed	Failed
DESIGN: Performed by a qualified professional familiar with the use of gabions.		
MAINTENANCE: Periodically inspected for signs of undercutting or excessive erosion.		

Gr Grade Stabilization Structure

Minimum Requirement	Passed	Failed
MATERIALS: Constructed of concrete, rock, masonry, steel, aluminum, or treated wood.		
OUTLET: Adequate, stable outlet for discharges.		
VEGETATION: On all disturbed areas immediately.		
Maintenance: Periodically inspected for signs of undercutting or excessive erosion.		

Lv Level Spreader

Minimum Requirement	Passed	Failed
GRADE: No greater than 1 % for the last 15 feet of the dike or diversion.		
LENGTH: Determined by plan preparer from estimated storm flow.		
OUTLET: Discharges onto an undisturbed stabilized area to create uniform sheet flow.		
MAINTENANCE: No blockages at point of discharge.		

Mb Erosion Control Matting and Blankets

Minimum Requirement	Passed	Failed
INSTALLATION: According to manufacturer's specifications.		
MAINTENANCE: check for slumping or failure of material.		

Rd Rock Filter Dam

Minimum Requirement	Passed	Failed
HEIGHT: Not higher than channel banks with dam center 6 inches lower than outer edges of dam.		
SIDE SLOPES: 2:1 or flatter.		
LOCATION: Located so that it will not cause flooding of upstream property. Minimum Requirement Passed Failed		
ROCK SIZE: Determined by the design criteria established in the riprap section (Appendix C) of the E&SC Manual.		
TOP WIDTH: Should be no less than 6 feet.		
MAINTENANCE: Sediment removed when it reaches a depth of 1/2 the original height of dam. Dam removed at completion of its useful life.		

Re Retaining Wall

Minimum Requirement	Passed	Failed
SPECIFIC DESIGN: Performed by capable design engineer or architect.		
MAINTENANCE: Periodically inspected for signs of undercutting or excessive erosion.		

Rt Retrofitting

Minimum Requirement	Passed	Failed
HEIGHT: 1/2 the height of the stormwater management structure.		
HALF-ROUND PIPE: Diameter should be 1.5 times the principal pipe outlet diameter.		
SLOTTED BOARD DAM: Posts minimum size of 4"x4". 0.5 to 1 inch spacing between boards.		
STONE SIZE: 3 to 4 inch stone.		
POND INLET: Sediment entry point should be at opposite end of basin from outlet. If not, baffles should be installed.		
MAINTENANCE: Trash and debris hindering drainage has been removed. Sediment removed when structure is 1/3 full. Structure removed when project is stabilized.		

Sd1 Sediment Barrier

Minimum Requirement	Passed	Failed
LOCATION: Intended for areas where sheet flow occurs. Not installed in areas of concentrated flow. Installed on contour.		
BRUSH: Windrowed on the contour and at the lower perimeter of site. Compacted, if necessary. Filter fabric added, if necessary, to increase efficiency.		
SILT FENCE: Verify fabric and post types. Entrenched 4-6" depending on fence type. Posts spaced at a maximum of 6'.		
HAYBALES: Embedded to a depth of 4". Secured with stakes or bars driven through bales.		
SAND BAGS: Flow between and beneath sandbags minimized. If height exceeds two (2) bags, staked with steel rods.		
MAINTENANCE: Sediment removed at 1/2 barrier capacity and disturbed area stabilized. Barrier removed at end of useful life.		

Sd2 Inlet Sediment Trap

Minimum Requirement	Passed	Failed
BLOCK: Blocks wrapped with fabric with #57 wash stone placed on front.		
GRAVEL: Minimum stone diameter of 3 inches on inlet side and #57 stone on opposite side at a thickness of 1 foot.		
FRAME AND FABRIC: Sturdy frame with fabric entrenched and pulled taut.		
MAINTENANCE: Sediment removed when 2/3 fence capacity is reached		

Sd3 Temporary Sediment Basin

Minimum Requirement	Passed	Failed
LOCATION: Not located in a live stream.		
PRINCIPAL SPILLWAY PIPE: Pipe extended beyond downstream toe of the fill. All pipe joints watertight.		
RISER: 1/2 inch perforations 3 inches apart covered with two feet of 1/2 to 3/4 inch stone. Trash rack installed.		
EMERGENCY SPILLWAY: installed in undisturbed soil. Minimum bottom width of 8 feet. Stabilized with vegetation, riprap, or concrete.		
MAINTENANCE: All damages to structure repaired before day's end. Sediment removed when storage capacity has been reduced by 1/3.		

Sr Temporary Stream Crossing

Minimum Requirement	Passed	Failed
SIZE: Large enough to convey the full bank flow of the stream without appreciably altering the stream flow characteristics.		
OVERFLOW PROTECTION: Elevated crossings, crown fills over pipes, diversions or dikes.		
MAINTENANCE: Inspected after every rainfall or at least once a week with repairs made immediately.		

St Storm Drain Outlet Protection

Minimum Requirement	Passed	Failed
ALIGNMENT: Contains no bends and aligns with receiving channel.		
SUBGRADE: Constructed on 0.0% grade. Invert and outlet at same elevation as bottom of receiving channel. Compacted fill required.		
FILTER: Gravel filter or geotextile installed between riprap and subgrade. Gravel filter should be properly graded and geotextiles installed in accordance with manufacturer's recommendations .		
MINIMUM DIMENSIONS: Thickness = 3x's max. rock diameter; Width = 3x's outlet pipe diameter; Length = 6x's outlet pipe diameter.		
MAINTENANCE: inspect riprap outlet structures for any dislodged stones causing erosion. Repairs made immediately.		

Sr Surface Roughening

Minimum Requirement	Passed	Failed
SLOPES STEEPER THAN 3:1: Roughened by either stair-step grading, grooving, furrowing, or tracking. Areas to be mowed should have small furrows only.		
SLOPES FLATTER THAN 3:1: Soils loosened to a depth of 2 to 4 inches.		
STAIR-STEPPING: Stair-steps should have maximum width of 40"-50" and a maximum depth of 30"-40".		
GROOVING: Installed by equipment operating on the contour (across the slope). Maximum top width of 12"-15" and minimum depth of 3 inches for grooves.		
TRACKING: Tracked equipment operated up and down slope. Heavy clay soils may not track well.		
VEGETATION: Seed, mulch, lime, and fertilizer applied immediately after roughening.		

Tp Topsoiling

Minimum Requirement	Passed	Failed
STRIPPING: Confined to the immediate construction area. Only friable, loamy topsoil stripped. Objectionable rock and roots removed.		
STOCKPILES: Vegetated and mulched and located in areas not obstructing natural drainage.		
SPREADING: Areas prepared by tilling or scarifying. Lime and fertilizer added as required. Topsoil handled when it is not too wet. A 5 inch depth of loose soil is desirable.		
VEGETATION: Vegetation and mulch applied immediately.		

Wt Vegetated Waterway

Minimum Requirement	Passed	Failed
CHANNEL: Free of all trees, rocks, brush, and other debris. Shaped to desired cross-section. Protected from erosion during establishment by diversions, geotextiles, etc.		
FILL MATERIAL: Compacted. Excess fill material disposed of in a suitable manner and vegetated.		
VEGETATION: Seed, mulch, lime and fertilizer applied immediately.		

Bf Buffer Zone

Minimum Requirement	Passed	Failed
WIDTH: Minimum of 25 feet on all state waters; 50 feet on streams designated as “Trout Waters” unless variance is obtained. See Law for specifics.		
MAINTENANCE: Buffers protected from equipment encroachment. Sediment removed when effectiveness is lost.		

Cs Coastal Dune Stabilization

Minimum Requirement	Passed	Failed
LOCATION: 100 feet from mean high tide line.		
POSTS: Minimum length of 7' with minimum diameter of three inches; slats spaced approximately 1 1/4 inches apart.		
SPACING: Two or more parallel 4-foot high fences spaced from 30 to 40 feet apart.		
PLACEMENT: 30-foot sections of fence installed perpendicular to the prevailing winds.		
VEGETATION: Installed immediately following dune development. Mulch applied and irrigated, if necessary.		
PRESERVATION: Dunes protected from human and vehicular traffic.		

Ds1 Disturbed Area Stabilization
(With Mulching Only)

Minimum Requirement	Passed	Failed
SOIL PREPARATION: Loosed to a depth of 3", if possible.		
ANCHORING: Mulch anchored with a “packer disk” or with an emulsifier.		
EMULSIFIER MIXTURE: 100 gallons of emulsifier per ton of mulch. MATERIALS AND RELATED DEPTHS: Straw or hay - 2" to 4" depth. Pine needles - 4" to 6" depth. Wood chips, sawdust - 2" to 3" depth. Shredded leaves - 2" to 3" depth.		
COMMERCIAL MATTING OR NETTING: Followed manufacturer’s specifications.		

Ds2 Disturbed Area Stabilization
(With Temporary Seeding)

Minimum Requirement	Passed	Failed
SEEDBED PREPARATION: Soil should be loose and friable.		
LIME AND FERTILIZER: Fertilizer may be needed when low fertility conditions exist (500-700 pounds of 10-10-10 per acre).		
SEEDING: Vegetation selected is suitable to the area and season of the year.		
GERMINATION: Tag on bag should be checked and a simple germination test should preclude plantings.		
MULCH: Placed after seeding to retain moisture and protect seed.		

Ds3 Disturbed Area Stabilization
(With Permanent Vegetation)

Minimum Requirement	Passed	Failed
SEEDBED PREPARATION: Needed when the soil has been sealed from crusting or when conventional seeding is used.		
LIME AND FERTILIZER: Rates of 1-2 tons of lime per acre with fertilizer rates following Field Manual recommendations.		
SEEDING: Refer to appropriate planting tables. Companion crops may be required for areas needing quick cover.		
INOCULANTS: All legume seed should be inoculated and careful attention given to its handling.		
MULCH: Dry straw applied at a rate of 2 tons per acre, and dry hay at a rate of 2 1/2 tons per acre. 75% of soil surface covered.		
MULCH ANCHORING: 100 gallons emulsified asphalt per ton of mulch, “packer disk,” or synthetic netting.		
MOWING: 6" minimum height maintained.		
FUTURE FERTILIZER RATES: Refer to the Manual for second year fertilizer rates.		

Ds4 Disturbed Area Stabilization
(With Sodding)

Minimum Requirement	Passed	Failed
SURFACE: Surface at final grade. Surface clear of trash and other objects larger than 1 inch.		
INSTALLATION: Sod applied to soil surface only (not to frozen or gravel-type soils). Certified sod cut used within 36 hours.		
LIME AND FERTILIZER: Based on soil test. Applied according to recommendations.		
ANCHORING: Anchored with pins if slopes are steeper than 3:1.		
IRRIGATION: Rainfall supplemented with irrigation, if necessary.		

Du Dust Control

Minimum Requirement	Passed	Failed
METHODS: Mulch, vegetation or tackifiers applied or surface sprayed with water until it is thoroughly wet.		

Sb Streambank Stabilization
(Using Permanent Vegetation)

Minimum Requirement	Passed	Failed
DESIGN: Designed and installed by professionals familiar with process.		
MATERIALS: None used that could be poisonous to fish and aquatic life (i.e. asphalt, wood treated with creosote)		
RUNOFF: Intensive runoff diverted from the area being treated.		
SIDE SLOPE: 2:1 or flatter. Refer to Guidelines for recommended slope lengths.		
WORK SEQUENCE: Work starts upstream at a stable point along the bank.		
STAKE HEALTH: Cut with a saw. Planted same day as prepared. Buds upward. Split, stripped, and mushroomed cuttings replaced.		
STAKE INSTALLATION: Begins at water's edge and works up the bank.		
VEGETATION: Native trees and shrubs. Failures fixed at once with structural materials or new plants, mulching if necessary.		
INSPECTION: Checked regularly for wash-outs, undercutting, unhealthy vegetation, especially after heavy rains. Make necessary repairs immediately.		

Tb Tackifiers and Binders

Minimum Requirement	Passed	Failed
SPECIFICATIONS: Tackifiers and Binders are used to anchor wood cellulose, wood pulp fiber, and other mulch materials applied with hydroseeding equipment.		

ACTIONS TAKEN

___ Verbal Warning Issued Date: _____

___ Stop Work Order Issued Date: _____

___ Citation Issued Date: _____

Comments: _____

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Luke Crosson, Metering Technician
Breon Wright, Metering Technician
Keith Kimbrel, Metering Technician
Susan Dockery, Metering Technician
Jeffery L. Moore, Irrigation Specialist
Vacant, Irrigation Specialist
Bryant Hughley, Irrigation Tech
Vacant, Data Entry Clerk
229-995-6001 FAX: 229-995-5605

03/1/07

Georgia Soil and Water Conservation Commission
Erosion and Sediment Control Contact Information

State Headquarters
4310 Lexington Rd
PO Box 8024
Athens, GA 30603
(706) 542-3065

E&SC Education and Certification Program
PO Box 1665
Athens, GA 30603
(706) 542-1840
certification@gaswcc.org

Region 1
700 East 2nd Ave, Suite J
Rome, GA 30161-3359
(706) 295-6131

Region 2
PO Box 8024
Athens, GA 30603
(706) 542-9233

Region 3
1500 Klondike Road, Suite A109
Conyers, GA 30094
(770)- 761-3020

Region 4
3014 Heritage Road, Suite 1
Milledgeville, GA 31061
(478) 445-5766

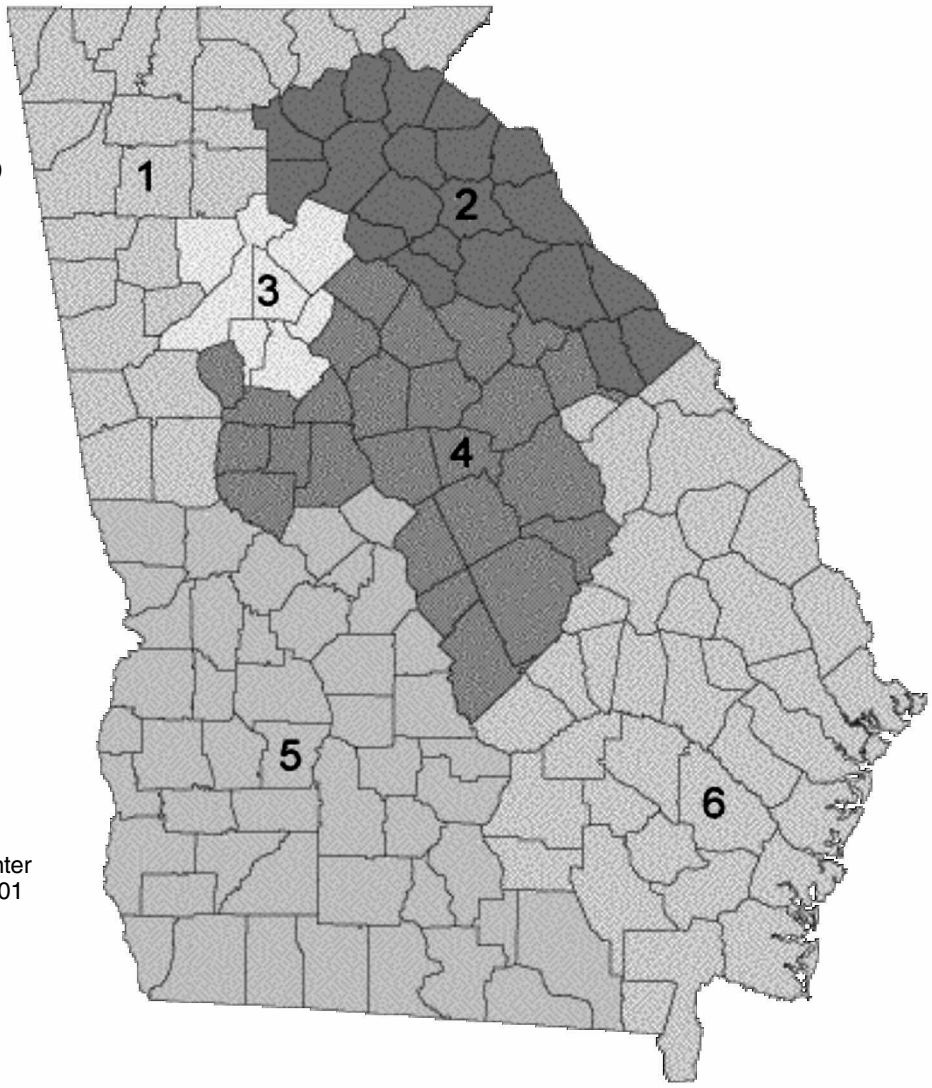
Covington/Newton County
1113 Usher Street
Covington, GA 64147
(478) 934-7299

Region 5
4344 Albany Highway
Dawson, GA 39842
(229) 995-6001

Region 6
151 Langston Chapel Road
Suite 700
Statesboro, GA30459
(912) 681-5241

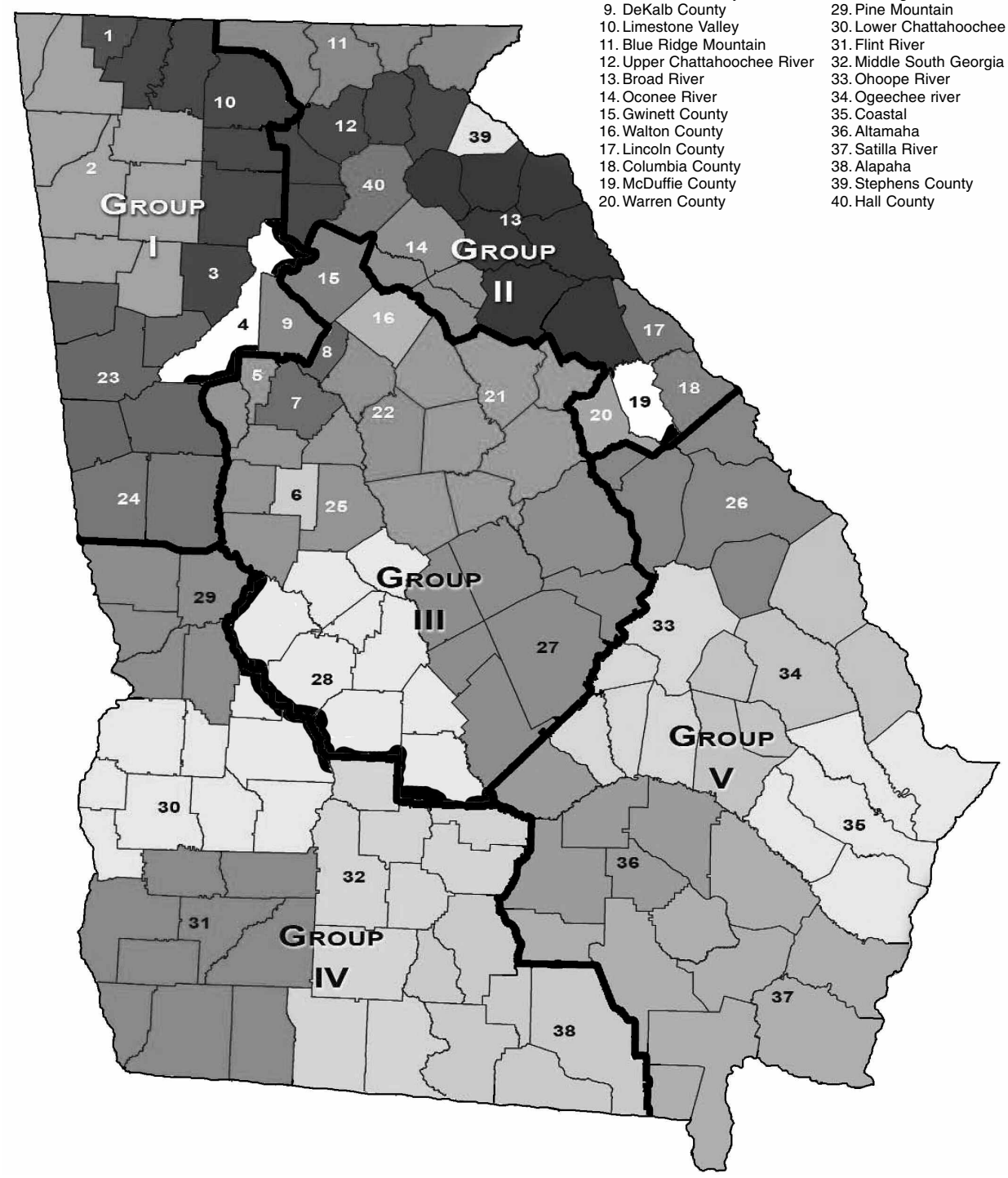
Coastal District Office
Jack Kingston Conservation Center
185 Richmond Davis Dr, Suite 201
Richmond Hill, GA 31324
(912) 459-2350

Brunswick/Jesup
3661 Altama Ave
Brunswick, GA 31520
(912) 265-8043



Conservation Districts
Georgia Soil and Water Conservation Commission

1. Catoosa County
2. Coosa River
3. Cobb County
4. Fulton County
5. Clayton County
6. Lamar County
7. Henry County
8. Rockdale County
9. DeKalb County
10. Limestone Valley
11. Blue Ridge Mountain
12. Upper Chattahoochee River
13. Broad River
14. Oconee River
15. Gwinett County
16. Walton County
17. Lincoln County
18. Columbia County
19. McDuffie County
20. Warren County
21. Piedmont
22. Upper Ocmulgee River
23. West Georgia
24. Roosevelt
25. Tawaliga
26. Brier Creek
37. Central Georgia
28. Ocmulgee River
29. Pine Mountain
30. Lower Chattahoochee River
31. Flint River
32. Middle South Georgia
33. Ohoope River
34. Ogeechee river
35. Coastal
36. Altamaha
37. Satilla River
38. Alapaha
39. Stephens County
40. Hall County



Key NRCS Staff in Georgia

State Public Affairs Specialist -
Mary Ann McQuinn
Phone: 706 546-2069
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E-mail:mary.mcquinn@ga.usda.gov

Assistant State Conservationist for Programs -
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Assistant State Conservationist for Operations -
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State Resource Conservationist - Vacant
Phone: 706 546-2009
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Water Resources Team Leader -
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State Conservation Engineer -
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Soil Sciences/NRI Team Leader -
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E-mail:edward.ealy@ga.usda.gov

State Administrative Officer -
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Plant Materials Team Leader -
Don Surrency
Phone: 706 595-1339
Fax: 706 595-5025
E-mail:don.surrency@ga.usda.gov

*****Complete directory available online at**
www.ga.nrcs.usda.gov

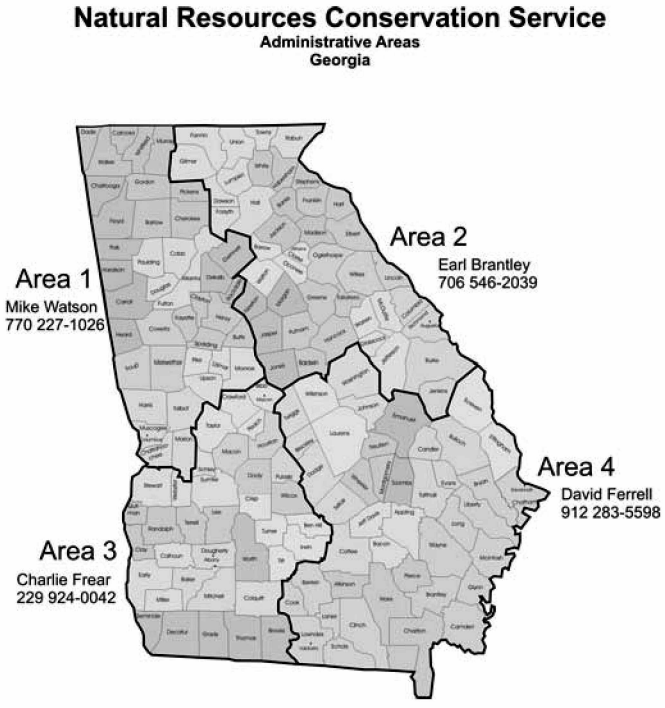
Georgia NRCS Administrative Areas

Area 1 - Griffin
Assistant State Conservationist for Field Operations - Michael Watson
Phone: 770 227-1026 Fax: 770 227-1511
E-mail: michael.watson@ga.usda.gov

Area 2 - Athens
Assistant State Conservationist for Field Operations - Earl Brantley
Phone: 706 546-2039 Fax: 706 546-2253
E-mail: earl.brantley@ga.usda.gov

Area 3 - Americus
Assistant State Conservationist for Field Operations - Charlie Frear
Phone: 229 924-0042 Fax: 229 924-0013
E-mail: charlie.frear@ga.usda.gov

Area 4 - Waycross
Assistant State Conservationist for Field Operations - David Ferrell
Phone: 912 283-5598 Fax: 912 283-8648
E-mail: david.ferrell@ga.usda.gov



Program Coordination Branch (continued)

ENVIRONMENTAL MANAGEMENT DISTRICTS

Mountain District	Atlanta	(404) 362-2671	Mountain District	Cartersville	(770) 387-4900
Northeast District	Athens	(706) 369-6376	Southwest District	Albany	(229) 430-4144
West Central District	Macon	(478) 751-6612	East Central District	Augusta	(706) 792-7744
Coastal District	Brunswick	(912) 264-7284	Coastal District	Savannah	(912) 353-3225

Revised February 2007

Georgia Department of Transportation

6/1/2007

Name	Room #	Phone Number	Fax Number	Office
Commissioner and Special Staff				
Harold Linnenkohl	102	(404) 656-5206	(404) 657-8389	Commissioner
Buddy Gratton, P.E.	108	(404) 656-5212	(404) 657-0193	Deputy Commissioner
David Studstill	122	(404) 656-5277	(404)463-7991	Chief Engineer
Kim Cameron	102	(404) 656-5206	(404) 657-8389	Confidential Assistant to Commissioner
Mike Dover	104	(404) 656-5206	(404) 657-8389	Executive Assistant to the Commissioner
Glenn S. Bowman		(404) 651-8355	(404) 463-7911	Executive Assistant to the Chief Engineer
Karlene Barron	315	(404) 463-6464	(404) 656-6927	Communications Administrator
Mike Malcom		(770) 785-6947	(770) 785-6955	Statewide Equipment Management; (7565 Honeycreek Ct., Lithonia, GA 30058)
Mike Johnson	270	(404) 656-5260	(404) 657-5792	Personnel Director
Terry Gable	201	(404) 656-5185	(404) 657-3300	State Aid Administrator
Brian Summers 2	66	(404) 656-6843	(404) 463-6131	Project Review Engineer
Leigh Priestley		(404) 463-1049	(404) 463-3045	Bureau of Environmental Compliance
Elizabeth Osmon	106	(404) 656-5211	(404) 657-0193	DOT Board Secretary
Treasurer				
Earl Mahfuz	148	(404) 656-5224	(404) 463-6026	Treasurer
Chris Jones	416-D	404-463-5468		Executive Assistant to the Treasurer
Dave Carmichael		(404) 699-4483	(404) 699-448	6Air Transportation Administrator; (4175 S. Airport Rd., Atlanta 30336)
Beryl Renfroe	301	(404) 656-5598	(404) 657-4278	Trans. Accts. Adm. - Audits
Chip Meeks	143	(404) 463-6029		Office of General Support Adm.
Jim Davis		(404) 656-5181	(404) 657-5193	Strategic Development Administrator 276 Memorial Dr. Atlanta, GA 30303
Administration Division				
Meg Pirkle	143	(404) 656-5239		Administration Director
Angela Robinson	150	(404) 656-5237	(404) 463-6026	Budget Administrator
Dawn Maddox	169	(404) 656-5566	(404) 657-0174	Trans. Accts. Adm - General Accounting
Jamie Simpson	170	(404) 463-2799		Financial Management Adm.
Construction Division				
Greg Mayo	134	(404) 656-5207	(404) 657-5810	Director of Construction
David Hoge	223	(404) 656-5325	(404) 651-6540	State Trans. Office Eng. - Contract Adm.
Matthew Cline	209	(404) 656-2106	(404) 656-9726	Trans. Eng. Adm. - Construction Claims
Georgene Geary		(404) 363-7512	(404) 363-7684	State Materials & Research Adm.; (15 Kennedy Dr., Forest Park 30297)
Randall Lee Hart	237	(404) 656-5306	(404) 657-0783	State Construction Engineer
EEO Division				
Michael Cooper	142	(404) 656-5323	(404) 656-5509	Director of E.E.O.
John Kirkpatrick	142	(404) 463-4280	(404) 656-5509	E.E.O. Asst. Administrator
Patricia Flowers	142	(404) 656-1710	(404) 656-5509	DBE Asst. Administrator

Field Districts Division

Russell McMurry		(770) 532-5526	(770) 532-5542	District #1/Gainesville (District Engineer)
Mike Thomas		(478) 552-4601	(478) 552-4677	District #2/Tennille (District Engineer)
Thomas Howell, P.E.		(706) 646-6500	(706)646-6584	District #3/Thomaston (District Engineer)
Joe Sheffield		(229) 386-3280	(229) 386-3612	District #4/Tifton (District Engineer)
Glenn Durrence		(912) 427-5711	(912) 427-5763	District #5/Jesup (District Engineer)
Kent L. Sager		(770) 387-3602	(770) 387-3653	District #6/Cartersville (District Engineer)
Bryant Poole		(770) 986-1001	(770) 986-1016	District #7/Chamblee (District Engineer)

Information Technology Division

Jeffery Hill	180	(404) 656-6034	(404) 651-7163	Director of Information Technology
Gary Blanton	179	(404) 656-6034	(404) 651-7163	Office of Infrastructure Administrator
Doug Chambers	West Annex	(404) 463-2860 ext. 103	(404) 463-2898	Office of I.T. Applications Administrator (276 Memorial Drive, Atlanta, Ga. 30303)
Tony Williams	183	(404) 656-6034	(404) 651-7163	Office of IT Business Practices

Legal Services Division

Sandra Burgess	333	(404) 657-5808	(404) 657-4781	Director of Legal Services
Kenneth Thompson	329	(404) 657-5806	(404) 657-4781	Legal Services Administrator

Operations Division

Steve Henry	TMC	(404) 635-8043	(404) 635-8001	Director of Operations (TMC--935 Confederate Ave. 30316)
David Crim	TMC	(404) 635-8734	(404) 635-8172	State Maintenance Engineer
Jeff Baker	TMC	(404) 635-8045	(404) 635-8066	State Utilities Engineer
Keith Golden	TMC	(404) 635-8038	(404) 635-8037	State Traffic Operations Engineer
TMC/General Information	TMC	(404) 624-1300	(404) 635-8001	(TMC--935 Confederate Ave. 30316)
Keith Golden	TMC	(404) 635-8115	(404) 635-8116	State Traffic Safety & Design Engineer
Kathleen Gibson	TMC	(404) 635-8176	(404) 635-8166 (1-800-570-5428)	Oversize Permit Unit Administrator

Planning, Data & Intermodal Development Division

Gerald Ross	127	(404) 656-0610	(404) 656-0584	Director of Planning, Data and Intermodal
Angela Alexander	372	(404) 656-5411	(404) 657-5228	State Transportation Planning Adm.
Vacant	West Annex	(404) 651-9200	(404) 657-4221	Intermodal Programs Administrator;
Jane Smith	North Annex	(770) 986-1360	(770) 986-1139	State Transportation Data Administrator North Annex - Chamblee

Pre-Construction Division

Todd Long	129	(404) 656-5187	(404) 656-0584	Director of Preconstruction
Brent Story	444	(404) 656-5386	(404) 657-0653	State Road and Airport Design Engineer
Ben Buchan	356	(404) 656-5436	(404) 657-7921	State Urban Design Engineer
Paul Liles	258	(404) 656-5280	(404) 651-7076	State Bridge and Structural Design Engineer
Harvey Keepler		(404) 699-4401	(404) 699-4440	State Environmental/Location Engineer; (3993 Aviation Circle, Atlanta 30336)
Phil Copeland	409	(404) 656-5372	(404) 657-8482	State Right of Way Administrator
Babs Abubakari	433	(404) 463-6133	(404) 463-6136	State Consultant Design Engineer

Georgia Forestry Commission

Georgia Forestry Commission
5645 Riggins Mill Road
Dry Branch, Georgia 31020

P. O. Box 819
Macon, Georgia 31202-0819

478-751-3500
1-800-GA-TREES (428-7337)
Fax: 478-751-3465

Georgia Forestry Commission
Human Resources Department
6835 James B. Rivers/Memorial Drive
Stone Mountain, GA 30083
678-476-6220
Fax: (678) 476-6230

Forestry Departments

Communications	(478) 751-3530	Email: Kassie Odum
Forest Fire Protection • County Rangers	(478) 751-3488	Email: Carol Layton
Forest Management • County Foresters • Forest Health & Water Quality Foresters	(478) 751-3485	Email: Bonny Adams
Forest Marketing	(706) 867-2899	Email: Nathan McClure
Seedlings - Reforestation	(478) 751-3520	Email: Russ Pohl
Sustainable Community Forestry Program (SCFP) • Urban & Community Forestry Grant • SCFP Foresters	(706) 542-6880 (678) 476-6226	Email: Sherrie Gabriel Email: Joan Scales

State Managed Forests and Nursery

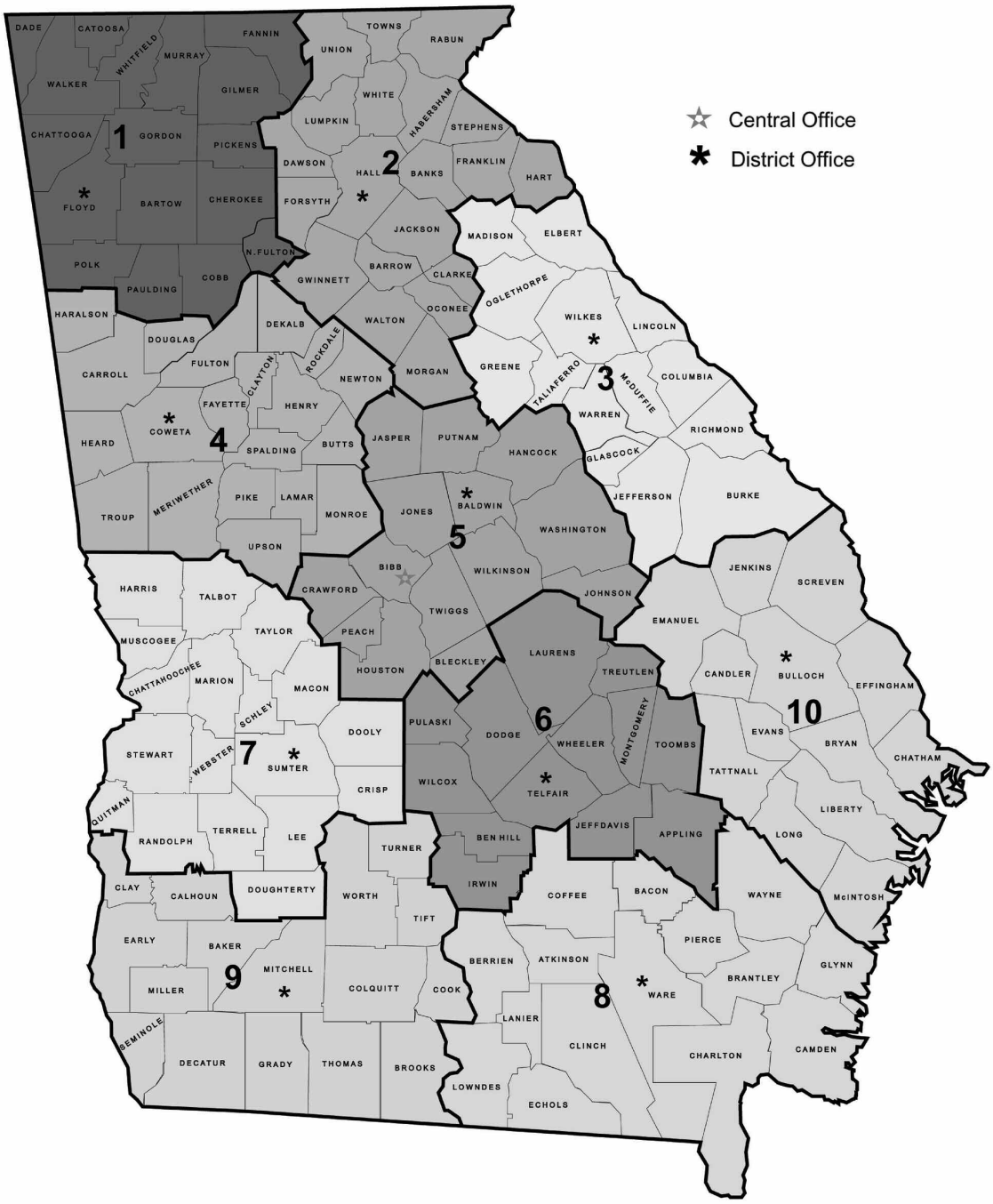
Baldwin State Forest	(478) 445-5164	
Bartram Educational Forest	(478) 445-2119	Email: Bartram
Brender-Hitchiti Forest	(478) 986-3914	
Dawson Forest	(706) 265-3707	Email: Tony Page
Dixon Memorial State Forest	(912) 287-6612	Email: Joe Wall
Flint River Nursery	(229) 268-7308	
Hightower Educational Forest	(706) 216-6073	Email: Hightower
Paulding Forest	(706) 265-3707	Email: Tony Page
Spirit Creek Educational Forest	(706) 790-2351	Email: Spirit Creek

District Offices

Rome 3086 Martha Berry Hwy NE Rome GA 30165	706-295-6021/6022 706-295-6921	Forester: lkelley@gfc.state.ga.us Ranger: tfloyd@gfc.state.ga.us Secretary: scumming@gfc.state.ga.us
Gainesville 3005 Atlanta Hwy Gainesville GA 30507	770-531-6043/6048 770-531-4080	Forester: kmasten@gfc.state.ga.us Ranger: salexander@gfc.state.ga.us Secretary: jthomas@gfc.state.ga.us
Washington 1465 Tignall Rd Washington GA 30673	706-678-2015 706-678-1766	Forester: chargrove@gfc.state.ga.us Ranger: mmunns@gfc.state.ga.us Secretary: atreadwell@gfc.state.ga.us
Newnan 187 Corinth Rd Newnan GA 30263	770-254-7218 770-254-7371	Forester: jsibley@gfc.state.ga.us Ranger: wboston@gfc.state.ga.us Secretary: greid@gfc.state.ga.us
Milledgeville 119 Hwy 49 Milledgeville GA 31061	478-445-5164/5548 478-445-2897	Forester: tclymer@gfc.state.ga.us Ranger: gwilliams@gfc.state.ga.us Secretary: trsemmler@gfc.state.ga.us
McRae Route 1 Box 67 Helena GA 31037	229-868-3385 229-868-3387	Forester: ldefee@gfc.state.ga.us Ranger: jlassiter@gfc.state.ga.us Secretary: bsteele@gfc.state.gfc.us
Americus 243 US Hwy 19 North Americus GA 31709	229-931-2436/2437 229-931-2762	Forester: cpritchett@gfc.state.ga.us Ranger: jconner@gfc.state.ga.us Secretary: pkennedy@gfc.state.ga.us
Waycross 5003 Jacksonville Hwy Waycross GA 31503	912-287-4915 912-284-2911	Forester: bwynn@gfc.state.ga.us Ranger: fsorrells@gfc.state.ga.us Secretary: jkent@gfc.state.ga.us
Camilla 3561 Hwy 112 Camilla GA 31730	229-522-3580/3581 229-522-3583	Forester: gfindley@gfc.state.ga.us Ranger: fsumner@gfc.state.ga.us Secretary: ljohnson@gfc.state.ga.us
Statesboro 18899 US Hwy 301 North Statesboro GA 30461	912-681-0490/0496 912-871-1719	Forester: wfell@gfc.state.ga.us Ranger: vowens@gfc.state.ga.u Secretary: njones@gfc.state.ga.us

5645 Riggins Mill Road
Dry Branch, GA 31020
1-800-GA-TREES (428-7337)
www.gatrees.org

Districts



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