Overview of Section 3

3.0

Section 3 is oriented toward the Design Engineer of the GESC Plan and addresses Step 4 in the GESC Permit Process:

Step 4. Prepare a GESC Plan following the 10 Elements of an Effective GESC Plan, Design and Sizing Criteria for BMPs, GESC Drawing Requirements, and GESC Report Requirements.

*Section 3.1, **Principles of Erosion and Sedimentation**, recommends addressing erosion near its start and employing sediment control BMPs to reduce downstream damages.*

*Section 3.2, **BMPS to Address Erosion and Sediment**, identifies a number of standard BMPs accepted for use in Douglas County to control erosion and sediment on construction sites.*

> ***Section Highlight – Standard BMP Drawings***
> *A set of GESC Plan Standard Notes and Details, included in Appendix B, has been prepared to establish a consistent approach to BMP implementation in the County. These shall be attached to each GESC Drawing set.*

*Section 3.3, **10 Elements of an Effective GESC Plan**, presents a systematic approach to select BMPs for a GESC Plan. The 10 Elements are described in Sections 3.4 through 3.13.*

> ***Section Highlight – 10 Elements of an Effective GESC Plan***
> *These 10 elements provide Design Engineers with a step-by-step approach for selecting BMPs to include on a GESC Plan.*

*Section 3.14, **Special Requirements for Residential Projects**, discusses street acceptance requirements for detached single-family residential projects and how street acceptance plans and acceptance relates to the GESC Permit Process.*

*Section 3.15, **Special Requirements for Utility Construction**, describes erosion and sediment control requirements for utility construction.*

*Section 3.16, **Special Requirements for Temporary Batch Plants**, describes erosion and sediment control BMPS to use for Temporary Batch Plants.*

*Section 3.17, **Design and Sizing Criteria for BMPs**, identifies the design parameters to be specified for each BMP on the GESC Plan and provides criteria for sizing BMPs.*

*Sections 3.18, 3.19 and 3.20, **Standard GESC Drawing Requirements, Report Requirements, and Submittal Requirements for Related Plans**, list detailed information to include on the various GESC documents. A checklist of requirements is included in Appendix G.*

> ***Section Highlight – Example GESC Drawings***
> *Several example sets of GESC Drawings (Appendix C) have been prepared to illustrate the selection and depiction of erosion and sediment control BMPs.*

*Section 3.21, **BMP Cost Issues**, Cost issues associated with the installation and maintenance of BMPs are discussed.*

*Section 3.22, **Variances**, provides guidance for requesting variances to the criteria presented in the GESC Manual.*

Permit Step 4. Prepare a GESC Plan following the 10 Elements of an Effective GESC Plan, Design and Sizing Criteria for BMPS, GESC Drawing Requirements, and GESC Report Requirements.
Sections 3.1 through 3.21 discuss Step 4.

Principles of Erosion and Sedimentation

3.1

The reduction of erosion and the capture of sediment are necessary to reduce the loss of soil on a construction site and minimize off-site impacts. In order to understand how BMPs can be used to control construction site erosion, it is helpful to gain an understanding of erosion and sedimentation processes. The following information was based on principles discussed in *Volume 3*.

Once vegetation is removed, erosion proceeds unchecked.

3.1.1 Erosion. Soil erosion is the process by which the land surface is worn away by the action of wind, water, ice and gravity. Erosion is a natural process and has occurred since the earth was formed. The shape of the land was created, in large part, by the erosion process. The problem comes when the natural rate of erosion is greatly increased by construction activities that disturb the land. Construction disturbs the natural soil and vegetation and increases erosion because bare, loose soil is easily moved by wind and water.

Water-caused erosion starts small, when rain hits the ground, and grows progressively greater as the runoff moves downhill. Erosion follows a definite progression, as follows:

1. ***Raindrop*** *erosion leads to* ***sheet*** *erosion.*
2. ***Sheet*** *erosion leads to* ***rill*** *erosion.*
3. ***Rill*** *erosion leads to* ***gully*** *erosion.*
4. ***Gully*** *erosion leads to* ***channel*** *erosion.*

Raindrop Erosion. Raindrops detach soil particles and splash them into the air. These detached particles are then vulnerable to stormwater runoff or snowmelt.

Raindrop erosion.

Sheet erosion.

Sheet Erosion. Shallow surface flows move as a uniform sheet for a short distance, transporting soil dislodged from raindrop erosion, exposing weaknesses in the soil structure, and starting to concentrate in tiny surface irregularities, forming rivulets.

Principles of Erosion and Sedimentation, continued

Rill Erosion. As the flow changes from a shallow sheet to a concentrated flow, the velocity and turbulence of the flow increases. The energy of the concentrated flow is able to detach and transport soil particles. This action begins to cut into the soil mantle and form tiny channels. Rills are small, but well-defined channels that are only a few inches deep.

Rill erosion.

Gully erosion.

Gully Erosion. Gullies occur as the flows in rills come together into larger and larger channels. Whereas rill erosion can be eliminated or repaired fairly easily, gully erosion requires major work to regrade and stabilize.

Channel erosion.

Channel Erosion. As runoff in rills and gullies continues to move downstream, it enters channels that are also susceptible to erosion through bank cutting and degradation. Channels continually adjust and change, degrading and widening, in response to increased runoff from urbanization.

Controlling erosion at its early stages is the most effective way to manage construction site erosion and sedimentation. Therefore, an effective GESC Plan will focus on the following:

- Controlling erosion potential by limiting the area and duration of disturbance.
- Requiring timely restabilization of disturbed areas.
- Providing an adequate drainage network throughout the site in all stages of construction to ensure that stormwater runoff has a defined place to go.
- Designing all drainage conveyances, from small swales to larger drainage channels, to be noneroding and stable.

Vegetation plays an extremely important role in controlling erosion. Roots bind particles together and the leaves or blades of grass reduce raindrop impact forces on the soil. Grass, leaves, plant litter and other ground cover trap rain, which allows infiltration and reduces runoff velocity. Vegetation reduces wind velocity at the ground surface, and provides a rougher surface, which will trap particles moving along the ground. Once vegetation is removed, erosion proceeds unchecked.

Sheet, rill and gully erosion develop quickly in the absence of vegetation.

Principles of Erosion and Sedimentation, continued

3.1.2 Sedimentation. Once soil particles are picked up and moved by wind or water, they eventually come to rest, often in undesirable locations. This is the process of *sedimentation*. During a rainstorm, runoff normally builds up rapidly to a peak and then diminishes. Because the amount of sediment a watercourse can carry is dependent upon the velocity and volume of runoff, sediment is deposited as runoff decreases. The deposited sediments may be resuspended when future runoff events occur. In this way, sediments are moved progressively downstream in the waterway system.

The burden of cleaning up deposited sediments can be substantial.

Sediment that accumulates in water quality ponds need to be cleaned-out periodically, requiring significant effort and cost.

Sedimentation can cause property damage and increase drainage maintenance costs, impair habitat and water quality in downstream receiving waters, and accelerate eutrophication and loss of storage in lakes and reservoirs.

Even with a focus on reducing erosion at its start, no plan will be 100% effective; therefore, GESC Plans must also identify a number of measures designed to capture eroded sediments prior to their conveyance off site.

Sedimentation can impair aquatic habitat in downstream receiving waters.

BMPs to Address Erosion and Sediment

3.2

The *GESC Manual* describes a number of Standard BMPs acceptable to Douglas County for use in reducing erosion and sediment from construction activities. These BMPs are shown in Table 3-1.

Table 3-1. Erosion and Sediment Control BMPs

No.	BMP	ID	Type of Control	Initial Stage	Interim Stage	Final Stage
1	Check Dam	CD	Sediment			
2	Compost Blanket	CB	Erosion			
3	Compost Filter Berm	CFB	Erosion			
4	Concrete Washout Area	CWA	Construction			
5	Construction Fence	CF	Construction			
6	Construction Markers	CM	Construction			
7	Dewatering	DW	Sediment			
8	Diversion Ditch	DD	Erosion			
9	Erosion Control Blanket	ECB	Erosion			
10	Inlet Protection	IP	Sediment			
11	Reinforced Check Dam	RCD	Sediment			
12	Reinforced Rock Berm	RRB	Sediment			
13	RRB for Culvert Protection	RRC	Sediment			
14	Sediment Basin	SB	Sediment			
15	Sediment Control Log	SCL	Sediment			
16	Sediment Trap	ST	Sediment			
17	Seeding and Mulching	SM	Erosion			
18	Silt Fence	SF	Sediment			
19	Stabilized Staging Area	SSA	Erosion			
20	Surface Roughening	SR	Erosion			
21	Temporary Slope Drain	TSD	Erosion			
22	Temporary Stream Crossing	TSC	Erosion			
23	Terracing	TER	Erosion			
24	Vehicle Tracking control	VTC	Sediment			
25	VTC with Wheel Wash	WW	Sediment			

BMPs to Address Erosion and Sediment, continued

Seeding and mulching (SM) *reduces erosion and is considered an erosion control.*

A sediment control log (SCL) *captures eroded sediments and is considered a sediment control BMP.*

All BMPs shall be indicated in the GESC Plans as being part of the Initial Stage, Interim Stage or Final Stage of construction.

3.2.1 Standard Detail Number and Identifier. The number indicated in the first column of Table 3-1 corresponds to the number of the standard construction detail shown in Douglas County's standard drawings, entitled GESC Plan Standard Notes and Details, included in Appendix B. To take less space on the drawing, BMPs are called out on a GESC Drawing using the two or three letter identifier and symbol shown in the BMP Legend.

3.2.2 Type of Control. Three general types of BMPs are shown:

- Construction Control. These BMPs are related to construction access and staging.
- Erosion Control. These BMPs are used to limit the amount and extent of erosion.
- Sediment Control. Sediment control BMPs are designed to capture eroded sediments prior to their conveyance off site.

3.2.3 Phase of Construction. The BMPs listed apply to one or more of the following construction phases. All BMPs shall be indicated in the GESC Drawings as being part of the Initial Stage, Interim Stage or Final Stage of construction. This is to help clarify when each BMP is to be installed.

- Initial Stage. These BMPs shall be installed at the outset of construction, prior to the initial Preconstruction Meeting and any other land-disturbing activities. Initial controls are to be placed on existing grades, but shall be based in part on proposed grading operations.
- Interim Stage. These BMPs shall be based on proposed grades and drainage features and are installed after initial site grading. For some BMPs such as Inlet Protection, interim controls are installed after the construction of site infrastructure.
- Final Stage. BMPs shown in the Final Stage GESC Drawing shall be installed as one of the last steps in the construction process, such as final seeding and mulching.

3.2.4 GESC Drawings are to Use the Standard BMPs. When preparing GESC Drawings, the Design Engineer shall use the standard BMPs shown in Table 3-1. These BMPs have shown to be effective under actual construction site conditions within Douglas County and therefore are accepted for use by Douglas County. A complete set of details for these accepted BMPs (the Douglas County GESC Plan Standard Notes and Details - see Appendix B), has been prepared to illustrate the BMPs shown in Table 3-1.

The Douglas County GESC Plan Standard Notes and Details provide Permittee(s) with comprehensive installation and maintenance information for all of the BMPs accepted for use in the County.

BMPs to Address Erosion and Sediment, continued

The GESC Drawings submitted to the County for final signatures and subsequently provided to the Contractor as construction drawings shall include a set of the GESC Plan Standard Notes and Details. **Other details shall not be used.** The complete set of BMP details is discussed further in Section 3.2.6.

If Douglas County approves additional BMPs in the future (see Section 3.2.5), documentation of the additional BMPs will be made available on the Douglas County website.

3.2.5 Use of Alternative or Innovative BMPs. Public Works Engineering recognizes that there will be new advances in the development of erosion and sediment control BMPs that may prove effective, or even out-perform controls currently accepted. Douglas County may allow, under strictly-controlled circumstances, the installation of erosion and sediment control BMPs other than the standard BMPs shown in Table 3-1. These shall be considered pilot programs.

A pilot program will be considered upon demonstration by the Design Engineer of adequate evidence that shows the proposed control measure will effectively control erosion and sediment. Complete plans and details for the proper installation and maintenance of the proposed BMP shall also be submitted. The pilot program, if allowed, shall be undertaken for no more than 12 months. If Douglas County finds the BMP to be effective at the end of the testing period, a revision to the *GESC Manual* may be considered.

The use of alternative or innovative erosion or sediment control BMPs other than those already accepted for use by Douglas County (shown in Table 3-1) may be allowed under the terms of the pilot program described in this section.

Douglas County reserves the right to reject any BMP proposed for the pilot program, either during the review period or during the field trial, if the pilot BMP does not perform with sufficient effectiveness. In the case of an unsuccessful field trial, one or more of the Douglas County Standard BMPs listed in Table 3-1 shall replace the failed pilot BMP at the Owner's expense.

3.2.6 GESC Plan Standard Notes and Details. As discussed in Section 3.2.4, the Douglas County GESC Plan Standard Notes and Details has been prepared to depict the BMPs shown in Table 3-1. Construction details and notes provide direction to the Permittee(s) regarding installation and maintenance requirements for each BMP. The Douglas County Standard Notes and Details shall be submitted with **all** GESC Drawings. A reduced copy of these Standard Drawings is included in Appendix B.

BMPs to Address Erosion and Sediment, continued

The GESC Plan Standard Notes and Details comprise minimum measures to be adhered to on a construction site. The Permittee(s) and Design Engineer may select more conservative approaches than indicated herein and exceed minimum criteria.

The Douglas County GESC Plan Standard Notes and Details serve several purposes:

- ***Increased consistency.*** *Consistent details and notes for a standard set of BMPs will increase the likelihood that BMPs will function effectively and will be installed and maintained correctly.*
- ***Time savings.*** *The set of standard drawings will save Design Engineers the effort associated with developing and drawing their own notes and details. Less time will be needed to review plans and inspect the BMPs, and as field personnel gain experience constructing the standard BMPs, it is anticipated that installation and maintenance will become more efficient.*
- ***Definition of sizing variables.*** *The standard details identify the critical variables that the Design Engineer must specify on the GESC Plan to locate and size the BMPs. This will reduce the likelihood that information needed on the plans will be missing or unclear, or that BMPs are improperly sized.*

3.2.7 Selecting BMPs for the GESC Drawings. Section 3.3 introduces a 10 step approach for developing a GESC Plan. Guidance is provided for selecting standard BMPs for specific portions of a construction site. It is important to consider effectiveness and maintenance requirements when selecting BMPs. Some BMPs, such as Silt Fence, are relatively inexpensive to install the first time, but may be tougher to maintain or not as effective as other BMPs.

The goal of GESC Plan Standard Notes and Details is to avoid the prevalence of improper BMP installations and insufficient maintenance.

10 Elements of an Effective GESC Plan

3.3

This section describes a systematic approach to control erosion and sediment on a construction site. 10 Elements of an Effective GESC Plan are summarized; Douglas County requires that each of these elements be addressed in a GESC Plan.

10 Elements of an Effective GESC Plan:

1. *Preserve and Stabilize Drainageways.*
2. *Avoid the Clearing and Grading of Sensitive Areas.*
3. *Balance Earthwork On-Site.*
4. *Limit the Size of Grading Phases to Reduce Soil Exposure.*
5. *Stabilize Exposed Soils in a Timely Manner.*
6. *Implement Effective Perimeter Controls.*
7. *Use Sediment Basins for Areas Exceeding 1.0 Acre.*
8. *Protect Steep Slopes.*
9. *Protect Inlets, Storm Sewers and Culverts.*
10. *Provide Access and General Construction Controls.*

Information

The example GESC Drawings shown in Appendix C are provided as a guide but, since each site is different, are not to be considered all-inclusive.

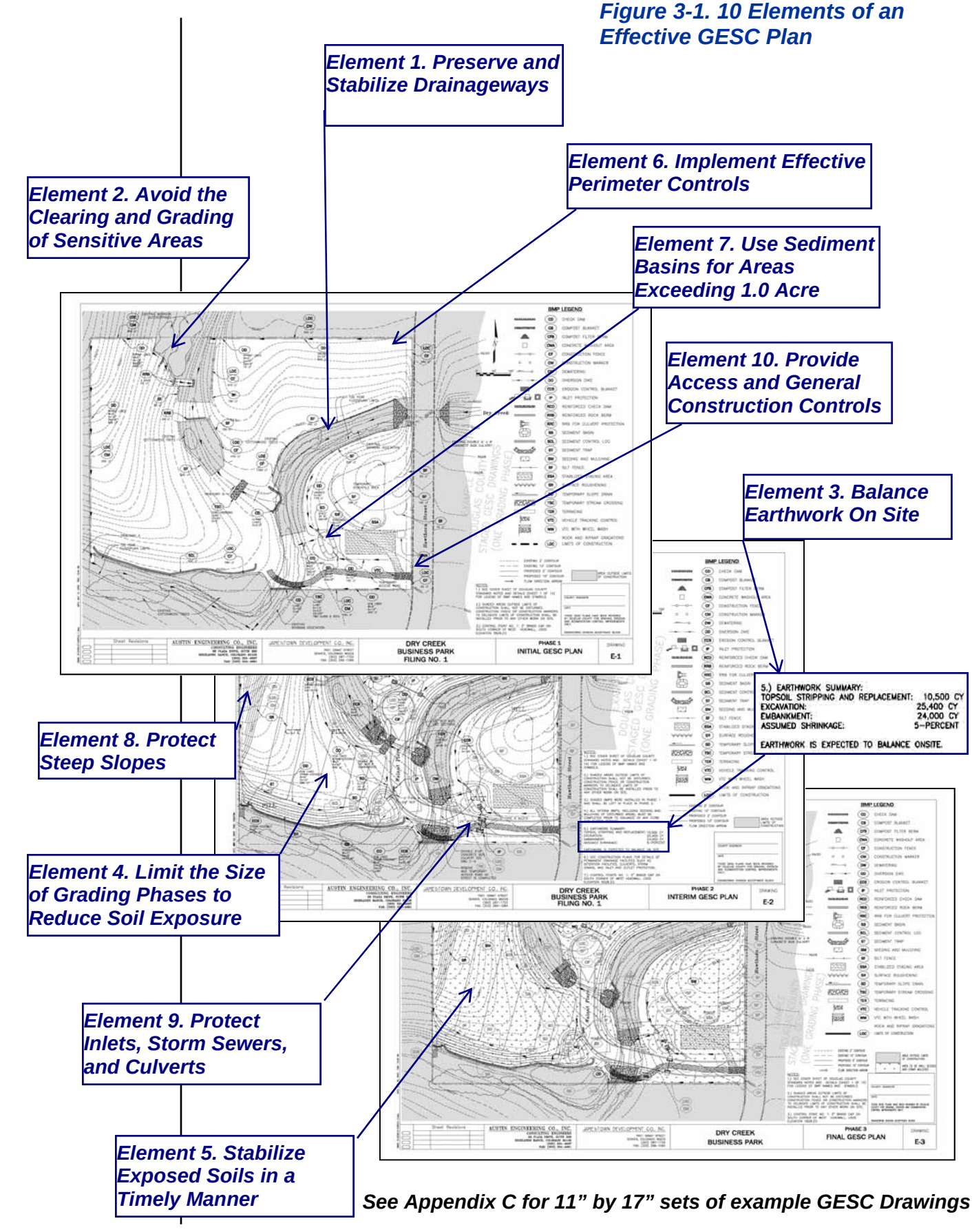
These 10 Elements are based in part on work published by the Center for Watershed Protection, a nonprofit group specializing in stormwater quality research and education. The 10 Elements are designed to reduce the amount and duration of erosion and trap most sediment that does erode prior to leaving the site.

A set of example GESC Drawings (shown in Appendix C) have been prepared in accordance with the 10 Elements to illustrate the concepts discussed herein and depict the information that shall be shown on GESC Drawings. Figure 3-1 relates the 10 Elements to the example GESC Drawings.

The following information has been included in the GESC Manual to assist the Design Engineer in developing an effective GESC Plan:

- *Sections 3.4 through 3.13 describe the 10 Elements of an Effective GESC Plan that shall be addressed when preparing a GESC Plan.*
- *Section 3.17 addresses design and sizing information for each of the County's Standard BMPs and describes the dimensions and parameters that shall be specified on the GESC Drawings.*
- *Sections 3.18 and 3.19 describe information that shall be provided in the GESC Drawings and Report.*
- *Appendix B contains a copy of the Douglas County GESC Plan Standard Notes and Details that shall be attached to all construction drawings.*
- *Appendix C provides example GESC Drawings for each type of GESC Plan.*
- *Appendix D provides a detailed checklist that shall be followed when developing a GESC Plan.*

Figure 3-1. 10 Elements of an Effective GESC Plan



See Appendix C for 11" by 17" sets of example GESC Drawings

Element 1. Preserve and Stabilize Drainageways

3.4

Work in drainageways requires special care and attention. Drainageway corridors comprise an important natural resource with habitat, open space, and aesthetic value. Since drainageways also function to convey stormwater runoff, they are susceptible to damage from the erosive forces of water,

Existing drainageway corridors offer valuable habitat, vegetation, and aesthetics, and shall not be filled in, regraded, or realigned without the approval of Douglas County.

especially if they are disturbed. It is critical that construction activities be designed to reduce any adverse impacts to drainageways and that County, State, and Federal permitting processes be complied with (see Sections 2.5, 2.6, and 2.7 respectively).

3.4.1 Drainageways Shall Not be Filled, Regraded, or Realigned.

Existing drainageways shall not be filled within the limits of the 100 year floodplain or the existing top of banks of incised channels, whichever is more restrictive, without the approval of Douglas County. If riparian vegetation, desirable habitat, or other stream resources exist beyond the limits of the 100 year floodplain, consideration shall be given to avoiding impacts to those areas as well. Existing drainageways shall not be regraded or realigned without the approval of the County. Physical barriers, such as fencing, shall be required to limit access into stream corridors. Perimeter sediment controls, discussed in Section 3.9.2, shall be implemented to protect drainageways.

Important!

Existing drainageways shall not be filled wtihin the limits of the 100 year floodplain or the existing top of banks of incised channels, whichever is more restrictive, without the approval of Douglas County. Existing drainageways shall not be regraded or realigned without the approval of the County.

All existing drainageways on the site shall be delineated on GESC Drawings to the limit of their 100 year floodplains (based on future development peak

Element 1. Preserve and Stabilize Drainageways, continued

discharges). All 100 year floodplains shall be shown if the floodplain information exists or will be developed as a part of the overall project. Limits of Construction shall be clearly shown on a GESC Drawings to indicate the exact limits of grading adjacent to a drainageway.

3.4.2 Ample Freeboard Above the 100 year Floodplain Shall be Provided. Floodplain elevations can rise over time due to the following:

Grade control structures, increased roughness from wetland vegetation, and aggradation can raise floodplain elevations. Therefore, ample freeboard shall be provided at the outset of development.

- Increased baseflows and runoff from development can promote increased growth of wetland and riparian vegetation, making drainageways hydraulically rough and leading to higher flow depths.
- Stream stabilization work can raise the bed of the drainageway at the crests of drop structures and flatten the channel slope, leading to higher flow depths.
- Upstream bank erosion or watershed erosion, flatter slopes, or increased channel vegetation can lead to sediment deposition and channel aggradation, raising the streambed and floodplain elevations.

All of these conditions are generally healthy and positive, since they slow flow velocities, improve stream stability, and enhance water quality through sediment trapping. For these conditions to occur over time without jeopardizing properties during floods, ample freeboard must be provided at the outset of development. Freeboard over the future development 100 year water surface elevation should be in accordance with the *Drainage Manual*, as amended.

Freeboard over the future development 100 year water surface elevation must be provided as outlined in the Drainage Manual, as amended.

3.4.3 Existing Drainageways Shall be Stabilized. It may be impossible, or undesirable, to avoid all construction in an existing drainageway. Most natural channels cannot be left alone in their predevelopment condition. Increased runoff from development can shift the natural balance of a stream over time, tending toward degradation and bank erosion as the stream tries to flatten its grade.

Element 1. Preserve and Stabilize Drainageways, continued

Drop structures and other grade control features are usually necessary to reduce the channel slope to future equilibrium conditions and to control flow velocity. Bank or toe protection may also be necessary to reinforce weak, unstable channel banks. Grade control structures and other channel stabilization improvements shall be designed according to the criteria shown in the *Drainage Manual,* as amended. **Under no circumstances shall broken up concrete or asphalt be used for bank stabilization.**

Stream stabilization improvements shall limit disturbance and retain a natural character.

3.4.4 Disturbance to Existing Drainageways Shall be Minimized and Quickly Restored. In addition to the construction of grade control and bank stabilization improvements, there may be other unavoidable instances where construction must occur in existing drainageways. Examples include bridges and culverts for road crossings, utility crossings, storm sewer outfalls, and temporary stream crossings for construction access. However, it is critical that construction disturbance within drainageways be minimized and quickly restored.

When construction within a drainageway is unavoidable, the Design Engineer shall delineate construction limits that restrict activities to the smallest area possible. **Construction Fence (CF)** or **Construction Markers (CM)** shall be indicated on the GESC Drawing to indicate the allowable limits of disturbance along all stream corridors to be preserved, and around any other preservation zones

Construction Fence (CF) *consists of orange plastic fencing material, or other Douglas County approved material, attached to support posts and used to limit access to the construction site.*

If disturbance to a drainageway is significant, such that excessive amounts of sediment may be transported downstream, a **Check Dam (CD)**, reinforced or nonreinforced, shall be installed immediately downstream of the disturbed area in the drainageway. If several areas of disturbance are located in close

Element 1. Preserve and Stabilize Drainageways, continued

Important!

What about straw bales?

Straw bales are not an accepted sediment control BMP for GESC Permitted projects in the County; the track record for effective long-term performance of straw bales in the County has not been strong.

proximity, 1 Check Dam at the downstream end of the construction area may be appropriate (in general, BMPs shall be configured to control erosion and trap sediment outside of the limits of drainageways to enable Check Dams to be used infrequently). Sizing criteria for Check Dams is provided in Section 3.17.1.

*A **Check Dam (CD)** is a small rock dam, designed to withstand overtopping, that is placed in a stream or drainageway. The purpose of the check dam is to trap water-borne sediment in the backwater zone upstream of the check.*

Crossing drainageways with construction equipment requires a **Temporary Stream Crossing (TSC)**. Temporary Stream Crossings shall be installed as approved by the County.

As soon as possible after construction of facilities in drainageways, or after removal of a Temporary Stream Crossing, all disturbed areas within

*A **Temporary Stream Crossing (TSC)** consists of rock layer placed temporarily in a stream to allow construction equipment to cross. A stream crossing may include culverts or provide a low-water crossing or ford.*

streams and drainage channels shall be topsoiled, seeded and mulched, and unless otherwise approved, protected with **Erosion Control Blanket (ECB)**. Additional plantings, such as willows or other riparian species, shall be considered to enhance channel stability, habitat, and aesthetics. Erosion Control Blanket shall be required for the disturbed channel bed and banks and all slopes steeper than 4:1. The Design Engineer shall indicate approximate limits of Erosion Control Blanket on the GESC Drawing.

***Erosion Control Blanket (ECB)** is a fibrous blanket of straw, jute, coconut or excelsior material trenched in and staked down over prepared, seeded soil. The blanket reduces both wind and water erosion and helps to establish vegetation.*

These limits shall extend to the top of the banks. Additional design information for Erosion Control Blanket is provided in Section 3.17.7.

Element 1. Preserve and Stabilize Drainageways, continued

3.4.5 Any New Drainageway Shall be Designed and Stabilized. Even after existing drainageways are identified and preserved, new development projects usually require an additional network of small drainageways, swales and storm sewer facilities. During grading operations, prior to the construction of storm sewer facilities, additional temporary ditches or dikes may be necessary to control site stormwater runoff.

Permanent drainageways and swales shall be designed and stabilized in accordance with the Drainage Manual, as amended.

Upgradient properties will generate runoff that may need to be intercepted and conveyed through the site in drainageways that don't necessarily correspond to existing stream channels. Off-site flows shall be conveyed through the site in stable drainageways. Off-site flow impacts the layout of perimeter drainage facilities and starts to set the location and size of the on site drainage network.

Permanent drainage facilities, including roadside ditches, shall be designed and stabilized according to the Douglas County *Drainage Manual,* as amended.

Temporary Diversion Ditches may be necessary at upslope and downslope perimeters, at the top of steep slopes, and downstream of slope drains. Diversion Ditches shall be sized and stabilized according to the criteria shown herein for a **Diversion Ditch (DD)**. Sections 3.9.2 and 3.11.2 provide specific guidance for locating Diversion Ditches.

*A **Diversion Ditch (DD)** is a small earth channel used to divert and convey runoff. Depending on slope, the diversion swale may need to be lined with erosion control matting, plastic (for temporary installations only), or riprap*

Element 2 Avoid the Clearing and Grading of Sensitive Areas

3.5

In addition to drainageways, other sensitive resources may exist on a site. These could include:

- Protected habitat for threatened or endangered species.
- Wetlands.
- Nesting bird habitat.
- Riparian corridors.
- Forested areas.
- Mature cottonwood stands.
- Bedrock outcroppings.
- Steep slopes.
- Potential stormwater infiltration areas.
- Historic, cultural, or archeological resources.
- Areas of unique or pristine vegetation, habitat, or landform.

Disturbance to sensitive resource areas shall be avoided or minimized.

A resource inventory should be conducted for the site and include any sensitive areas such as those listed above. The location, aerial extent, and type of resource, including stream floodplains as discussed in Section 3.4, shall be shown on the Initial GESC Drawing.

Disturbance to sensitive resource areas shall be avoided or minimized. Destroying or disturbing wetlands, nesting bird habitat, and protected habitat for threatened or endangered species is sharply restricted; these restrictions shall be addressed through the appropriate Federal or State agency permitting process.

A Design Engineer can go farther than preserving critical resource areas; other open space areas can be left undisturbed and exempt from clearing and grading operations. The technique of mapping out areas of the site that can be left undisturbed, termed “fingerprinting”, can reduce grading costs and contribute to the ultimate value of the development. The GESC Drawings shall clearly show Limits of Construction and shall call out **Construction Fence (CF)** or other approved means to protect resources that are to be preserved.

Element 3. Balance Earthwork on Site

3.6

A common design task for almost all construction projects is the development of a proposed grading plan. Proposed contours shall be shown to provide for new roadways, building sites, and drainage features on the Interim and Final GESC Drawings. To reduce impacts on County roadways, development projects are required to balance earthwork quantities on site. This takes effort on the part of the Design Engineer to develop a grading plan, check earthwork quantities, and raise or lower portions of the site as necessary to

Element 3. Balance Earthwork on Site, continued

achieve a balance between cut and fill material. This process will generally require several iterations, each time refining critical site slopes and design grades. The balance requirement can be waived if a specific project is required in order to comply with the Douglas County Master Plan, as amended.

In the event that it is impractical to balance earthwork quantities, a variance shall be requested during the review of the GESC Drawings (see Section 3.22). The variance shall address the following, at a minimum:

- Reason for variance.
- Amount of material to be imported or exported.
- Location of disposal site if export or source site if import.
- GESC Permit numbers for disposal or source sites.
- Detailed haul route plan and traffic control plan for haul route.
- Type and number of trucks required to complete import or export.

If the variance is accepted, GESC Drawings shall be prepared for the import or export site in accordance with the *GESC Manual* and additional Fiscal Security may be required.

Element 4. Limit the Size of Grading Phases to Reduce Soil Exposure

3.7

For sites where the total disturbed area will exceed 40 acres, grading

Design Requirements for Phased Grading

1. *Determine if the site exceeds "threshold" size of 40 acres (70 acres for soil mitigation operations).*
2. *Clearly identify sequence of construction of each phase and entire project on drawings. Phasing sequence for GESC Plan shall match the phasing from the Subdivision Improvements Agreement (SIA), and Site Improvement Plan Improvements Agreement (SIPIA) which serve as the guides by which individual portions of the subdivision will be initially accepted and released from conveyance and building permit restrictions. Careful consideration should be given when developing the SIA and Street Acceptance Plans, since the developer will have to adhere to the Plan through construction. Phasing of the subdivision improvements and lots shall be such that the streets and lots to be accepted are accessible from a street that has already been accepted by Douglas County. Additional information on Initial Close-out Acceptance is provided in Section 6.2.*
3. *Balance earthwork within each phase, if possible. If not possible, area of grading plus stockpiles and/or borrow areas must not exceed 40 acres (70 acres for soil mitigation operations) per grading phase.*
4. *Carefully locate temporary stockpiles and staging areas in each phase to prevent additional soil disturbance.*
5. *Accommodate water/sewer and other utility construction within each phase.*
6. *Incorporate road segments, temporary turn-arounds, and emergency access within each phase.*
7. *When feasible segregate temporary construction access in each phase from access for permanent residents.*
8. *Show both the temporary and permanent stormwater management facilities in each phase.*
9. *Develop Initial, Interim and Final GESC Drawings for each phase.*
10. *Ensure that the GESC Plan for later upstream phases address potential impacts to already completed downstream phases of the construction site.*

Element 4. Limit the Size of Grading Phases to Reduce Soil Exposure, continued

operations shall not take place all at one time. Instead, the site shall be divided into separate grading phases each disturbing 40 acres or less. If overexcavation, stockpiling, and replacement of soils is necessary for mitigating expansive soils or addressing similar issues, each phase may disturb up to a maximum of 70 acres, as approved by Douglas County. During construction, each grading phase shall be accepted by the Erosion Control Inspector prior to starting work on the next phase. Drill seeding and crimp mulching shall be completed within 14 days of the Erosion Control Inspector's acceptance of the phase or a Stop Work Order shall be issued (see Section 5.10.3).

Information

Phased GESC Plans shall be configured to be consistent with SIA phasing, including Street Acceptance Plans, See Section 3.14 for additional Information

Phased grading operations shall be configured to match the phasing of the Subdivision Improvements Agreement (SIA) for detached single-family residential projects. This includes ensuring that the GESC Drawing phases are consistent with Street Acceptance Plans. Street Acceptance Plans are discussed further in Section 3.14. The Design Engineer must also consider how to balance earthwork in each phase to end up with the final overall grading phases desired.

Element 5. Stabilize Exposed Soils in a Timely Manner

3.8

All areas disturbed by construction shall be stabilized as soon as possible to reduce the duration of soil exposure and the potential amount of erosion. Unless otherwise approved, Douglas County requires that disturbed areas be Drill Seeded and Crimp Mulched, or permanently landscaped within 14 days of the substantial completion of grading and top soiling operations. Topsoil stripping, stockpiling, and re-spreading in areas to be vegetated shall be a mandatory practice called for in all GESC Drawings. Adequate "footprints" for topsoil stockpiles shall be shown assuming stockpile slopes are no steeper than 3 to 1.

Important!

Topsoil Preservation.

Topsoil stripping, stockpiling, and re-spreading in areas to be vegetated shall be a mandatory practice called for in all GESC Plans. Adequate "footprints" for topsoil stockpiles shall be shown within the limits of construction, assuming stockpile slopes are no steeper than 3 to 1.

Erosion control blanket protecting a slope.

The BMPs applicable to stabilizing exposed soils consist of **Surface Roughening (SR), Seeding and Mulching (SM), Erosion Control Blanket (ECB), and Compost Blanket (CB)**. Descriptions and photographs for Surface Roughening, Seeding and Mulching, and Compost Blanket are shown below; Erosion Control Blanket was shown in Section 3.4.4. Design information for Erosion Control Blanket is provided in Section 3.17.7. Surface Roughening shall be shown for all disturbed areas. Drill Seeding and Crimp Mulching shall be shown for all areas that shall not be paved, sodded, landscaped or otherwise

Surface Roughening (SR) *consists of creating a series of grooves or furrows on the contour in all disturbed, graded areas to trap rainfall and reduce the formation of rill and gully erosion.*

Element 5. Stabilize Exposed Soils in a Timely Manner, continued

stabilized in an approved manner.

***Seeding and Mulching (SM)** consists of drill seeding disturbed areas with grasses and crimping in straw mulch to provide immediate protection against raindrop and wind erosion and, as the grass cover becomes established, to provide long-term stabilization of exposed soils.*

Compost Blanket has performed favorably in field trials in Douglas County. This County-accepted BMP can be considered as an alternative to Erosion Control Blanket and crimp mulch for stabilizing exposed soils (see Section 3.17.2).

***Compost Blanket (CB)** consists of a layer of Class I Compost spread over prepared, seeded topsoil in non-concentrated flow areas to protect exposed soil against raindrop and wind erosion and to provide an organic soil amendment to promote the establishment of vegetation.*

Element 6. Implement Effective Perimeter Controls

3.9

3.9.1 Upslope Perimeters. If the upstream off-site area is developed, runoff will most likely enter the site at one or more discrete outfalls; drainage facilities shall be sized and stabilized to convey off-site runoff through the site (see Section 3.4 for design guidance for streams and drainage channels). The Design Engineer should consider the need for a **Construction Fence (CF)** to discourage public entry to the site during construction (see Section 3.4.4 for a description and photograph of construction fence).

If the upstream off-site area is currently undeveloped, runoff may enter the site in a defined natural channel or via sheet flow (or both). Runoff in existing channels shall be conveyed through the site in a stabilized stream or drainage channel (see Section 3.4). Runoff entering the site via sheet flow may need to be captured in a **Diversion Ditch (DD)** based on upstream topography and directed to a stream or drainage channel (see Section 3.4.5 for a description and photograph of a Diversion Ditch). Diversion Ditches that have mild slopes may be unlined, whereas steeper ditches and rundowns must be lined with Erosion Control Blanket (for moderate slopes), plastic (temporary installations only), or riprap.

A **Temporary Slope Drain (TSD)** shall be used to convey runoff down a channel bank or slope to the bottom of a drainageway. When Diversion Ditches intersect a slope or channel bank, a Temporary Slope Drain, consisting of pipe, plastic, or riprap, shall be required to convey diverted water from the Diversion Ditch down the slope or channel bank.

*A **Temporary Slope Drain (TSD)** is a small culvert or plastic liner to convey runoff down a slope or channel bank to reduce the occurrence of rill and gully erosion.*

Element 6. Implement Effective Perimeter Controls, continued

3.9.2 Downslope Perimeters. Downslope perimeter BMPs apply to the downslope perimeters of construction disturbance perimeters along drainageways, and downslope perimeters adjacent to other areas to be left undisturbed. Sediment controls shall be located as close to the source of erosion as possible, on the downslope side of any disturbed area.

If the upstream disturbed drainage area exceeds 1.0 acre, a **Diversion Ditch (DD)** shall be required to convey runoff to the required Sediment Basin (see Section 3.10 for Sediment Basin criteria).

If the upstream disturbed drainage area is less than 1.0 acre, one of the following BMPs shall be shown along the perimeter:

Reinforced Rock Berm (RRB)

*A **Reinforced Rock Berm (RRB)** consists of a linear mass of gravel enclosed in wire mesh to form a porous filter, able to withstand overtopping. The berm is heavy and stable and promotes sediment deposition on its upstream side.*

Sediment Control Log (SCL)

*A **Sediment Control Log (SCL)** consists of a cylindrical bundle of wood, coconut, compost, excelsior, or straw fiber designed to form a semi-porous filter, able to withstand overtopping. The log can be staked into the ground and promotes sediment deposition on its upstream side.*

Silt Fence (SF)

Silt Fence (SF) is a temporary sediment barrier constructed of woven fabric stretched across supporting posts. The bottom edge of the fabric is placed in an anchor trench that is backfilled with compacted soil.

Photo provided by Storm Water Control.

Diversion Ditch (DD). A Diversion Ditch is described in Section 3.4.5.

*A **Diversion Ditch (DD)** is a small earth channel used to divert and convey runoff. Depending on slope, the diversion ditch may need to be lined with erosion control matting, plastic (for temporary installation only), or riprap.*

Element 6. Implement Effective Perimeter Controls, continued

Of these four BMPs, a Reinforced Rock Berm, Sediment Control Log, and Silt Fence function best when installed level, on a contour. However, these BMPs may slope up to 5% from horizontal in accordance with the design information provided in Section 3.17.14. In the County's experience, Silt Fence is the least durable and has the highest maintenance cost of the four alternatives; therefore, consideration should be given to all of the alternatives before simply specifying Silt Fence. Additional information on maintenance costs is provided in Section 3.21.

Construction Fence (CF) is also recommended along the downslope perimeters if the adjacent area is developed or consists of a public use area. Construction Fence is necessary to discourage vehicle access over the top of a Diversion Ditch, Reinforced Rock Berm, or Sediment Control Log. See Section 3.13 for Construction Site Access Controls.

In drainageways with an upstream watershed area of 20 acres or more that exit the site, and where disturbance is such that excessive amounts of sediment may move downstream, a **Check Dam (CD)** is recommended at the downgradient perimeter (**Reinforced Check Dam (RCD)** for areas exceeding 130 acres). In disturbed drainageways having an upstream watershed area of less than 20 acres that exit the site, a **Reinforced Rock Berm (RRB)** is recommended at the downgradient perimeter. However, if possible, BMPs are to be configured to control erosion and sediment outside the limits of drainageways so that instream BMPs are used infrequently, and only as a last resort.

Element 7. Use Sediment Basins for Areas Exceeding 1.0 Acre

3.10

Runoff from all disturbed drainage areas exceeding 1.0 acre shall be treated in a **Sediment Basin (SB)** if the site will allow for the placement of a basin. Runoff from disturbed areas less than 1.0 acre may be treated in a Sediment Basin, a **Sediment Trap (ST)**, or one of the downslope perimeter BMPs described in Section 3.9.2. Design guidance for Sediment Basins is provided in Section 3.17.10.

*A **Sediment Basin (SB)** is an impoundment that captures sediment-laden runoff and releases it slowly, providing prolonged settling times to capture coarse and fine-grained soil particles.*

*A **Sediment Trap (ST)** consists of a riprap berm with a small upstream basin that acts to trap coarse sediment particles.*

Element 7. Use Sediment Basins for Areas Exceeding 1.0 Acre, continued

Any permanent detention or water quality facilities shall incorporate a Sediment Basin with at least half of the Sediment Basin storage volume required provided below the lowest outlet of a permanent detention facility or water quality basin. Including Sediment Basins in these facilities makes sense for several reasons:

- The need for a temporary outlet and spillway are eliminated.
- Detention and water quality basins are generally located at a low point in the drainage system, enabling site runoff to be conveyed to the Sediment Basin.
- The Sediment Basin ends up being "out of the way" of other construction and doesn't have to be relocated.

A stable drainage path shall be designed and shown downstream of the outlet and spillway of a Sediment Basin. If the Sediment Basin is located within a permanent detention facility or water quality basin, the drainageway downstream is likely to be a permanent feature and shall be shown in a separate design detail. Temporary drainage paths shall consist of a **Diversion Ditch (DD)** or, if appropriate, a riprap apron or other stable feature that is detailed by the Design Engineer.

Permanent detention facilities shall be constructed as early in the development process as possible. If site planning has identified easements for permanent detention facilities, the Design Engineer should consider locating Sediment Basins in these locations even if permanent detention facilities are not planned until later in the development.

Element 8. Protect Steep Slopes

3.11

Steep slopes may either be comprised of steep existing slopes that are to be preserved or cut or fill slopes created during the grading process. In either case, the measures in this section shall be taken to protect these slopes against erosion. For the purposes of definition, a slope is considered steep if it is steeper than 4 (horizontal) to 1 (vertical).

Erosion Control Blanket (ECB) *shall be used on slopes greater than 4:1.*

3.11.1 Proposed Slopes Shall be No Steeper than 3 to 1. Slopes steeper than 3 to 1 are difficult to vegetate and maintain. Long term rill and gully erosion are likely on such slopes. Approved permanent stabilization shall be required to control grades on all sites that cannot be graded at a 3 to 1 slope. Retaining walls may be necessary to control grades on a site. Slopes steeper than 4 to 1 shall be protected with **Erosion Control Blanket (ECB).**

3.11.2 Runoff Shall be Diverted Away from Steep Slopes. A permanent or temporary **Diversion Ditch (DD)** shall be depicted above all steep slopes on the site that may receive concentrated or sheet flows. Where steep cut slopes are planned near the site perimeters enough room should be left to install a Diversion Ditch, unless otherwise accepted by the County.

Element 8. Protect Steep Slopes, continued

3.11.3 Terracing Shall be Incorporated into the Grading of Steep Slopes. To break up the flow of incidental runoff down slopes and reduce the development of rill and gully erosion, grading of new steep slopes shall incorporate **Terracing (TER).** Design criteria are provided in Section 3.17.19.

***Terracing (TER)** consists of creating one or more flat benches in high, steep cut or fill slopes to interrupt runoff and reduce the formation of rill and gully erosion.*

Element 9. Protect Inlets, Storm Sewer Outfalls, and Culverts

3.12

The entrances to storm sewer inlets shall be protected using one of the following approved BMPs to reduce the inflow of sediment. Likewise, storm sewer outfalls and culvert outlets shall be protected against scour and erosion.

All storm sewer inlets on a site shall be provided with **Inlet Protection (IP)**. The GESC Drawing shall specify whether area, sump, or continuous grade Inlet Protection is to be used in a particular location. The half Y-shaped continuous grade Inlet Protection is intended to trap sediment upstream of an inlet on a continuous grade street without causing any bypass of flow around the inlet. Sump and area Inlet Protection is also designed to maintain inlet capacity after runoff flows over the wire-enclosed rock. The only Inlet Protection that blocks an inlet opening is Temporary Inlet Protection, discussed in Section 5, which is only used to keep soil out of an inlet prior to paving operations. All culvert inlets on a site shall be provided with a

***Inlet Protection (IP)** consists of a reinforced rock berm placed in front of (but not blocking) a curb-opening inlet or around an area inlet to reduce sediment in runoff approaching the inlet.*

Reinforced Rock Berm (RRB). Storm sewer outfalls and culvert outlets shall be permanently protected against erosion with a riprap apron or other approved means in accordance with the *Drainage Manual,* as amended.

*A **Reinforced Rock Berm (RRB)** can be placed in front of a culvert to reduce sediment in the runoff approaching the culvert.*

Riprap shall be installed at the same time as construction of the storm sewer outfall or culvert. In addition, **Erosion Control Blanket (ECB)** shall be provided in the area disturbed by the construction of the storm sewer outfall or culvert.

Element 10. Provide Access and General Construction Controls

3.13

3.13.1 Limits of Construction (LOC)

Limits of Construction shall be shown on GESC Drawings and shall include all utility tie-ins. The Design Engineer shall be careful to delineate Limits of Construction that provide adequate room for the necessary work, including vehicular and temporary storage of equipment and materials, while at the same time limiting the disturbed area to the minimum necessary. Unless otherwise accepted by the County for utility work, all stockpiles of excavated materials shall be placed on the uphill side of the trench within the Limits of Construction.

It is especially important to show Limits of Construction and erosion and sediment control BMPs for utility work outside the site.

3.13.2 Construction Fence (CF)

Construction Fence or **Construction Markers (CM)** shall be shown throughout the site to delineate all limits of construction along stream corridors and sensitive areas including school zones and trails. Construction Fence and/or Markers installation notes as found in Appendix B require that Construction Fence or other means defining stream corridors and sensitive areas shall be installed as the very first step in the construction phase, prior to any other work or disturbance on the site. This is critical to avoiding unwanted disturbance beyond the Limits of Construction.

3.13.3 Vehicle Tracking Control (VTC)

Vehicle Tracking Control shall be provided at all entrance/exit points at the site. The number of access points shall be minimized. A location shall be selected that accounts for the safety of the traveling public and avoids disturbance of trees, desirable vegetation, and low, wet areas. Steep grades (greater than 8%) shall be avoided. As discussed in Section 2.5.3, a Temporary Construction Access Permit shall be required at all access points onto public right-of-way to or from a site.

***Vehicle Tracking Control (VTC)** consists of a pad of 3" to 6" rock at all entrance/exit points for a site that is intended to help strip mud from tires prior to vehicles leaving the construction site.*

Element 10. Provide Access and General Construction Controls, continued

3.13.4 Stabilized Staging Area (SSA). A Stabilized Staging Area shall be provided near the main access point and should be connected to the vehicle tracking control. The Stabilized Staging Area should be the location used for chemical storage.

*A **Stabilized Staging Area (SSA)** consists of stripping topsoil and spreading a layer of granular material in the area to be used for a trailer, parking, storage, unloading and loading. A stabilized staging area reduces the likelihood that the vehicles most frequently entering a site are going to come in contact with mud*

3.13.5 Concrete Washout Area (CWA). A Concrete Washout Area shall be indicated in a location near all concrete work areas.

*A **Concrete Washout Area (CWA)** is a shallow excavation with a small perimeter berm to isolate concrete truck washout operations. The washout area shall be combined with a vehicle tracking control pad to control tracking of mud.*

3.13.6 Stockpile Areas. All Stockpile Areas shall be shown on the GESC Drawing. As discussed in Section 3.8, topsoil stripping, stockpiling, and re-spreading in areas to be vegetated shall be a mandatory practice called for in all GESC Drawings. Adequate "footprints" for topsoil stockpiles, stockpiles of excess excavated material, and stockpiles for imported materials shall be shown assuming stockpile slopes are no steeper than 3 to 1. Stockpiles shall not be shown outside the Limits of Construction.

3.13.7 Temporary Access Roads. All Temporary Access Roads shall be shown on the GESC Drawing.

Special Requirements for Residential Projects (Street Acceptance Plans)

3.14

3.14.1 Street Acceptance Plan. Public Works Engineering requires that all residential subdivision improvements and GESC Permit requirements be built/completed, inspected and accepted by Public Works Engineering prior to any conveyance or transfer of title to any lot, lots, tract or tracts of land within a phase, or prior to any building permit(s) being issued. In most cases this requires a Street Acceptance Plan. The criteria for Street Acceptance Plans are referenced in Chapter 14.6 of the *Roadway Manual*.

Special Requirements for Utility Construction

3.15

As Douglas County grows, so does the demand for installation of new underground utility lines, and upgrade and maintenance of existing lines. To address the demands, utility companies may apply for an annual Small Utility GESC Permit that will address the majority of small projects generated by growth. See Section 9 of the *GESC Manual* for more information on this permit. In the situations where the project is larger than the parameters set forth in Section 9 of the *GESC Manual* the utility company shall provide the information needed to apply for a Standard GESC Permit. At a minimum, all utility line construction shall comply with the following:

- Obtain GESC Permit prior to the start of construction.
- All utility work within a Douglas County right-of-way shall be required to obtain a Douglas County Right-of-Way Use and Construction Permit in accordance with the *Roadway Manual,* as amended.
- Provide adequate erosion and sediment controls.
- No more than 1,000 linear feet of trench shall be open at any one time.
- Where consistent with safety and space considerations, excavated material is to be placed on the uphill side of trenches.
- At NO time shall excavated material be placed in the curb, gutter, sidewalk, or in the street within 6 feet of the flowline.
- Limits of Construction shall be large enough for a work area, temporary storage of excavated material and imported material, and equipment access to the project.
- Downslope perimeter controls shall be installed per Section 3.9.2.
- Trench dewatering devices must discharge in a manner that will not affect streams, wetlands, drainage systems, or off-site property. Discharge from the trench shall be free of any sediment. A rock riprap pad shall be placed at the discharge end of hose to prevent any additional erosion. The **Dewatering (DW)** detail shall be complied with at the suction and discharge ends of the pumping facilities.
- **Inlet Protection (IP)** shall be provided whenever soil erosion from the excavated area has the potential of entering a storm sewer system.
- All disturbed areas shall be drill seeded and crimp mulched within 14 days after utility work is completed. For larger projects, Seeding and Mulching shall be done in phases rather than at the end of construction, per Section 3.8.
- Comply with all other applicable criteria as outlined in the *GESC Manual*.

Special Requirements for Temporary Batch Plants

3.16

As stated in Section 1.5.2, because of the potential impact of Temporary Batch Plants on land, vegetation, and receiving waters, batch plants require their own GESC Permit (even if the plant is to be located inside the Limits of Construction of a GESC-permitted project). GESC Permits for Temporary Batch Plants are valid for 1 year from the date issued. A Temporary Batch Plant/GESC Permit renewal application may be considered for a Temporary Batch Plant/GESC Permit extension. The request for renewal shall be made no later than 30 days prior to the expiration of the Temporary Batch Plant/GESC Permit. All extensions are contingent on the applicant reapplying for the Temporary Batch Plant/GESC Permit and completion of a satisfactory site inspection to ensure that the site is in compliance with the Temporary Batch Plant GESC Plan.

Temporary Batch Plants have specific GESC Plan requirements to reduce impacts to the environment.

Temporary Batch Plant GESC Drawings have specific BMP requirements as shown below. Additional information on Drawing and Report requirements is provided in Sections 3.20.1. Other Temporary Batch Plant submittal requirements are described in Section 4.

Design and Sizing criteria for BMPs

3.17

All of the design parameters outlined on the Douglas County accepted details shall be specified for each BMP selected, as indicated on the Douglas County GESC Plan Standard Notes and Details drawings in Appendix B and discussed in detail in Section 5.7. The parameters may include specific dimensions, such as lengths and widths, or type if more than one configuration of a BMP exists. Design guidance is provided in the following paragraphs for each of the Douglas County-accepted BMPs.

3.17.1 Check Dam (CD) and **Reinforced Check Dam (RCD).** Design parameters to be specified on the plan-view GESC drawings include the following items shown on the construction detail:

- Type of Check Dam (Check Dam or Reinforced Check Dam).
- Length (L) dimension.
- Crest length (CL) dimension.
- Depth (D) dimension.

Design and Sizing criteria for BMPs, continued

The type of Check Dam is based on the drainage area upstream of the Check Dam. A **Reinforced Check Dam (RCD)** should be used for drainage areas greater than 130 acres. A nonreinforced **Check Dam (CD)** may be used for drainage areas less than 130 acres. A **Reinforced Rock Berm (RRB)** may be used as a Check Dam for drainage areas less than 20 acres.

Dimensions are to be specified to ensure that the dam fits the existing drainageway cross section shape and provides adequate overtopping capacity. The depth (D) dimension shall provide a minimum weir capacity equal to a 2 year return period event for development conditions expected during the operation of the check dam.

3.17.2 Compost Blanket (CB) and **Compost Filter Berm (CFB)**. Design parameters to be specified on the plan-view GESC Drawings include the following items:

- Location and aerial extend of Compost Blanket and any Compost Filter Berms.
- Area (A) in square yards of Compost Blanket.
- Length (L) in linear feet of any Compost Filter Berm.

Compost Blanket and Filter Berms shall not be used in drainageways, swales, or any area of concentrated flow, but may be used as an alternative for Erosion Control Blanket on slopes outside of drainageways, or as an alternative to Crimp Mulching.

3.17.3 Concrete Washout Area (CWA). One or more locations for a Concrete Washout Area, near all areas of concrete work, shall be specified on the plan-view GESC Drawings. The use of Vehicle Tracking Control in conjunction with a Concrete Washout Area is mandatory if access to and from the Concrete Washout Area is from a paved surface.

3.17.4 Construction Fence (CF) and **Construction Markers (CM)**. Design parameters to be specified on the plan-view GESC Drawings include the following items:

- Location of Construction Fence or line of Markers.
- Length (L) in lineal feet of Construction Fence or line of Markers.
- Coordinates or other location information.

Construction Fence shall be required along all drainageways and sensitive resources, as listed in Section 3.5. Construction Fence is also required adjacent to schools, parks, and other locations where pedestrian traffic may be a concern.

3.17.5 Dewatering (DW). Design parameters to be specified on the plan-view GESC Drawings include the following items:

Design and Sizing criteria for BMPs, continued

- The location of all proposed Dewatering operations.
- The location of the Sediment Basin where discharges are to be directed.

The size of the dewatering pump shall be determined by the Contractor to provide sufficient capacity for the proposed pumping rates.

The discharge from Dewatering operations can be directed into a Sediment Basin or a perforated pipe with rock pad that has been constructed on the site. As mentioned in Section 2.6.2, a State Permit for Discharges Associated with Construction Activities is generally required for Dewatering operations.

3.17.6 Diversion Ditch (DD). Design parameters to be specified on the plan-view GESC Drawings include the following items:

- Lining of Diversion Ditch (earth, ECB, riprap, or plastic).
- Length of each type of ditch.
- Depth (D) and width (W) dimensions.
- In addition, if the ditch lining is ECB or riprap, the type of Erosion Control Blanket and size of riprap (D50) needs to be specified.

Lining type is based on slope of the ditch, as shown on the GESC Drawing Standard Notes and Details provided in Appendix B. Dimensions shall be specified to ensure that the ditch adequately conveys runoff from a 2 year return period event for development conditions expected during the operation of the ditch. Ditches or drainageways conveying a 2 year flow rate exceeding 10 cfs shall require an independent design by a Professional Engineer (PE).

3.17.7 Erosion Control Blanket (ECB). Design parameters to be specified on the plan-view GESC Drawings include the following items shown on the construction detail:

- Type of blanket (straw, straw-coconut, coconut, or excelsior).
- Area (A) in square yards for each type of blanket.
- Dimensions or location information.

Type of blanket shall be based on the shear stress associated with the design flow, as discussed below. Dimensions shall be specified to ensure that the blanket provides protection to the top of the disturbed channel.

All Erosion Control Blankets shall have double sided netting. All Erosion Control Blankets and netting should be made of 100% natural and biodegradable material

Information

All erosion control blankets shall have double sided netting. All erosion control blankets and netting should be made of 100% natural and biodegradable material and shall have a minimum product life of 2 years

Design and Sizing Criteria for BMPs, continued

and shall have a minimum product life of 2 years for channel applications and 12 month product life for slope applications.

Erosion Control Blanket shall be specified based on the judgment of the Design Engineer, but at a minimum, blanket in drainageways shall be sized for the shear stress from a 2 year return period event for development conditions expected during the operation of the matting. Table 3-2 provides the maximum shear stress and velocity, based on un-vegetated channel conditions, for allowable Types of Erosion Control Blankets.

A double-net straw or excelsior blanket shall be used for all slopes steeper than 4:1, outside of drainageways. Concave slope areas that may concentrate sheet flows as well as all other drainage channels (up to the top of the banks) shall require a double-net 70% straw / 30% coconut, double-net 100% coconut, or double-net 100% excelsior blanket based on the shear stress and velocity of the new or disturbed channel. The shear stresses and velocities shown in Table 3-2 shall be considered the maximum allowable values. Channels where velocities and stresses exceed those shown in Table 3-2 shall be designed in accordance with the *Drainage Manual*, as amended.

Table 3-2 Erosion Control Blanket Type

TYPE	COCONUT CONTENT	STRAW CONTENT	MIN. WEIGHT (lbs/sy)	MANNING'S N VALUE (Varies with depth as shown)	ALLOWABLE MAX. SHEAR STRESS (lbs/sf)	ALLOWABLE MAX. VELOCITY (fps)
STRAW	0%	100%	0.5	0.018 for D>=2.0' 0.050 for D<=0.5'	Not allowed in drainageways or diversion ditches	
STRAW-COCONUT	30% MIN.	70% MAX	0.5	0.018 for D>=2.0' 0.050 for D<=0.5'	1.75	5.0
COCONUT	100%	0%	0.5	0.018 for D>=2.0' 0.050 for D<=0.5'	2.25	5.0
EXCELSIOR	N/A	N/A	0.7	0.028 for D>=2.0' 0.066 for D<=0.5'	2.00	5.0

The GESC Drawing shall indicate Erosion Control Blanket in disturbed areas of a drainageway adjacent to permanent erosion protection at storm sewer outfalls. Permanent erosion protection shall be designed according to the *Drainage Manual*, as amended, and shown on the construction drawings for the project.

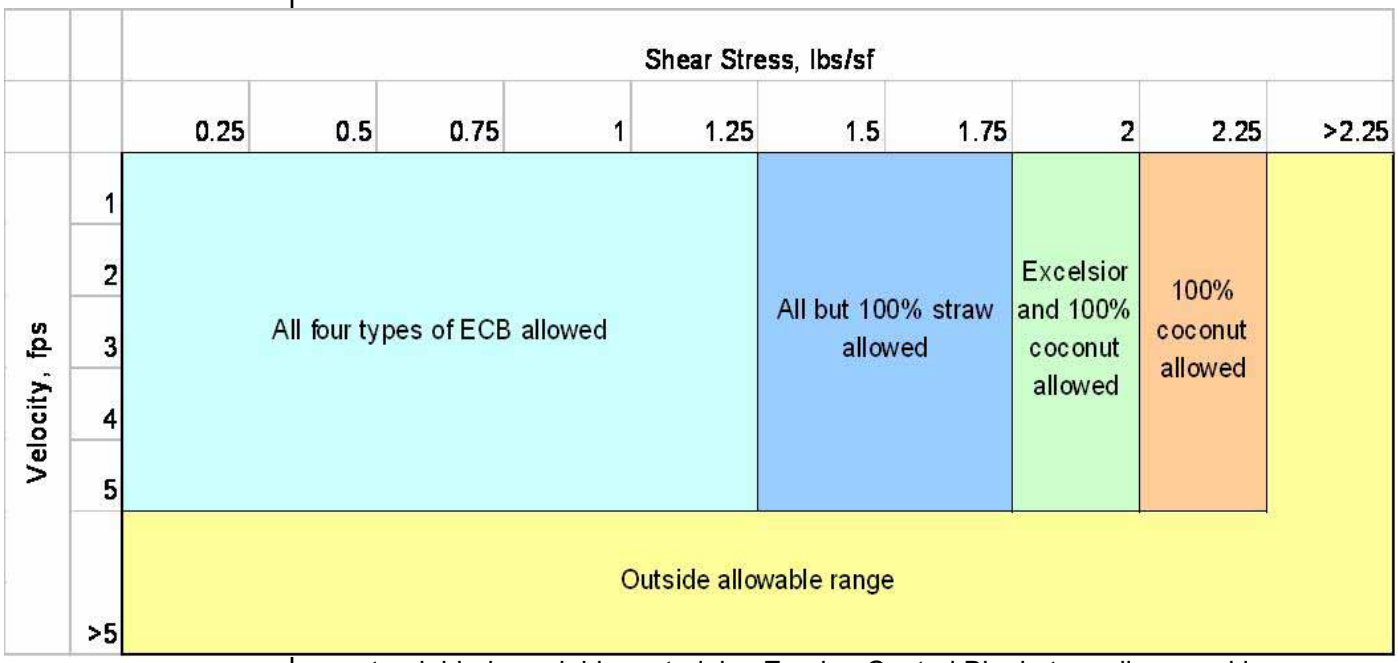
Shear stress and velocity in ditches and drainageways may be calculated based on the following formulas:

- Shear stress (lbs/sf) = 62.4 ∗ D ∗ S, where
- D (ft) = maximum flow depth for the design (2 yr) storm event, and S (ft/ft) = drainageway slope.

Design and Sizing Criteria for BMPs, continued

- Velocity (ft/sec) = Q/A, where Q (cfs) = design (2 yr) flow

For depths between 0.5 and 2.0 feet, solution will be iterative, continuing until the depth corresponding to the Manning's N value is within 0.25 feet of the calculated depth. The maximum drainageway shear stress and velocity calculated using the above equations shall be less than the values indicated in Table 3-2 for the type of blanket specified. Figure 3-2 shows the information in Table 3-2 in a graphical format. This criterion is for temporary ditches and permanent channels designed to be grass-lined. For permanent channels, the types of Erosion Control Blanket shown shall be considered to comprise temporary erosion control only until vegetation can be established. The Erosion Control Blanket shown herein shall be fabricated from 100% natural, biodegradable materials. Erosion Control Blanket, as discussed in this section, is to be provided for temporary stabilization of permanent drainageways or roadside ditches that have been designed to be stable with grass or vegetative lining, consistent with criteria presented in the *Drainage Manual*, as amended. The blanket is to provide erosion protection until the vegetation is established, and it is therefore an important component of an effective GESC Drawing. Under no circumstance does the use of temporary Erosion Control Blanket relieve the Design Engineer of the requirement to satisfy channel design criteria in the *Drainage Manual*. Permanent channel and roadside ditch stabilization measures must be addressed in the Phase III Drainage Report for the project and be specified and detailed on the project construction drawings.



3.17.8 Inlet Protection (IP). Inlet Protection shall be shown on the plan-view GESC Drawings at all street and area inlets. The GESC Drawing shall indicated the type of Inlet Protection, either sump or continuous-grade for curb-opening inlets, or area inlet protection.

Design and Sizing Criteria for BMPs, continued

Determining the length of the reinforced rock berm to fit the inlet is the responsibility of the Permittee(s), as is providing Temporary Inlet Protection in accordance with the GESC Drawing Standard Notes and Details.

3.17.9 Reinforced Rock Berm (RRB). Design parameters to be specified on the plan-view GESC Drawings include the following items:

- Length (L) dimensions.
- Depth (D) dimensions.

If used in a Diversion Ditch or small drainageway, dimensions are to be specified to ensure that the berm fits the drainageway cross section shape and provides adequate overtopping capacity. The depth (D) dimension shall provide a minimum weir capacity equal to a 2 year return period event for development conditions expected during the operation of the Reinforced Rock Berm.

When used as a downhill perimeter control, the design criteria described for **Silt Fence (SF)** in Section 3.17.14 shall apply, except that the Reinforced Rock Berm may be used as a Check Dam across swales and small drainageways (up to 20 acres of upstream drainage area).

3.17.10 Sediment Basin (SB). Design parameters shall be specified on the plan-view GESC drawings and include the following items:

- Location.
- Crest length (CL) dimension, bottom area (A), height of orifices (H), number of columns of orifices (N), and hole diameter (HD).

The Sediment Basin design shown on the GESC Drawing Standard Notes and Details provided in Appendix B shall be used for any disturbed drainage area greater than 1.0 acre. The standard Sediment Basin is appropriate for use for disturbed drainage areas up to 15 acres. For drainage areas greater than 15 acres, a *Volume 3* design must be prepared and shown in the construction drawings.

Sizing information for the Sediment Basin design (based on providing a minimum initial storage volume equal to 1,800 cubic feet per upstream disturbed acre, shall be determined from Table 3-3 (on the following page). As shown on the standard detail sheets, the standard sediment basin features a pipe outlet drilled with a single column of orifice holes. The hole diameter shown in Table 3-3 will drain the upper 1.5 feet of the Sediment Basin in about 4 hours.

A Right-of-Way Use and Construction Permit and inspections are necessary prior to the construction of the outlet works, if the outlet is to be part of a permanent detention basin or water quality facility.

Design and Sizing Criteria for BMPs, continued

Table 3-3, Sizing information for Standard Sediment Basin

Upstream Drainage Area (rounded to nearest acre, (ac)	*Basin Bottom Width (W), (ft)*	*Spillway Crest Length (CL), (ft)*	*Hole Diameter (HD), (in)*
1	*16*	*2.0*	*7/16*
2	*22*	*4.0*	*5/8*
3	*27*	*6.0*	*3/4*
4	*31*	*8.0*	*7.8*
5	*35*	*10.0*	*1.0*
6	*38*	*12.0*	*1-1/8*
7	*41*	*14.0*	*1-1/4*
8	*44*	*16.0*	*1-1/4*
9	*47*	*18.0*	*1-3/8*
10	*49*	*20.0*	*1-3/8*
11	*52*	*22.0*	*1-1/2*
12	*54*	*24.0*	*1-1/2*
13	*56*	*26.0*	*1-5/8*
14	*59*	*28.0*	*1-5/8*
15	*61*	*30.0*	*1-3/4*

Permanent detention and water quality facilities shall have Temporary Sediment Basins incorporated within them. Outlet facilities for Extended Detention Basins that provide a drain time of 40 hours may be used as the Sediment Basin Outlet as long as at least half of the Sediment Basin Volume is provided below the lowest orifice of the permanent outlet works.

3.17.11 Sediment Control Log (SCL). Design parameters to be specified on the plan-view GESC Drawings shall include the following items:

- Location of the Sediment Control Log.
- Length (L) of the Sediment Control Log.

When used as a downslope perimeter control, the design criteria described for **Silt Fence (SF)** in Section 3.17.14 shall apply.

3.17.12 Sediment Trap (ST). Design parameters shall be specified on the plan-view GESC Drawings and include the following items:

- Location, length (L) and width (W) dimensions.

Sediment Trap may be used for upstream disturbed areas less than 1.0 acre. Sediment Trap dimensions shall be specified to provide a storage volume equal to 1,800 cubic feet per upstream acre.

Design and Sizing Criteria for BMPs, continued

3.17.13 Seeding and Mulching (SM). Design parameters to be specified on the plan view GESC Drawings include the following items:

- Type of seed mix (Permanent, Temporary, or Low Growth).
- Area (A) in acres to be seeded and mulched.

Unless otherwise approved by the County, the standard seed mix shall be specified. It is recommended that the Design Engineer be familiar with Contractor requirements for Seeding and Mulching, documented in the Douglas County GESC Standard Notes and Details (see Appendix B). Some of the main requirements include the following:

- Existing topsoil shall be stripped to a depth of 6 inches (unless otherwise approved) from areas to be disturbed. The stripped topsoil shall be stockpiled during grading operations, and then replaced to a depth of at least 6 inches in all areas to be seeded. If quantities of on-site topsoil are inadequate to provide a replaced depth of 6 inches, the Permittee(s) will have to import topsoil or condition the soil as approved by Douglas County. All disturbed areas are to be ripped prior to placing topsoil. Topsoil shall be thoroughly loosened prior to seeding to a depth of at least 6 inches.

- All seeding shall be accomplished using a drill seeder at a depth of seeding not less than ¼ inch and not more than ¾ inch and at the rates specified in the GESC Standard Notes and Details. In small areas that are impossible to drill seed, the Permittee(s), with the County's prior approval, may hand broadcast seed at twice the drilled rate, lightly rake to cover the seed, and crimp mulch.

Important!

What about Hydraulic Seeding / Hydraulic Mulching?

Hydraulic seeding/ hydraulic mulching, , the practice of applying grass seed to the surface of the soil along with a slurry of water and cellulose mulch, has had a poor record of performance in Douglas County. As a result, hydraulic seeding and mulching shall not be allowed on GESC permitted projects.

Design and Sizing Criteria for BMPs, continued

- Straw mulch shall be applied at 2 tons per acre and mechanically crimped into the soil. Revegetation is considered complete when the site is covered by an average of 3 plants per square foot of the variety and species found in the Douglas County-approved mix (for blue-grass or equivalent turf areas, the required coverage shall be at least 80% cover of the species planted). There shall be no bare areas larger than 4 square feet (2 feet by 2 feet or equivalent). The site shall be free of eroded areas and shall be free from infestation of noxious weeds in accordance with Section 6.5. The GESC Manager is responsible for inspections (monthly) and reseeding operations are required twice per year until a satisfactory stand of grass as denoted above is achieved.

Information on seed types in the Douglas County standard seed mixes is provided in Appendix E.

The GESC Permit shall be active until Initial Close-out Acceptance is granted (for detached single-family residential projects), or revegetation has reached completion for all other projects and Final Close-out Acceptance is granted. Seeding and Mulching operations must be undertaken when a GESC Permit expires and no renewal is granted.

3.17.14 Silt Fence (SF). Design parameters to be specified on the plan view GESC drawings include the following items:

- Location of Silt Fence.
- Length (L) in linear feet of Silt Fence.

Silt Fence works most effectively when placed relatively level, on the contour, to capture and filter approaching sheet flow. It is not suited for concentrated flow or for large upstream drainage areas. The following criteria shall apply to the use of silt fence:

1. Silt Fence shall not be used across swales or drainageways.
2. Silt Fence shall be located on the contour. Silt Fence may be shown running up or down slight slopes (up to 5%), but shall not be placed in a location where the fence slope exceeds 5% unless conditions of Table 3-4 are met.
3. The average upslope length of the area draining to an individual section of Silt Fence shall not exceed 100 disturbed feet and the total area draining to a section of Silt Fence shall not exceed 10,000 square feet of disturbed area.
4. Silt Fence located transverse to a slope shall be staggered based on the information in Table 3-4. The end of a downslope section of Silt Fence shall extend a minimum of 15 feet into the drainage "shadow" of the adjacent upslope section to ensure capture of all approaching sheet flow.
5. In all cases, the ends of individual sections of Silt Fence shall be

Design and Sizing Criteria for BMPs, continued

placed upslope at least 1 foot higher vertically than the low point in the fence.

Items 1 through 5 above also apply to **Sediment Control Log (SCL)** and notes 2 through 5 apply to **Reinforced Rock Berm (RRB)** when these are used as downslope perimeter controls. As long as a site perimeter slopes less than 5% and has no low points where concentrated flow occurs, Silt Fence (or Sediment Control Log or Reinforced Rock Berm) may be placed directly along the perimeter. In this case, the fence will occupy a narrow strip of ground (less than 1 foot) and the Limits Of Construction can extend relatively close to the perimeter.

If the perimeter slopes more than 5%, Silt Fence (or Sediment Control Log or Reinforced Rock Berm) must be staggered according to the information in Table 3-4, with individual sections oriented generally on the contour (or on less than a 5% slope) and "overlapping" by at least 15 feet. In this case, the sections of Silt Fence will occupy a relatively wide strip of ground (perhaps 20 to 50 feet); therefore, either the silt fence needs to be placed downslope of the perimeter (requiring the approval of Douglas County and, if it affects adjacent property, the owner of the adjacent property) or the Limits Of Construction cannot extend very close to the perimeter. For this reason, it may be advantageous for the Design Engineer to use a lined **Diversion Ditch (DD)** along downslope perimeters steeper than 5% (a Diversion Ditch may be a good option for perimeters flatter than 5% as well).

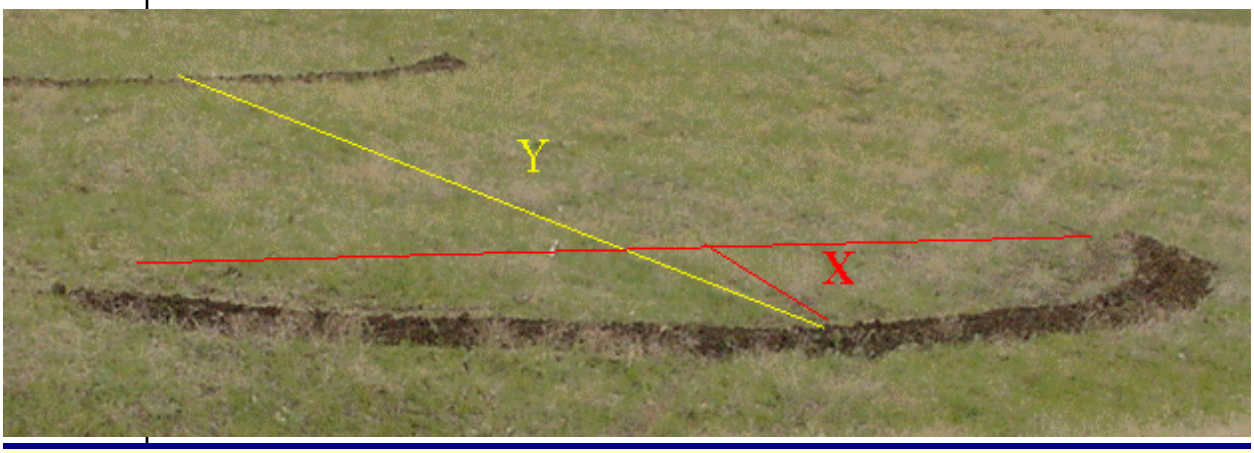


Table 3-4. Silt Fence on Slope

Slope Percentage	*Slope Ratio*	*Minimum elevation difference from low point in fence to ends of fence, X (feet)*	*Maximum space between rows, Y (feet)*
5-10%	*20:1 – 10:1*	*1*	*50*
10-20%	*10:1 – 5:1*	*1*	*25*
20-33%	*5:1 – 3:1*	*1*	*15*

Silt Fencing located at the toe of a slope shall be placed a minimum of 5 feet offset from the toe to allow for maintenance activities. In locations where Silt

Design and Sizing Criteria for BMPs, continued

Fencing is required on a slope, it shall be designed and installed per Table 3-4. The slope percentage or slope ratio dictates the spacing of adjacent rows of Silt Fence.

If construction takes place in the winter, Silt Fence should be placed far enough off the roadway to avoid damage from snow-plowing operations.

Silt Fence should be located far enough off streets to avoid damage from snow-plowing operations.

3.17.15 Temporary Slope Drain (TSD). Design parameters to be specified on the plan-view GESC Drawings include the following items:

- Types of Slope Drain (pipe, riprap lined, or plastic lined).
- Location and length (L) in linear feet.
- "D" dimension and "D50" size.

Dimensions are to be specified to ensure that the Slope Drain provides capacity equal to a 2 year return period event for development conditions expected during the operation of the Slope Drain.

3.17.16 Stabilized Staging Area (SSA). Design parameters to be specified on the plan-view GESC Drawings include the following:

- Location of Staging Area.
- Approximate area (A) in square yards of the Staging Area.
- SSA shall include and not be limited to BMPs designed for outdoor storage of construction materials, fuels, solvents, oils, trash, portable sanitary facilities, bulk storage, vehicle maintenance, and loading and unloading operations.

Gravel, road base, or recycled concrete may be used for the Stabilized Staging Area.

3.17.17 Surface Roughening (SR). Surface Roughening is to be performed in all disturbed areas on a site. The Surface Roughening **(SR)** symbol is to be shown on the GESC Drawings in these areas.

3.17.18 Stream Crossing (SC). Design parameters to be specified on the plan-view GESC Drawings include the following items shown on the construction detail:

- Location of Stream Crossing.
- Type of Stream Crossing (ford or culvert).
- For ford crossing, length (L), crest length (CL), and depth (D) dimensions.

Design and Sizing Criteria for BMPs, continued

- For culvert crossing, length (L), height (Y), overtopping depth (H), diameter (D) and number of culverts.

The type of Stream Crossing is based on the presence of baseflow and the shape of the channel. If there is any baseflow present, or the channel is relatively deep and narrow, a culvert crossing shall be used. Ford-type Stream Crossings shall not be used where bank cuts are necessary. Dimensions are to be specified to ensure that the crossing fits the existing drainageway cross section shape and provides adequate overtopping capacity. The flow depth (D or H) dimension shall provide a minimum weir capacity equal to a 2 year return period event for development conditions expected during the operation of the Stream Crossing.

For temporary culvert crossings, the Design Engineer shall specify pipe class, minimum cover, etc. to ensure that the culverts will bear the loads associated with the type of vehicles that may use the crossing. The structural capacity of the crossing shall be the responsibility of the Design Engineer.

3.17.19 Terracing (TER). Design parameters to be specified on the plan view GESC Drawings include the following items:

- Location and length of Terracing.
- Width (W) and height (H) dimensions.

Terracing shall be used on all permanent slopes between 3 to 1 and 4 to 1 that are greater than 15 feet in height. Benches shall be at least 8 feet wide and shall occur at a vertical spacing of not more than 15 feet on all permanent slopes.

3.17.20 Vehicle Tracking Control (VTC). Design parameters to be specified on the plan view GESC Drawings include the following:

- Include location of all Vehicle Tracking Controls, etc.

A location shall be selected that avoids disturbance of trees, desirable vegetation, and low, wet areas. Slopes greater than 8% shall be avoided. All access points to or from a construction site require a Temporary Construction Access Permit as outlined in the *Roadway Manual*, as amended. No ramps of dirt, gravel, asphalt, wood, or other materials are allowed in the curb section. A stop sign is required for all exiting traffic from the site.

3.17.21 Vehicle Tracking Control with Wheel Wash (WW). Vehicle Tracking Control with Wheel Wash does not need to be specified. It shall be used only if specifically required by the Erosion Control Inspector, typically, only if vehicle tracking onto public streets becomes a major problem.

Standard GESC Plan Drawing Requirements

3.18

The following GESC Drawing requirements shall be adhered to when preparing a Standard GESC Drawing. Specific requirements vary based on the three types of Standard GESC Drawings described in Section 2. Drawing requirements for a Staged GESC Permit (separate drawings for the Initial, Interim, and Final Stages) are discussed in the following paragraphs. Requirements for Small Site and Utility GESC Drawings and Staged and Phased GESC Drawings are shown in Sections 3.18.8 and 3.18.9, respectively. Submittal requirements for the Temporary Batch Plant GESC Drawing, and Stand-alone GESC Drawings are described in Section 3.20.

Appendix G summarizes the drawing requirements in a checklist format. This checklist must be filled out, signed, stamped by the Design Engineer, and submitted with the GESC Drawing to ensure that each of the requirements is addressed.

All GESC Drawings, which are also required for off-site borrow or disposal areas, shall be prepared on 22x34 or 24x36 inch sheets at a scale of 1 inch to 20 feet up to 1 inch to 200 feet, as appropriate, to clearly show sufficient detail for review. An example set of GESC Drawings for Staged/Phased permits is provided in Appendix C.

As discussed in Section 2.2, GESC Drawings shall be signed and stamped by the Design Engineer. Only the drawing sets submitted for final acceptance need to be signed and stamped (See Section 4.6).

3.18.1 GESC Drawing Cover Sheet. Since the GESC Drawings are normally part of a comprehensive set of construction drawings for development, 1 cover sheet may suffice for the entire set of drawings. It shall include the following information related to the GESC portion of the plan set. Additional requirements shall be required for the other portions of the construction drawings, contact Public Works Engineering for a complete list of cover sheet requirements.

1. Project name.
2. Project address (if applicable).
3. Owner address.
4. Design firm's name and address.
5. Plan sheet index.
6. Design Engineer's Signature Block.
7. The following note:

   THE ***GRADING, EROSION AND SEDIMENT CONTROL PLAN*** INCLUDED HEREIN HAS BEEN PLACED IN THE DOUGLAS COUNTY FILE FOR THIS PROJECT AND APPEARS TO FULFILL APPLICABLE DOUGLAS COUNTY GRADING, EROSION AND SEDIMENT CONTROL CRITERIA, AS AMENDED. ADDITIONAL GRADING, EROSION AND SEDIMENT CONTROL MEASURES MAY

Standard GESC Plan Drawing Requirements, continued

BE REQUIRED OF THE PERMITTEE(S) DUE TO UNFORESEEN EROSION PROBLEMS OR IF THE SUBMITTED GESC PLAN DOES NOT FUNCTION AS INTENDED. THE REQUIREMENTS OF THIS GESC PLAN SHALL RUN WITH THE LAND AND BE THE OBLIGATION OF THE PERMITTEE(S) UNTIL SUCH TIME AS THE GESC PLAN IS PROPERLY COMPLETED, MODIFIED OR VOIDED.

8. GESC Drawing Design Engineer's signature block with name, date, and Professional Engineer registration number. Signature block shall include the following note:

   THE ***GRADING, EROSION AND SEDIMENT CONTROL PLAN*** INCLUDED HEREIN HAS BEEN PREPARED UNDER MY DIRECT SUPERVISION IN ACCORDANCE WITH THE REQUIREMENTS OF THE *GRADING, EROSION, AND SEDIMENT CONTROL (GESC) CRITERIA MANUAL* OF DOUGLAS COUNTY, AS AMENDED.

9. County Acceptance Block (see Appendix F).
10. General Location Map at a Scale of 1 inch to 1,000 feet to 8,000 feet indicating:
    - General vicinity of the site location.
    - Major roadway names.
    - North arrow and scale.

3.18.2 GESC Drawing Index Sheet. For projects that require multiple plan view sheets to adequately show the project area (based on the specified scale ranges), a single plan view sheet shall be provided at a scale appropriate to show the entire site on 1 sheet. Areas of coverage of the multiple blow-up sheets are to be indicated as rectangles on the index sheet.

3.18.3 Initial GESC Drawing. This plan sheet shall provide grading, erosion and sediment controls for the initial clearing, grubbing and grading of a project. At a minimum, it shall contain:

1. Property Lines.
2. Existing and proposed easements.
3. Existing topography at 1 or 2 foot contour intervals, extending a minimum of 100 feet beyond the property line.
4. Location of any existing structures or hydrologic features within the mapping limits.
5. USGS Benchmark used for project.
6. Limits of Construction encompassing all areas of work, access points, storage and staging areas, borrow areas, stockpiles, and utility tie-in locations in on-site and off-site locations. Stream corridors and other resource areas to be preserved and all other areas outside the Limits of Construction shall be lightly shaded to clearly show area not to be disturbed.

Standard GESC Plan Drawing Requirements, continued

7. Location of stockpiles, including topsoil, imported aggregates, and excess material.
8. Location of storage and staging areas for equipment, fuel, lubricant, chemicals (and other materials) and waste storage.
9. Location of borrow or disposal areas.
10. Location of temporary roads.
11. Location, map symbol, and letter callouts of all initial erosion and sediment control BMPs.
12. Information to be specified for each BMP, such as type and dimensions, as called for in the GESC Standard Notes and Details.
13. The following note:

    SEE COVER SHEET OF DOUGLAS COUNTY GESC STANDARD NOTES AND DETAILS (SHEET 1) FOR LEGEND OF BMP NAMES AND SYMBOLS.
14. Douglas County approval block.
15. Other information as may be reasonably required by Douglas County.
16. Design Engineer sign off block.

3.18.4 Interim GESC Drawing. This plan sheet shows BMPs to control grading, erosion and sediment during the initial overlot grading, site construction and site revegetation process. At a minimum, it shall contain the following information:

The Interim GESC Drawing shall show all the information included on the Initial GESC Drawing, as noted below:

1. Existing topography at 1 or 2 foot contour intervals extending a minimum of 100 feet beyond the property line, as shown on Initial GESC Drawing. **These contours shall be screened.**
2. Location of all existing erosion and sediment control measures on site, as shown on the **Initial** GESC Drawing Sheet. **These control measures shall be screened. Dimension information for initial stage BMPs shall not be shown.**
3. Items 1, 2, and 4 through 10 from the Initial GESC Drawing (see Section 3.18.3).

In addition, the Interim GESC Drawing shall include the following:

4. Proposed topography at 1 or 2 foot contour intervals, showing elevations, dimensions, locations, and slope of all proposed grading.
5. Outlines of cut and fill areas.
6. Location of all interim erosion and sediment controls, designed in conjunction with the proposed site topography, but also considering the controls designed in the Initial GESC Drawing.
7. Location of all buildings, drainage features and facilities, paved areas, retaining walls, curbing, water quality facilities, or other permanent features to be constructed in connection with, or as a part of, the proposed work, per approved plat, Site Improvement Plan

Standard GESC Plan Drawing Requirements, continued

(SIP), or other improvement plan.

8. The following notes:
   - SEE COVER SHEET OF DOUGLAS COUNTY GESC STANDARD NOTES AND DETAILS (SHEET 1) FOR LEGEND OF BMP NAMES AND SYMBOLS.
   - SHADED BMPS WERE INSTALLED IN INITIAL STAGE AND SHALL BE LEFT IN PLACE IN INTERIM STAGE UNLESS OTHERWISE NOTED.
   - ALL INTERIM EROSION AND SEDIMENT CONTROL BMPS INCLUDING DRILL SEEDING AND CRIMP MULCHING OF DISTURBED AREAS, MUST BE INSTALLED, INSPECTED, AND APPROVED BY THE COUNTY PRIOR TO THE ISSUANCE OF A RIGHT-OF-WAY USE AND CONSTRUCTION PERMIT FOR THE PURPOSE OF PAVING OR INSTALLATION OF CURB AND GUTTER.
   - SEE CONSTRUCTION PLANS FOR DETAILS OF PERMANENT DRAINAGE FACILITIES SUCH AS DETENTION FACILITIES, WATER QUALITY FACILITIES, CULVERTS, STORM DRAINS, AND OUTLET PROTECTION.

9. Summary of cut and fill volumes showing how earthwork balances on site.
10. Douglas County acceptance block.
11. Design Engineer sign-off block.

3.18.5 Final GESC Drawing. This Drawing shows controls for final completion of the site. At a minimum, this Drawing shall contain the indicated information:

The Final GESC Drawing shall include all information shown on the Initial and Interim Drawings, as noted below:

1. Existing topography in areas of proposed contours need not be shown.
2. Existing Initial and Interim BMPs shall be shown (**screened**). Dimension information shall not be shown.

In addition, the following information shall be shown:

3. Directional flow arrows on all drainage features.
4. Any Initial or Interim BMPs that are to be removed and any resulting disturbed area to be stabilized.
5. Location of all Final erosion and sediment control BMPs, permanent landscaping, and measures necessary to minimize the movement of sediment off site until permanent vegetation can be established.
6. Show area of buildings, pavement, sod, and permanent landscaping (define types) per accepted plat, SIP, or other improvement plan.

Standard GESC Plan Drawing Requirements, continued

7. Show Seeding and Mulching (SM) everywhere except buildings, pavement areas and permanent landscaping areas.
8. Show other BMPs considered by the Designer Engineer to be appropriate.
9. Show the following BMPs to be removed at the end of construction:
   - Dewatering (DW)
   - Temporary Stream Crossings (SC)
   - Stabilized Staging Area (SSA)
   - Vehicle Tracking Control (VTC)
   - Construction Fence (CF)
10. Include the following notes:
   - SEE COVER SHEET OF DOUGLAS COUNTY GESC STANDARD NOTES AND DETAILS (SHEET 1) FOR LEGEND OF BMP NAMES AND SYMBOLS.
   - SHADED BMPS WERE INSTALLED IN INITIAL OR INTERIM GESC DRAWING AND, UNLESS OTHERWISE INDICATED, SHALL BE LEFT IN PLACE UNTIL REVEGETATION ESTABLISHMENT IS APPROVED BY THE COUNTY.
   - SEE CONSTRUCTION PLANS FOR DETAILS OF PERMANENT DRAINAGE FACILITIES SUCH AS DETENTION FACILITIES, CULVERTS, STORM DRAINS, AND OUTLET PROTECTION.
11. Douglas County acceptance block.
12. Design Engineer sign off block.

In addition the following information should be included:

13. Other information as may be reasonably required by Douglas County.

3.18.6 GESC Plan Standard Notes and Details. A copy of the GESC Standard Notes and Details (included in Appendix B) shall be provided with each set of GESC Drawings.

3.18.7 GESC Drawing and Report Checklist. A copy of a GESC Drawing and Report Checklist is provided in Appendix G. It must be completely filled out, signed and stamped by the PE, and submitted with the GESC Drawing.

3.18.8 Drawing Requirements for Small Site and Utility GESC Drawings. These Drawing requirements are the same as for GESC Staged/Phased Permit, although the erosion and sediment controls for the Initial, Interim, and Final Stages of construction may be shown on a single drawing, as long as this can be accomplished clearly.

3.18.9 Drawing Requirements for Staged and Phased GESC Drawings. GESC Drawing requirements for Staged and Phased GESC Drawings are the same as for Staged Plans, except that each phase of construction (less than 40 acres of disturbance, or 70 acres for overexcavation projects) shall be shown separately (with Initial, Interim, and

Standard GESC Plan Drawing Requirements, continued

Final stages shown on individual sheets).

3.18.10 Submittal Requirements for Related Plans. GESC Drawing requirements for Temporary Batch Plant GESC Drawings, Street Acceptance Plans, and Stand-alone GESC Drawings are described in Section 3.20.

Standard GESC Report Requirements

3.19

A GESC Report is required for all projects that require a Standard or Temporary Batch Plant GESC Permit. The required content of the GESC Report varies based on the level of permitting required by the Colorado Department of Public Health and Environment, Water Quality Control Division's (WQCD), Stormwater Program.

3.19.1 GESC Projects that require a Stormwater Discharge Associated with Construction Activities Permit. For GESC Projects that are also required to obtain a Stormwater Discharge Associated with Construction Activities Permit from the WQCD, the State required Stormwater Management Plan (SWMP) can be utilized as the GESC Report as long as the below listed information is provided with the SWMP. Specific requirements for the development of the SWMP can be found on the WQCD web site.

Projects that utilize the SWMP as the GESC Report shall provide Douglas County with the following information that may not be included in the SWMP:

1. Opinion of Probably Cost for installation of BMPs – An Opinion of Probable Costs for erosion and sediment control, including anticipated maintenance during the construction phase, shall be submitted with the GESC Drawing(s). This will be reviewed by County staff and used as a basis for Fiscal Security (discussed in Section 4.8 of this *GESC Manual*).

2. Areas and Volumes – An estimate of the quantity (in cubic yards) of excavation and fill involved (showing an earthwork balance), and the surface area (in acres) of the proposed disturbance.

3. Calculations – Any calculations made for the design of such items as sediment basins or erosion control matting selection.

4. GESC Drawing and Report Checklist from Appendix G.

3.19.2 GESC Projects that do not require a Stormwater Discharge Associated with Construction Activities Permit. For GESC Projects that are not required to obtain a Stormwater Discharge Associated with Construction Activities Permit from the WQCD, the Applicant shall submit a GESC Report that contains the information below:

1. Name, address, and telephone number of the applicant – The name,

Standard GESC Report Requirements, continued

address, and telephone number of the Design Engineer preparing the GESC Plan shall also be included, if different from the applicant.

2. Project description – A brief description of the nature and purpose of the land-disturbing activity, the total area of the site, the area of disturbance involved, related project reference, and project location including township, range, section and quarter-section.

3. Existing site conditions – A description of the existing topography, vegetation, and drainage; a description of any wetlands on the site; and any other unique features of the property.

4. Adjacent areas – A description of neighboring areas such as streams, lakes, residential areas, roads, etc., which might be affected by the land disturbance.

5. Soils – A brief description of the soils on the site including information on soil type and names, mapping unit, erodibility, permeability, hydrologic soil group, depth, texture, and soil structure. (This information may be obtained from the soil report for the site, for adjacent sites if acceptable to the County, or the applicable Soil Survey prepared by the Natural Resources Conservation Service (NRCS)).

6. Areas and Volumes – An estimate of the quantity (in cubic yards) of excavation and fill involved (showing an earthwork balance), and the surface area (in acres) of the proposed disturbance.

7. Erosion and sediment control measures – A description of the methods presented in this *GESC Manual* that will be used to control erosion and sediment on the site.

8. Timing/Phasing schedule – A schedule indicating the anticipated starting and completion time periods of the site grading and/or construction sequence, including the installation and removal of erosion and sediment control BMPs. Indicate the anticipated starting and completion time periods of individual project phases.

9. Permanent stabilization – A brief description, including applicable specifications, of how the site will be stabilized after construction is completed.

10. Stormwater management considerations – Explain how stormwater runoff from and through the site will be handled during construction.

11. Maintenance – Any special maintenance requirements over and above what is identified in the GESC Standard Notes and Details.

Standard GESC Report Requirements, continued

12. Opinion of Probable Cost for installation of BMPs – An Opinion of Probable Costs for erosion and sediment control, including anticipated maintenance during the construction phase, shall be submitted with the GESC Drawing. This will be reviewed by County staff and used as a basis for Fiscal Security (discussed in Section 4.9 of this *GESC Manual*). A hardcopy of a spreadsheet that shall be used for preparing the Opinion of Probable Costs for erosion and sediment control is included in Appendix I.

13. Calculations – Any calculations made for the design of such items as sediment basins or erosion control blanket selection.

14. Other information or data – As may be reasonably required by Douglas County.

15. The following note – "THIS *GRADING, EROSION AND SEDIMENT CONTROL PLAN* HAS BEEN PLACED IN THE DOUGLAS COUNTY FILE FOR THIS PROJECT AND APPEARS TO FULFILL THE APPLICABLE DOUGLAS COUNTY *GRADING, EROSION AND SEDIMENT CONTROL* CRITERIA. ADDITIONAL GRADING, EROSION AND SEDIMENT CONTROL MEASURES MAY BE REQUIRED OF THE OWNER OR HIS/HER AGENTS, DUE TO UNFORESEEN EROSION PROBLEMS OR IF THE SUBMITTED PLAN DOES NOT FUNCTION AS INTENDED. THE REQUIREMENTS OF THIS PLAN SHALL RUN WITH THE LAND AND BE THE OBLIGATION OF THE LAND OWNER, OR HIS/HER DESIGNATED REPRESENTATIVE(S) UNTIL SUCH TIME AS THE PLAN IS PROPERLY COMPLETED, MODIFIED OR VOIDED."

16. Signature Page For owner/developer acknowledging the review and acceptance of responsibility, and a statement by the Design Engineer acknowledging responsibility for the preparation of the GESC Plan.

Appendix G summarizes the drawing requirements in a checklist format. This checklist must be filled out, signed, stamped by the Design Engineer, and submitted with the GESC Report to ensure that each of the requirements is addressed.

Submittal Requirements for Related Plans

3.20

3.20.1 Submittal Requirements for Temporary Batch Plant/GESC Drawings. Submittal requirements for Temporary Batch Plant GESC Drawings are as follows:

- A GESC Drawing for the site in accordance with the requirements found in this *GESC Manual*. The Batch Plant GESC Drawing shall comprise 2 plan sheets, an Initial and Final GESC Drawing (example plans are shown in Appendix D). The Initial Plan shall utilize at a minimum the following BMPs:
  - Sediment Basin (3.17.10) at the low point on the site;
  - Diversion Ditch (3.17.6) to route all stormwater runoff to the Sediment Basin;
  - Vehicle Tracking Control pad (3.17.20) at each entrance and exit;
  - A Stabilized Staging Area/stabilized driving surface (3.17.16) from Vehicle Tracking Control pads to the silo chute; and
  - Limits of Construction.

  The Final GESC Drawing shall include site clean up, regrading and revegetation and any additional temporary erosion and/or sediment controls.
  - A narrative report describing: purpose of plant, proposed schedule of operation, including days and times, duration of plant operations, anticipated daily trip generation, and maximum gross vehicle weight (GVW) of hauling units.
  - A posting of Fiscal Security (see Section 4.9) for the installation and maintenance of the temporary erosion and sediment control and site reclamation.
  - A lease agreement from the property owner (if applicable).
  - A copy of all associated State and Federal permits.
  - All access points to or from a construction site require a Temporary Construction Access Permit as outlined in the *Roadway Manual* as amended. No ramps of dirt, gravel, asphalt, wood, or other materials are allowed in the curb section.

3.20.2 Submittal Requirements for Stand-Alone GESC Permits. As discussed in Section 2.5.1, Douglas County discourages requests for "Stand-Alone" GESC Drawing reviews, followed by applications for a GESC Permit, separate from and in advance of an "Entire Project" approval.

("Entire Project" refers to all documents, processes and hearings that are required by Douglas County for a complete project submittal and approval.)

However, Douglas County recognizes the fact that there may be an occasional circumstance where consideration may be made to accept an application for a GESC Permit in advance of the entire project acceptance, if the proposed grading is part of a site improvement or development project subject to additional submittal requirements and processes. Such a request

Submittal Requirements for Related Plans, continued

is not part of the Douglas County process, and it shall not be considered to be a standard or practice.

If circumstances warrant this special consideration, a formal request shall be made to Public Works Engineering. If the request is accepted, a Stand-Alone GESC Drawing shall be submitted for review and acceptance.

Applications for a Stand-Alone GESC Permit will not be considered in the following instance:

- If GESC Permit applications for Site Improvement Plans (SIP) are ahead of the formal SIP approval.

If a formal request for a Stand-Alone GESC Drawing review is made, it shall include, but not be limited to, each of the following items:

- A detailed explanation why special consideration should be given to a request to begin grading in advance of acceptance of the entire project. The request will not be considered if the Applicant has failed to plan appropriately for the required processing time, or if there are repeated plan submittals resulting from poor plan preparation and/or failures to comply with County standards.
- Payment of all review fees.
- A Stand-Alone GESC Drawing shall be submitted on 24x36 inch sheets containing a cover sheet, plan sheets, and Douglas County-approved details and notes per Douglas County *GESC Manual*, and shall be signed and stamped by a Colorado Registered Professional Engineer.
- Submittal of a "Hold Harmless" letter (Appendix H) shall be provided with the written explanation for the GESC Permit request.

For projects on residential properties 2.5 acres or larger that are adding impervious area the plans shall include the total site imperviousness including the proposed addition(s).

The review schedule for a Stand-Alone GESC Drawing is the same as required when a GESC Drawing is submitted as a part of the entire project. The initial review period will begin when the construction plans are submitted to the Douglas County Public Works Engineering . A new GESC Drawing may be required at the time of full submittal.

3.20.3 Submittal Requirements for Permanent Drainage Facilities. Construction Drawings and a Phase III Drainage Report shall be submitted in accordance with Public Works Engineering requirements for any permanent drainage or water quality facilities. The design of permanent drainage facilities shall be accepted prior to issuing a GESC Permit.

3.20.4 Submittal Requirements for Annual Maintenance GESC Permit. Annual Maintenance GESC Permits are required for Permittees who perform multiple routine maintenance projects (each of which will result

Submittal Requirements for Related Plans, continued

in less than one acre of land disturbance) each year including but not limited to: repair/replacement of outfalls, concrete pans, manholes, rundowns, trickle channels, culverts, drop structures, pipes, inlets, bank stabilization, and stormwater management facility sediment removal.

Due to the fact that this permit will be handled on an annual basis instead of on a project-by-project basis, the special conditions below will apply. These special conditions will be considered supplemental to the GESC Permit application.

- The Annual Maintenance GESC Permit shall be applied for by the Applicant at the beginning of the calendar year and shall expire 1 year from the date of issuance.
- An initial list of routine maintenance projects that are anticipated to be completed within the period of time covered by the Annual Maintenance GESC Permit shall be submitted as part of the Annual Maintenance GESC Permit application. The list shall include the project name, location, description, construction period, and the designated GESC Field Manager for each project. In the event that a project is added to the list, or a significant change occurs in the level of impact for a listed project, the project list shall be updated and resubmitted to Douglas County prior to construction of such projects.
- No submittal of GESC Plans or report shall be required for each of the routine maintenance projects covered under this permit; however, GESC measures shall be installed to meet the requirements of the *Douglas County GESC Manual.*
- The Applicant shall designate a GESC Manager for each routine maintenance project to fulfill the responsibilities discussed in the *GESC Manual*. The GESC Manager shall be the primary contact person in charge of coordinating/monitoring compliance with the GESC requirements.
- Prior to the start of construction on a specific project site a Preconstruction meeting with a Douglas County Erosion Control Inspector shall be held. Preconstruction meetings shall be scheduled through the Engineering Permits Staff.
- Douglas County shall have jurisdiction over any construction site that is being covered under the Annual Maintenance GESC Permit. If an Erosion Control Inspector visits the project site and determines that the Permittee is not fulfilling the requirements of the Annual Maintenance GESC Permit, the GESC Manager shall be informed, and corrections shall be made by the Permittee. If the situation is not corrected in a timely manner, enforcement action in accordance with Section 5.10 of the *GESC Manual* shall be followed. Permittees or projects that fail to comply with the requirements of the *GESC Manual* may be removed from the Annual Maintenance GESC Permit process and required to process their projects through the standard GESC process. Projects that exceed the scope allowed under the Annual Maintenance Permit, as determined by Douglas County, may be required to obtain a GESC Permit in

Submittal Requirements for Related Plans, continued

accordance with the *GESC Manual*.

- Final establishment of vegetation for all routine maintenance projects shall meet the coverage requirements of the *GESC Manual*. Monthly inspections for each project shall be conducted by the Permittee until the coverage requirements have been satisfied.
- The project list discussed above shall be updated as projects are added and closed out and removed. This update may occur on a weekly or monthly basis, depending on the scope of the maintenance project activities. The updated list shall be submitted to Douglas County, at a minimum, when a new maintenance project is added or if a project is closed out. The GESC Manager shall have an updated project list in his possession in order to monitor the Annual Maintenance GESC Permit.
- The issuance of the Annual Maintenance GESC Permit does not relieve the Permittee from complying with other local, State or Federal permitting requirements including, but not limited to, Floodplain Development Permit, Temporary Construction Access Permit, Right-of-Way Use and Construction Permit, United States Army Corp of Engineers 404, etc.

3.20.5 Submittal Requirements for Oil and Gas Well Facilities.

Submittal requirements for Oil and Gas Well Facilities GESC Drawings are as follows:

- A GESC Drawing for the site in accordance with the requirements found in this *GESC Manual*. The Oil and Gas Well Facility GESC Drawing shall comprise of 3 plan sheets, a cover sheet in accordance with 3.18.1, an Initial and Final GESC Drawing in accordance with the below and checklist found in Appendix D. (example plans are shown in Appendix C).

The Initial Plan shall show the area disturbed necessary to create the initial pad site, associated access roads, and all other areas of disturbance necessary to bring the well into production. The initial plan shall show, at a minimum, the following information and BMPs:

1. Property lines.
2. Existing and proposed easements.
3. Existing topography at 1 or 2 foot contour intervals, extending a minimum of 100 feet beyond the area of disturbance.
4. Location of any existing structures or hydrologic features within the mapping limits.
5. Survey point used for project.
6. Limits of Construction encompassing all areas of work, access points, storage and staging areas, borrow areas, stockpiles, and utility tie-in locations in on-site and off-site locations. Stream corridors and other resource areas to be preserved and all other areas outside the limits of construction shall be lightly shaded to clearly show area not to be disturbed.
7. General location of wells.
8. Sediment Basin (3.17.10) at the low point on the site.
9. Diversion Ditch (3.17.6) to route all stormwater runoff to the Sediment Basin.
10. Vehicle Tracking Control pad (3.17.20) at each entrance and exit.

Submittal Requirements for Related Plans, continued

11. Location of borrow or disposal areas.
12. Limits of any defined floodplain within 100 feet of any proposed disturbance associated with the oil and gas facility.
13. Location of temporary roads.
14. Location, map symbol, and letter callouts of all initial erosion and sediment control BMPs.
15. Information to be specified for each BMP, such as type and dimensions, as called for in the GESC Standard Notes and Details.
16. The following note:
    SEE COVER SHEET OF DOUGLAS COUNTY GESC STANDARD NOTES AND DETAILS (SHEET 1) FOR LEGEND OF BMP NAMES AND SYMBOLS.
17. Douglas County acceptance block.
18. Other information as may be reasonably required by Douglas County.

The Final GESC Drawing shall include site clean up, permanent improvements, regrading and revegetation of any disturbed areas and any additional temporary erosion and/or sediment controls necessary until the well site meets final stabilization. Final stabilization shall mean installation of all permanent improvements, stabilization of all driving/parking/storage areas with gravel or other acceptable surface material and vegetation of all disturbed areas that meets the requirements of Section 6.4.2. The final plan shall show, at a minimum, the following information/BMPs:

1. Existing topography in areas of proposed contours need not be shown.
2. Existing Initial BMPs shall be shown, (**screened**). Dimension information shall not be shown.
3. Location of permanent oil and gas facilities such as well heads, tanks, etc.
4. Location of all gravel driving/gravel parking/productions areas.
5. Seed and Mulch of all disturbed areas outside of the gravel driving/parking/productions areas.
6. Erosion Control Blanket on slopes steeper than 4:1.
7. Location of permanent drainage features including water quality facilities per the *Drainage Manual*, as amended.
8. Limits of any designated floodplain within 100 feet of any proposed disturbance associated with the oil and gas location.
9. Additional BMPs as required by Section 3 of the *GESC Manual*.
10. Directional flow arrows on all drainage features.
11. Any initial BMPs that are to be removed and any resulting disturbed area to be stabilized.
12. Location of all final erosion and sediment control BMPs (including Seeding and Mulching), permanent landscaping, and measures necessary to minimize the movement of sediment off site until permanent vegetation can be established.
13. Show other BMPs considered by the designer to be appropriate.
14. Include the following notes:
    - SEE COVER SHEET OF DOUGLAS COUNTY GESC STANDARD NOTES AND DETAILS (SHEET 1) FOR LEGEND OF BMP NAMES AND SYMBOLS.
    - SHADED BMPS WERE INSTALLED IN INITIAL OR INTERIM GESC PLAN AND, UNLESS OTHERWISE INDICATED, SHALL BE LEFT

Submittal Requirements for Related Plans, continued

IN PLACE AND MAINTAINED UNTIL REVEGETATION ESTABLISHMENT IS APPROVED BY THE COUNTY.

- SEE CONSTRUCTION PLANS FOR DETAILS OF PERMANENT DRAINAGE FACILITIES SUCH AS DETENTION FACILITIES, CULVERTS, STORM DRAINS, AND INLET AND OUTLET PROTECTION.

15. Douglas County acceptance block.
16. Other information as may be reasonably required by Douglas County.

BMP Cost Issues

3.21

Costs associated with grading, erosion, and sediment control BMPs include the following:

1. Installation of the BMPs indicated on the Initial, Interim, and Final GESC Drawings according to the number, types, dimensions, and quantities called for.
2. Provision of GESC Manager (see Section 5.1 for a description of the GESC Manager role) to supervise, inspect, and interface with Douglas County on the project's GESC Drawing.
3. Installation of additional BMPs that the Permittee(s) think are appropriate or that are called for by the Erosion Control Inspector to address actual site conditions. (As stated in Section 1.7, the GESC Permit process is a dynamic, not static, process; the Permittee(s) are responsible for adapting the original GESC Drawing as necessary to effectively reduce erosion and sediment, and must comply with any modifications to the plan required by the Erosion Control Inspector.)
4. Maintenance costs for BMPs. Maintenance costs will vary based on many factors, including the magnitude and number of storm events occurring during the project.

Permittee(s) are required to provide an Opinion of Probable Cost associated with implementing the GESC Drawing. Appendix I provides approximate unit cost information that shall be used to generate a cost opinion.

Variances

3.22

Douglas County may consider waiving or modifying criteria that are deemed inappropriate or too restrictive for site conditions. Variances may be granted at the time of plan submission or request for plan revision prior to the work being completed in the field. Variances requested after the work has been completed shall not be considered.

3.22.1 Variance Submittal Requirements. Any request for a variance shall be in a separate letter addressed to the Public Works Engineering Director. The letter shall define:

- The criteria from which the applicant seeks a variance.

Important! *Variances requested after the work has been completed shall not be considered.*

Variances, continued

- The justification for not complying with the criteria.
- Alternate criteria or standard measures to be used in lieu of these criteria. The criteria and practices specified within this section of the *GESC Manual* relate to the application of specific erosion and sediment control practices. Other practices or modifications to specified practices may be used if approved by Douglas County prior to installation. Such practices must be thoroughly described and detailed.

3.22.2 Staff vs. Administrative Variances. Some variances may be minor in nature; these staff variances may be granted by the Douglas County Public Works Engineering's Development Review Engineer and Development Review Manager. A minimum amount of supporting documentation will be required for such variances. More complicated variances will require a more extensive review. These administrative variances shall be reviewed by the Public Works Engineering Director.