

Section 3. Preparing a TESC Plan

Overview of Section 3

3.0

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

Step 4. Prepare a TESC Plan following the Ten Elements of an Effective TESC Plan, Design and Sizing Criteria for Control Measures, TESC Drawing Requirements, and TESC Report Requirements.

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

Section 3.2, **Control Measures to Address Erosion and Sediment**, identifies a number of standard control measures accepted for use in the Town of Castle Rock to control erosion and sediment on construction sites.

Section Highlight – Standard Control Measure Drawings

A set of TESC Plan Standard Notes and Details, included in Appendix B, has been prepared to establish a consistent approach to control measure implementation in the Town. These shall be attached to each TESC Drawing set.

Section 3.3, **Ten Elements of an Effective TESC Plan**, presents a systematic approach to select control measures for a TESC Plan. The Ten Elements are described in Sections 3.4 through 3.13.

Section Highlight – Ten Elements of an Effective TESC Plan

These ten elements provide Design Engineers with a step-by-step approach for selecting control measures to include on a TESC Plan.

Section 3.14, **Special Requirements for Vertical Residential Construction**, describes erosion and sediment control requirements for Vertical Residential Construction.

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 measures to use for Temporary Batch Plants.

Section 3.17, **Design and Sizing Criteria for Control Measures**, identifies the design parameters to be specified for each control measure on the TESC Plan and provides criteria for sizing control measures.

Sections 3.18, 3.19, and 3.20, **Standard TESC Drawing Requirements, Report Requirements, and Submittal Requirements for Related Plans**, list detailed information to in-

Section Highlight – Example TESC Drawings

Several example sets of TESC Drawings have been prepared to illustrate the selection and depiction of erosion and sediment control measures and can be found in the appendices.

clude on the various TESC documents. A checklist of requirements is included in Appendix G.

Section 3.21, **Control Measure Cost Issues**, Cost issues associated with the installation and maintenance of control measures are discussed.

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

Permit Step 4: Prepare a TESC Plan following the Ten Elements of an Effective TESC Plan, Design and Sizing Criteria for Control Measures, TESC Drawing Requirements, and TESC Report Requirements.
 Sections 3.1 through 3.21 discuss Step 4.

Principles of Erosion and Sedimentation

Once vegetation is removed, erosion proceeds unchecked.

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 control measures 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 *Urban Drainage and Flood Control District Volume 3*.

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 erosional processes. 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:

Raindrop Erosion. Raindrops detach soil particles and splash them

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.

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.

Rill Erosion. As the flow changes from a shallow sheet to a concentrated flow, the

Principles of Erosion and Sedimentation, continued

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 TESC Plan will

focus on the following:

- Controlling erosion potential by limiting the area and duration of disturbance.
- Requiring timely re-stabilization 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 non-eroding 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.

Section 3. Preparing a TESC Plan

Principles of Erosion and Sedimentation, continued



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

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.

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-percent effective; therefore, TESC 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.

Control Measures to Address Erosion and Sediment

3.2

The *TESC Manual* describes a number of standard control measures acceptable to the Town of Castle Rock for use in reducing erosion and sediment from construction activities. These control measures are shown in Table 3-1.

Table 3-1. Erosion and Sediment Control Measures

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

Section 3. Preparing a TESC Plan

Control Measures 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.

All control measures shall be indicated in the TESC Plans as being part of the Initial Stage, Interim Stage or Final Stage of construction.

The Town of Castle Rock TESC Plan Standard Notes and Details provide permittee(s) with comprehensive installation and maintenance information for all of the control measures accepted for use in the Town.

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 the Town of Castle Rock's standard drawings, entitled TESC Plan Standard Notes and Details, included in Appendix B. To take less space on the drawing, control measures are called out on a TESC Drawing using the two or three letter identifier and symbol shown in the Legend.

3.2.2 Type of Control. Three general types of control measures are shown:

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

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

- Initial Stage. These control measures 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 control measures shall be based on proposed grades and drainage features and are installed after initial site grading. For some control measures such as Inlet Protection, interim controls are installed after the construction of site infrastructure.
- Final Stage. Control measures shown in the Final Stage TESC Drawing shall be installed as one of the last steps in the construction process, such as final seeding and mulching.

3.2.4 TESC Drawings are to Use the Standard Control Measures.

When preparing TESC Drawings, the Design Engineer shall use the standard control measures shown in Table 3-1. These control measures have shown to be effective under actual construction site conditions within the Town of Castle Rock and therefore are accepted for use by the Town. A complete set of details for these accepted control measures (the Town of Castle Rock TESC Plan Standard Notes and Details - see Appendix B), has been prepared to illustrate the control measures shown in Table 3-1. All TESC Plans shall also include a scale and north arrow.

Control Measures to Address Erosion and Sediment, continued

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

If the Town approves additional control measures in the future (see Section 3.2.5), documentation of the additional control measures will be made available on the Town’s website (*CRgov.com*) or at the Development Services Department for inclusion in Section 11. Section 11 is intended to contain all of the revisions and additions to the *TESC Manual* that may be prepared prior to a complete updating of the *TESC Manual*.

3.2.5 Use of Alternative or Innovative Control Measures. The Town recognizes that there will be new advances in the development of erosion and sediment control measures that may prove effective, or even out-perform controls currently accepted. The Town of Castle Rock may allow, under strictly-controlled circumstances, the installation of erosion and sediment control measures other than the standard control measures 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 control measure shall also be submitted. The pilot program, if allowed, shall be undertaken for no more than 12 months. If the Town finds the control measure to be effective at the end of the testing period, a revision to the *TESC Manual* may be considered (revisions will be made available on the Town’s website (*CRgov.com/TESC*) or at the Development Services Department to all holders of the *TESC Manual* for inclusion in Section 11).

The use of alternative or innovative erosion or sediment control measures other than those already accepted for use by the Town of Castle Rock (shown in Table 3-1) may be allowed under the terms of the Pilot Program described in this section.

The Town reserves the right to reject any control measure proposed for the pilot program, either during the review period or during the field trial, if the pilot control measure does not perform with sufficient effectiveness. In the case of an unsuccessful field trial, one or more of the Town of Castle Rock standard control measures listed in Table 3-1 shall replace the failed pilot control measure at the Owner’s expense.

3.2.6 TESC Plan Standard Notes and Details. As discussed in Section 3.2.4, the Town of Castle Rock TESC Plan Standard Notes and Details, has been prepared to depict the control measures shown in Table 3-1. Construction details and notes provide direction to the permittee(s) regarding installation and maintenance requirements for each control measure. The Town of Castle Rock Standard Notes and

Control Measures to Address Erosion and Sediment, continued

Details shall be submitted with all TESC Drawings. They are available on the Town’s website (*CRgov.com*) or in Appendix B.

The TESC 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 Town of Castle Rock TESC Plan Standard Notes and Details serve several purposes:

- ◆ **Increased consistency.** Consistent details and notes for a standard set of control measures will increase the likelihood that control measures 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 control measures, and as field personnel gain experience constructing the standard control measures, 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 TESC Plan to locate and size the control measures. This will reduce the likelihood that information needed on the plans will be missing or unclear, or that control measures are improperly sized.

3.2.7 Selecting Control Measures for the TESC Drawings. Section 3.3 introduces a ten-step approach for developing a TESC Plan. Guidance is provided for selecting standard control measures for specific portions of a construction site. It is important to consider effectiveness and maintenance requirements when selecting control measures. Some control measures, such as silt fence, are relatively inexpensive to install the first time, but may be tougher to maintain or not as effective as other control measures. It is also important to follow the manufacturers specifications for a specific control measure.



The goal of TESC Plan Standard Notes and Details is to avoid the prevalence of improper control measure installations and insufficient maintenance.

Section 3. Preparing a TESC Plan

Ten Elements of an Effective TESC Plan



Information

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

3.3

This section describes a systematic approach to control erosion and sediment on a construction site. Ten Elements of an effective TESC Plan are summarized; the Town of Castle Rock requires that each of these elements be addressed in a TESC Plan.

Ten Elements of an Effective TESC 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.*

These Ten 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 Ten Elements are designed to reduce the amount and duration of erosion and trap most sediments that do erode prior to leaving the site.

A set of example TESC Drawings (shown in Appendix C) have been prepared in accordance with the Ten Elements to illustrate the concepts discussed herein and depict the information that shall be shown on TESC Drawings. Figure 3.1 relates the Ten Elements to the example TESC Drawings.

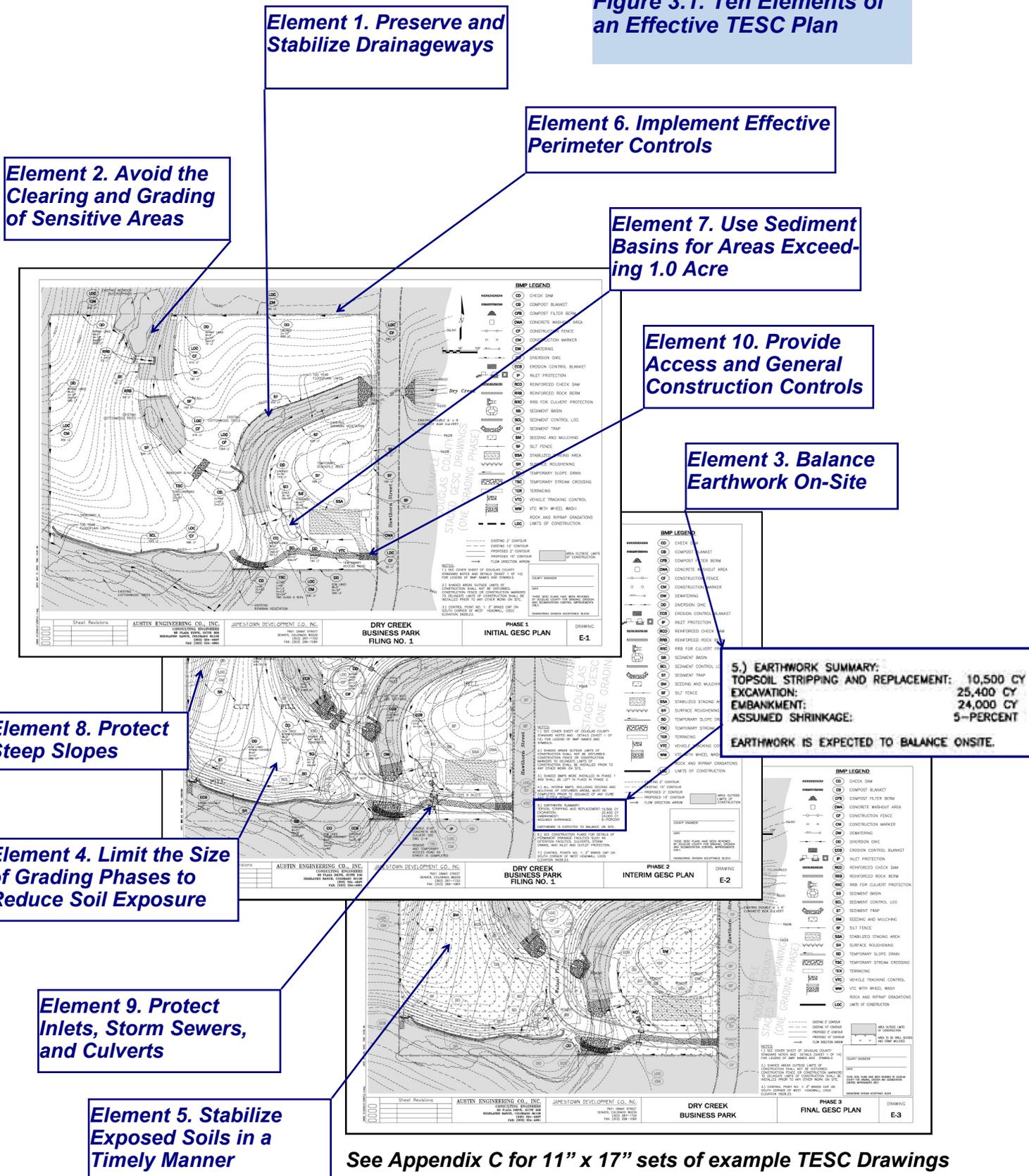
The following information has been included in the TESC Manual to assist the Design Engineer in developing an effective TESC Plan:

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

Section 3. Preparing a TESC Plan

Step 4. Prepare a TESC Plan following the Ten Elements of an Effective TESC Plan and Other Plan Requirements

Figure 3.1. Ten Elements of an Effective TESC Plan



See Appendix C for 11" x 17" sets of example TESC 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



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

stormwater runoff, they are susceptible to damage from the erosive

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

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 the Town. 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 Town. 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 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 the Town. Existing drainageways shall not be regraded or realigned without the approval of the Town.

Section 3. Preparing a TESC Plan

**Element 1.
Preserve and
Stabilize
Drainageways,
continued**

All existing drainageways on the site shall be delineated on TESC Drawings to the limit of their 100-year floodplains (based on future development peak discharges). Limits of construction shall be clearly shown on TESC Drawings to indicate the exact limits of grading adjacent to a drainageway and to delineate the limits of the undisturbed riparian corridor.

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 aggradations 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.

Freeboard over the future development 100-year water surface elevation must be provided as outlined in the Town's Drainage Regulations, as amended.

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 must be provided as outlined in the *Town's Drainage Regulations*, 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, however, the natural channel shall be preserved to the maximum extent possible. 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 Regulations*, as

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

amended. **Under no circumstances shall broken up concrete or asphalt be used for bank stabilization.**

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 TESC Drawing within the drainageway corridor to indicate the allowable limits of disturbance. In the same manner, construction fence or construction markers shall be shown throughout the site to identify all limits of construction (along all perimeters of the site, along all stream corridors to be preserved, and around any other preservation zones). Coordinates or other information shall be provided to establish the location of the fence.

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



**Element 1.
Preserve and
Stabilize
Drainageways,
continued**

Important! *What about straw bales? Straw bales are not an accepted sediment control measure for TESC Permitted projects in the Town; the track record for effective long-term performance of straw bales in the Town has not been strong.*



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 proximity, one check dam at the downstream end of the construction may be appropriate (in general, control measures 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 limited to one per 2000 lineal feet of drainageway unless otherwise approved by the Town.

*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.*



As soon as possible after construction of facilities in drainageways, or after removal of a temporary stream crossing, all disturbed areas within 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, banks and all slopes equal to and steeper than 4:1. The Design Engineer shall indicate approximate limits of erosion control blanket on the TESC Drawing. These limits shall extend to the top of the banks. Additional design information for erosion control blanket is provided in Section 3.17.7.

***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.*



**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 and discharged to stable outlet points. 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 Town of Castle Rock *Drainage Regulations*, 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.*



Section 3. Preparing a TESC Plan

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 TESC 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 TESC 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 TESC Drawings. To reduce impacts on Town roadways, development projects are encouraged to balance earthwork onsite.

Section 3. Preparing a TESC Plan

**Element 3.
Balance
Earthwork On
Site, continued**

In the event that it is impractical to balance earthwork quantities, an Authorization for Haul Route application shall be included with the review submittal for the import or export of material. The submittal shall include the following, at a minimum:

- Amount of material to be imported or exported
- Location of disposal site if export or source site if import
- TESC 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

TESC Drawings shall be prepared for the import or export site in accordance with the *TESC Manual*, and applicable permits, fees and fiscal surety shall 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 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

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 the TESC Plan shall match the phasing from the Development Agreements (DA), the Subdivision Improvements Agreement (SIA), the Public Improvement Agreement (PIA), and/or the Public Improvement Plans, 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 DA, SIA, PIA, and Public Improvement 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 the Town of Castle Rock. 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. 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 TESC Drawings for each phase.
10. Ensure that the TESC Plan for later upstream phases address potential impacts to already completed downstream phases of the construction site.

Section 3. Preparing a TESC Plan

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

Information
Phased TESC Plans shall be configured to be consistent with DA, SIA, and PIA phasing, including Public Improvement Plan.

mitigating expansive soils or addressing similar issues, each phase may disturb up to a maximum of 70 acres, as approved by the Town. Drill seeding and crimp mulching shall be completed within seven days of the Stormwater Inspector's acceptance of the phase or a Stop Work Order shall be issued (see Section 5.10.3). If site conditions prevent installation, permittee(s) shall notify the Stormwater Inspector in writing of the other control measure(s) to be employed as listed in 3.8 below until conditions allow for seeding and crimping.



Phased grading operations shall be configured to match the phasing of the Development Agreement (DA) or Subdivision Improvements Agreement (SIA) for detached single-family residential projects. This includes ensuring that the TESC Drawing phases are consistent with Public Improvement Plans. 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

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

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, the Town requires that disturbed areas be drill seeded and crimp mulched, or permanently landscaped, within 30 days from the start of land disturbance activities or within seven days of the substantial completion of grading and topsoiling operations, whichever duration is shorter. Topsoil stripping, stockpiling, and re-spreading in areas to be vegetated shall be a mandatory practice called for in all TESC Drawings. Adequate "footprints" for topsoil stockpiles shall be shown assuming stockpile slopes are no steeper than 3 to 1.

The control measures applicable to stabilizing exposed soils consist of **Surface Roughening (SR)**, **Seeding and Mulching (SM)**, **Erosion Control Blanket (ECB)**, and **Compost Blanket (CB)**.



Erosion control blanket protecting a slope.

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 for erosion control blanket is provided in Section 3.17.7.

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.



Surface roughening shall be shown for all disturbed areas and drill seeding and crimp mulching shall be shown for all areas that shall not be paved, sodded, landscaped or otherwise stabilized in an approved manner.

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

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 areas around the Town. This Town-accepted control measure 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 shall be captured in a **Diversion Ditch (DD)** 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 short-term installations only), or riprap. Design Engineer must evaluate impacts to water rights.

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 control measures apply to the downslope perimeters of construction disturbance (generally the downhill site perimeters), 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 control measures 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 installations only), or riprap.



**Element 6.
Implement Effective
Perimeter Controls,
continued**

Of these four control measures, a reinforced rock berm, sediment control log, and silt fence function best when installed level, on a contour. However, these control measures may slope up to 5 percent from horizontal in accordance with the design information provided in Section 3.17.14. In the Town’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, control measures are to be configured to control erosion and sediment outside the limits of drainageways so that instream control measures 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)**. 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 control measures 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 facility shall incorporate a sediment basin with at least half of the sediment basin required storage volume 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.

3.10.1 Temporary Substitutes for Sediment Basins (SB)

Sediment Basins (SB) are required on all sites with disturbed areas larger than 1 acre. The permittee is responsible for installing and maintaining the sediment basin to the extent physically possible in sequencing and phasing of earthmoving operations. The Town understands that circumstances may exist where implementation of temporary sediment basins is unfeasible during certain phases of grading operations based on boundary conditions and other limitations outside the control of the permittee. In the event that implementation of standard sediment basins is anticipated to be physically unfeasible, the following constraints may be considered for the acceptance of substitute controls. Prior to commencing earthwork operations, an action plan (redlined TESC Plan) identifying the selected control measure(s) along with the timing of such controls shall be submitted to the Stormwater Inspector for acceptance. Generally, sites must either provide on-site volumetric treatment prior to discharge, ensure on-site retention to prevent untreated discharge or only in extreme and limited cases reduce discharge to the maximum extent through infiltration techniques as further outlined below:

1. Relocate and/or redistribute temporary sediment basins and diversion ditches as needed to accommodate phased grading operations. The overall volume requirements are to be maintained at designated discharge points as shown on the TESC Plan. This field change shall be documented on the TESC Plan and submitted to the Stormwater Inspector for acceptance prior to implementation.
2. Minimize discharge areas through on-site retention, but in no case allow more than 1 acre of concentrated runoff from the site at any one location without volumetric controls (i.e. direct flows to

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

temporary cut areas with volumes greater than or equal to 2.5 times the required sediment basin volume). Other temporary control measures such as silt fence, check dams, temporary sediment traps are to be implemented as needed for these smaller runoff areas prior to discharge. A redlined TESC Plan showing proposed areas, volumes, acreage and timing of this drainage control measure shall be submitted to the Stormwater Inspector for acceptance prior to implementation.

- 3. In some extreme cases and for limited periods of time during earthmoving operations, sites may encounter areas larger than 1 acre that have the potential to discharge from the site. After all other means have been exhausted, implementation of on-going deep surface roughening (furrows a minimum of 6"-12" deep) to reduce runoff from large disturbed areas may be the only drainage control possible. Deep surface roughening shall be refreshed on active grading areas at the end of each day until the sediment basin(s) are reinstalled. A redlined TESC Plan showing proposed areas, volumes, acreage and timing of this drainage control measure shall be submitted to the Stormwater Inspector for acceptance prior to implementation.

Ultimately, site drainage control is the responsible of the permittee to operate within the constraints of the TESC Permit and the approved TESC Plan. If at any time it is determined by the Stormwater Inspector that the site controls are inadequate, a stop work order may be issued until the necessary controls are implemented.

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 shall locate 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).

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 where other approved means of stabilization cannot be achieved. All instances where means of stabilization other than retaining walls are proposed must be submitted to the Town of Castle Rock



Erosion Control Blanket (ECB) shall be used on slopes equal to or steeper than 4:1.

Element 8.
Protect Steep Slopes,
continued

Stormwater Division for approval. Slopes equal to or 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, a minimum of 6 feet between the property line and the top of the cut slope shall be reserved for the diversion ditch, unless otherwise accepted by the Town.

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 3.17.20.

***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 control measures 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 TESC 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



***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.*

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.

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

All culvert inlets on a site shall be provided with a **Reinforced Rock Berm (RRB)**.

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



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 Regulation*, as amended. 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 TESC 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 Town 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 measures 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 all perimeters of the site, along all stream corridors to be preserved, and around any other preservation zones). Construction fence installation notes as found in Appendix B require that construction fence or other means defining all limits of construction 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 eight percent) shall be avoided.

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 connected to the vehicle tracking control.

*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 TESC 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 TESC 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 TESC Drawing.

3.14

Special Requirements for Vertical Residential Construction. See Section 8 for Vertical Residential Construction requirements.

3.15

As the Town of Castle Rock grows, so does the demand for installation of new underground utility lines, and upgrade and maintenance of existing lines. Many times this work is located in streets, where storm sewer inlets can be impacted, or along or across drainageways. Although the work is generally short lived, the close proximity to storm drainage systems provides an ample opportunity for contamination of stormwater runoff. A TESC Plan for underground utility work should configure control measures to reduce the contamination of stormwater

**Special
Requirements
for Vertical
Residential
Construction**

**Special
Requirements
for Utility
Construction**

Special Requirements for Utility Construction, continued

runoff from construction erosion and sediment.

At a minimum, all utility line construction shall comply with the following:

- Obtain TESC Permit prior to the start of construction.
- All utility work within a Town of Castle Rock right-of-way shall be required to obtain a Town of Castle Rock Construction Permit in accordance with the *Transportation Design Criteria Manual*, as amended, and may require a landscape/irrigation permit.
- Provide adequate erosion and sediment controls.
- No more than 300 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 seven 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 *TESC 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 TESC Permit (even if the plant is to be located inside the limits of construction of a TESC-permitted project).

TESC Permits for temporary batch plants are valid for one year from the date issued. The site shall be reclaimed per the associated reclamation plan prior to the end of the one-year permit cycle. A Temporary Batch Plant/TESC Permit renewal application may be considered for a Temporary Batch Plant/TESC Permit extension. The request for renewal shall be made no later than 30 days prior to the expiration of the Temporary Batch Plant/TESC Permit. All extensions are contingent on the applicant reapplying for the Temporary Batch Plant/TESC Permit and

Special Requirements for Temporary Batch Plants, continued

Design and Sizing Criteria for Control Measures

completion of a satisfactory site inspection to ensure that the site is in compliance with the Temporary Batch Plant TESC Plan. The license agreement from the property owner shall be resubmitted with the request for a time extension.



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

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

3.17

All of the design parameters outlined on the Town of Castle Rock accepted details shall be specified for each control measure selected, as indicated on the Town of Castle Rock TESC Plan Standard Notes and Details 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 control measure exists. Design guidance is provided in the following paragraphs for each of the Town of Castle Rock-accepted control measures.

3.17.1 Check Dam (CD) and Reinforced Check Dam (RCD). Design parameters to be specified on the plan-view TESC 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

The type of check dam is based on the drainage area upstream of the check dam. A **Reinforced Check Dam (RCD)** shall be used for drainage areas greater than 130 acres. A non-reinforced **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 twenty 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 two-year return period event for development conditions expected during the operation of the check dam.

Design and Sizing Criteria for Control Measures, continued

3.17.2 Compost Blanket (CB) and Compost Filter Berm (CFB).

Design parameters to be specified on the plan-view TESC 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 material composition

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 TESC Drawings. The use of vehicle tracking control in conjunction with a concrete washout area is mandatory.

3.17.4 Construction Fence (CF) and Construction Markers (CM).

Design parameters to be specified on the plan-view TESC 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 or construction markers shall be shown throughout the site to identify the limits of construction. 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. Either construction fence or markers should be considered for the remainder of the site.

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

- 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.

Unless otherwise approved, the discharge from dewatering operations is to be directed into a sediment basin that has been constructed on the site.

Design and Sizing Criteria for Control Measures, continued

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 TESC 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 (D_{50}) needs to be specified

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

3.17.7 Erosion Control Blanket (ECB). Design parameters to be specified on the plan-view TESC 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 and shall have a minimum product life of two years for channel applications and twelve 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 two-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 unvegetated channel conditions, for allowable types of erosion control blankets.

A double-net straw or excelsior blanket shall be used for all slopes equal to or steeper than 4:1, outside of drainageways. Concave slope areas that may concentrate sheet flows as well as all other drainage

Information

i 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 two years.

Design and Sizing Criteria for Control Measures, continued

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 Regulations*, as amended.

The TESC 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 Regulations*, as amended, and shown on the construction drawings for the project.

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	NA	NA	0.7	0.028 for D>=2.0' 0.066 for D<=0.5'	2.00	5.0

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

For depths between 0.5 and 2.0 feet, the 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.

Design and Sizing Criteria for Control Measures, continued

The erosion control blanket shown herein shall be fabricated from 100 percent 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 Regulations*, as amended. The blanket is to provide erosion protection until the vegetation is established, and it is therefore an important component of an effective TESC Drawing.

Figure 3.2. Erosion Control Blanket Design Criteria

		Shear Stress, lbs/sf										
		0.25	0.5	0.75	1	1.25	1.5	1.75	2	2.25	>2.25	
Velocity, fps	1	All four types of ECB allowed					All but 100% straw allowed		Excelsior and 100% coconut allowed	100% coconut allowed	Outside allowable range	
	2											
	3											
	4											
	5											
	>5	Outside allowable range										

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 Regulations*. 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 TESC Drawings at all street and area inlets. The TESC Drawing shall indicated the type of inlet protection, either sump or continuous-grade for curb-opening inlets, or area inlet protection.

Providing temporary inlet protection in accordance with the TESC Drawing Standard Notes and Details, as well as determining the length of the reinforced rock berm to fit the inlet is the responsibility of the permittee(s).

Design and Sizing Criteria for Control Measures, continued

3.17.9 Reinforced Rock Berm (RRB). Design parameters to be specified on the plan-view TESC 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 two-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 twenty acres of upstream drainage area).

3.17.10 Sediment Basin (SB). Design parameters shall be specified on the plan-view TESC 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 TESC 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 fifteen acres, a *USDCM 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 1800 cubic feet per upstream acre, shall be determined from Table 3-3. 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 forty hours.

A 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.

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 forty-hours may be used as the sediment basin outlet as long as at least half of the

Design and Sizing Criteria for Control Measures, continued

sediment basin volume is provided below the lowest orifice of the permanent outlet works. The permittee is responsible for the removal and accumulated sediment prior to the completion of the permanent detention or water quality basin.

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

3.17.11 Sediment Control Log (SCL). Design parameters to be specified on the plan-view TESC 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 to be specified on the plan-view TESC Drawings 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 1800 cubic feet per upstream acre.

Design and Sizing Criteria for Control Measures, continued

3.17.13 Seeding and Mulching (SM). Design parameters to be specified on the plan-view TESC 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 Town, 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 Town of Castle Rock TESC Drawing Standard Notes and Details (see Appendix B). Some of the main requirements include the following:

- Existing topsoil shall be stripped to a depth of six inches (unless otherwise approved) from areas to be disturbed. The stripped topsoil shall be stockpiled during grading operations, then replaced to a depth of at least six inches in all areas to be seeded. If quantities of on-site topsoil are inadequate to provide a replaced depth of six inches, the permittee(s) will have to import topsoil or condition the soil as approved by the Town of Castle Rock. 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 six inches.
- All seeding shall be accomplished using a drill seeder at a depth of seeding not less than 1/4-inch and not more than 3/4-inch and at the rates specified in the TESC Drawing Standard Notes and Details. In small areas that are impossible to drill seed, the permittee(s), with the Town's prior approval, may hand broadcast seed at twice the drilled rate, lightly rake to cover the seed, and crimp mulch.
- Straw mulch shall be applied at two tons per acre and mechanically crimped into the soil. Revegetation is considered complete when the site is adequately covered with the variety

What about Hydraulic Seeding / Hydraulic Mulching?

Important! 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 the Town of Castle Rock and surrounding areas. As a result, hydraulic seeding and mulching shall not be allowed on TESC permitted projects.



Design and Sizing Criteria for Control Measures, continued

and species found in the Town of Castle Rock (same as Douglas County) approved mix. 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. Seeded and mulched areas shall be inspected monthly. Repairs and reseeding and mulching shall be undertaken after the first growing season for any areas failing to meet required coverage as stated above.

The TESC Permit shall be active until revegetation has reached completion and Final Close-out Acceptance is granted (*Refer to Section 8 for Vertical Residential TESC Permitting*). Seeding and mulching operations must be undertaken when a TESC Permit expires and no renewal is granted.

3.17.14 Silt Fence (SF). Design parameters to be specified on the plan-view TESC 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-percent), but shall not be placed in a location where the fence slope exceeds five percent 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 fifteen 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 placed upslope at least one 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 five percent 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 one foot) and the limits of construction can extend relatively close to the perimeter.

Design and Sizing Criteria for Control Measures, continued

If the perimeter slopes more than five percent, 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 five percent slope) and “overlapping” by at least fifteen feet. In this case, the sections of silt fence will occupy a relatively

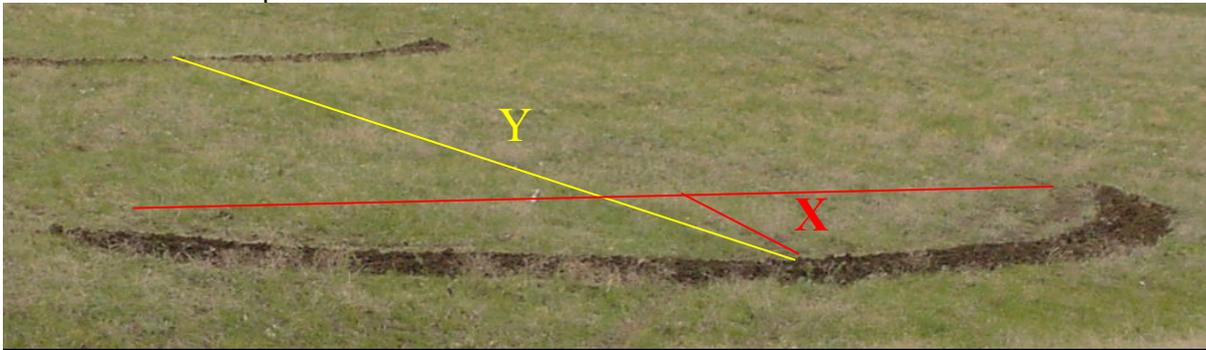


Table 3-4. Silt Fence on Slope

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

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 the Town of Castle Rock 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 five percent (a diversion ditch may be a good option for perimeters flatter than five percent as well).

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



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

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

Design and Sizing Criteria for Control Measures, continued

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

- Type 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 two-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 TESC Drawings include the following:

- Location of staging area
- Approximate area (A) in square yards of the staging area

Gravel, road base, or recycled concrete may be used for the stabilized staging area.

3.17.17 Surface Roughening (SR). Since surface roughening is to be performed in all disturbed, graded areas on a site, the location of surface roughening does not need to be indicated. However, as a reminder, the surface roughening (**SR**) symbol is to be shown on the TESC Drawing.

3.17.18 Stream Crossing (SC). Design parameters to be specified on the plan-view TESC 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
- 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 two-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

Design and Sizing Criteria for Control Measures, continued

structural capacity of the crossing shall be the responsibility of the Design Engineer.

3.17.19 Temporary Road Crossing (TRC) Design parameters to be specified on the plan-view TESC Drawings include the following items:

- Location of road crossing

A location shall be selected that avoids disturbance of trees or desirable vegetation, or installing over inlets, ramps, manholes, valves and other surface utilities.

3.17.20 Terracing (TER). Design parameters to be specified on the plan-view TESC Drawings include the following items:

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

Terracing may be used on 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.

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

- Location of all vehicle tracking controls.

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 and from a construction site must be shown on the TESC Plans, and are reviewed and approved as part of the TESC Permit. 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.

3.17.22 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 Stormwater Inspector, typically, only if vehicle tracking onto public streets becomes a major problem.

Standard TESC Plan Drawing Requirements

3.18

The following TESC Drawing requirements shall be adhered to when preparing a Standard TESC Drawing. Specific requirements vary based on the three types of Standard TESC Drawings described in Section 2. Drawing requirements for a Staged TESC Permit (separate drawings for the Initial, Interim, and Final Stages) are discussed in the following paragraphs. Requirements for Small Site and Utility TESC Drawings and Staged and Phased TESC Drawings are shown in Sections 3.18.9 and 3.18.10, respectively. Submittal requirements for the Temporary Batch

**Standard
TESC Plan
Drawing
Requirements,
continued**

Plant TESC Drawings, Early Grading TESC Drawings, and Temporary Stockpile TESC 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 TESC Drawing to ensure that each of the requirements is addressed.

All TESC Drawings, which are also required for off-site borrow or disposal areas, shall be prepared on 22" by 34" or 24" by 36" sheets at a scale of one-inch to twenty-feet up to one-inch to 100-feet, as appropriate, to clearly show sufficient detail for review. An example set of TESC Drawings for Staged/Phased permits is provided in Appendix C.

As discussed in Section 2.2, TESC 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 TESC Drawing Cover Sheet. A separate cover sheet is required for all TESC Plans. It shall include the following:

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 *TEMPORARY EROSION AND SEDIMENT CONTROL PLAN* INCLUDED HEREIN IS ON FILE AT THE TOWN OF CASTLE ROCK AND APPEARS TO FULFILL APPLICABLE TOWN OF CASTLE ROCK TEMPORARY EROSION AND SEDIMENT CONTROL CRITERIA, AS AMENDED. ADDITIONAL TEMPORARY EROSION AND SEDIMENT CONTROL MEASURES MAY BE REQUIRED OF THE PERMITTEE(S) DUE TO UNFORESEEN EROSION PROBLEMS OR IF THE SUBMITTED TESC PLAN DOES NOT FUNCTION AS INTENDED. THE REQUIREMENTS OF THIS TESC PLAN SHALL RUN WITH THE LAND AND BE THE OBLIGATION OF THE PERMITTEE(S) UNTIL SUCH TIME AS THE TESC PLAN IS PROPERLY COMPLETED, MODIFIED OR VOIDED.

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

THE *TEMPORARY EROSION AND SEDIMENT CONTROL*

**Standard
TESC Plan
Drawing
Requirements,
continued**

PLAN INCLUDED HEREIN HAS BEEN PREPARED UNDER MY DIRECT SUPERVISION IN ACCORDANCE WITH THE REQUIREMENTS OF THE *TEMPORARY EROSION, AND SEDIMENT CONTROL (TESC) MANUAL* OF THE TOWN OF CASTLE ROCK, AS AMENDED.

9. Town Acceptance Block (see Appendix F).
10. General Location Map at a Scale of 1-inch to 1000- feet to 8000-feet indicating:
 - General vicinity of the site location.
 - Major roadway names.
 - North arrow and scale.

3.18.2 TESC 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 one sheet. Areas of coverage of the multiple blow-up sheets are to be indicated as rectangles on the index sheet.

3.18.3 Initial TESC Drawing. This drawing sheet shall provide temporary erosion and sediment controls for the initial clearing, grubbing and grading of a project. Control measures should generally be sufficient to cover construction activities through the completion of overlot grading. At a minimum, it shall contain:

1. Property Lines.
2. Existing topography at one- or two-foot contour intervals, extending a minimum of 100 feet beyond the property line.
3. Location of any existing structures or hydrologic features within the mapping limits.
4. USGS Benchmark and note that NAVD88-Datum was used for project.
5. 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.
6. Location of stockpiles, including topsoil, imported aggregates, and excess material.
7. Location of storage and staging areas for equipment, fuel, lubricant, chemicals (and other materials) and waste storage.
8. Outlines of cut and fill areas.
9. Summary of cut and fill volumes.

Standard TESC Plan Drawing Requirements, continued

10. Location of temporary roads.
11. Location of borrow or disposal areas.
12. Location, map symbol, and letter callouts of all initial erosion and sediment control measures.
13. Information to be specified for each control measure, such as type and dimensions, as called for in the Standard Notes and Details.
14. The Control Measure Legend from the cover sheet of the Town of Castle Rock Standard Notes and Details.
15. The following notes:
 - REMOVAL OF CONTROL MEASURES SHALL NOT OCCUR WITHOUT THE APPROVAL OF THE STORMWATER INSPECTOR.
 - ALL PAVED SURFACES MUST REMAIN FREE OF ALL SEDIMENT AND MAY REQUIRE STREET SWEEPING AT THE DISCRETION OF THE STORMWATER INSPECTOR.
16. Town of Castle Rock approval block.
17. Design Engineer sign-off block.
18. Other information as may be reasonably required by the Town of Castle Rock.

3.18.4 Interim TESC Drawing. This drawing sheet shows temporary erosion and sediment control measures during site construction. At a minimum, it shall contain the following information:

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

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

4. Proposed topography at one- or two-foot contour intervals, showing elevations, dimensions, locations, and slope of all proposed grading.
5. 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 TESC Drawing.
6. Location of all buildings, drainage features and facilities, paved areas, retaining walls, water quality facilities, or other permanent features to be constructed in connection with, or as a part of, the proposed work, per approved plat, Final Planned Development Site Plan (FPDSP), or other improvement plan.
7. The Control Measure Legend from the cover sheet of the Town of Castle Rock Standard Notes and Details.
8. The following notes:

Standard TESC Plan Drawing Requirements, continued

- SHADED CONTROL MEASURES WERE INSTALLED IN INITIAL STAGE AND SHALL BE LEFT IN PLACE IN INTERIM STAGE UNLESS OTHERWISE NOTED.
- SEE PUBLIC IMPROVEMENT CONSTRUCTION PLANS FOR DETAILS OF PERMANENT DRAINAGE FACILITIES SUCH AS DETENTION FACILITIES, WATER QUALITY FACILITIES, CULVERTS, AND STORM DRAINS.
- REMOVAL OF TEMPORARY EROSION AND SEDIMENT CONTROL MEASURES SHALL NOT OCCUR WITHOUT THE APPROVAL OF THE STORMWATER INSPECTOR.
- ALL PAVED SURFACES MUST REMAIN FREE OF ALL SEDIMENT AND MAY REQUIRE STREET SWEEPING AT THE DISCRETION OF THE STORMWATER INSPECTOR.

9. Town of Castle Rock acceptance block.

10. Design Engineer sign-off block.

3.18.5 Final TESC Drawing. This drawing sheet shows controls for final completion of the site including final stabilization and temporary sediment controls through revegetation. At a minimum, this drawing sheet shall contain the indicated information:

The Final TESC 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 control measures 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 control measures that are to be removed and any resulting disturbed area to be stabilized.
5. Location of all Final erosion and sediment control measures, 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 approved plat, FPDSP, SIA, or other improvement plan or agreement.
7. Show seeding and mulching (SM) everywhere except buildings and pavement areas.
8. Show other control measures considered by the Designer Engineer to be appropriate.
9. Show the following control measures to be removed at the end of construction:

Standard TESC Plan Drawing Requirements, continued

- dewatering (DW)
 - temporary stream crossings (SC)
 - stabilized staging area (SSA)
 - vehicle tracking control (VTC)
 - construction fence (CF)
10. The Control Measure Legend from the cover sheet of the Town of Castle Rock Standard Notes and Details.
 11. Include the following notes:
 - SHADED CONTROL MEASURES WERE INSTALLED IN INITIAL OR INTERIM TESC DRAWING AND, UNLESS OTHERWISE INDICATED, SHALL BE LEFT IN PLACE UNTIL REVEGETATION ESTABLISHMENT IS APPROVED BY THE TOWN.
 - SEE PUBLIC IMPROVEMENT CONSTRUCTION PLANS FOR DETAILS OF PERMANENT DRAINAGE FACILITIES SUCH AS DETENTION FACILITIES, WATER QUALITY FACILITIES, CULVERTS, AND STORM DRAINS
 - REMOVAL OF TEMPORARY EROSION AND SEDIMENT CONTROL MEASURES SHALL NOT OCCUR WITHOUT THE APPROVAL OF THE STORMWATER INSPECTOR.
 - ALL PAVED SURFACES MUST REMAIN FREE OF ALL SEDIMENT AND MAY REQUIRE STREET SWEEPING AT THE DISCRETION OF THE STORMWATER INSPECTOR.
 11. Town of Castle Rock acceptance block.
 12. Design Engineer sign-off block.
 13. Other information as may be reasonably required by the Town of Castle Rock.

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

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

3.18.8 Drawing Requirements for Small Site and Utility TESC Drawings. These Drawing requirements are the same as for TESC 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 TESC Drawings. TESC Drawing requirements for Staged and Phased TESC Drawings are the same as for Staged Plans, except that each phase of construction (less than 40 acres of disturbance, or 70 acres for over-excavation projects) shall be shown separately (with Initial, Interim, and Final stages shown on individual sheets).

Standard TESC Report Requirements

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

3.19

A TESC Report is required for all projects that require a Standard TESC Permit.

3.19.1 TESC Projects that require a CDPHE General Permit. For TESC Projects that are also required to obtain a General Permit from the CDPHE, the State required Stormwater Management Plan (SWMP) can be utilized as the TESC 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 CDPHE web site.

Projects that utilize the SWMP as the TESC Report shall provide the Town with the following information that may not be included in the SWMP.

1. Opinion of probable cost for installation of control measures - An opinion of probable costs for erosion and sediment control, including anticipated maintenance during the construction phase, shall be submitted with the TESC Drawing(s). This will be reviewed by Town staff and used as a basis for Fiscal Surety (discussed in Section 4.10 of this TESC Manual).
2. Areas and Volumes—An estimate of the quantity (in cubic yards) of excavation and fill involved (showing 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 blanket selection.

3.19.2 TESC projects that do not required a CDPHE General Permit. For TESC Projects that are not required to obtain a General Permit from the CDPHE, the applicant shall submit a TESC Report that contains the below information:

1. Name, address, and telephone number of the applicant – The name, address, and telephone number of the Design Engineer preparing the TESC 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.
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

Standard TESC Report Requirements, continued

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, soil structure, and construction limitations. (This information may be obtained from the soil report for the site, for adjacent sites if acceptable to the Town, 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 *TESC 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 measures. 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 standard notes and details.
12. Opinion of probable cost for installation of control measures – An opinion of probable costs for erosion and sediment control, including anticipated maintenance during the construction phase, shall be submitted with the TESC Plan. This will be reviewed by Town staff and used as a basis for Fiscal Surety (discussed in Section 4.9 of this *TESC Manual*).

The spreadsheet that shall be used for preparing the opinion of probable costs for erosion and sediment control is included in Appendix H.

13. Calculations – Any calculations made for the design of such items as sediment basins/traps, channels, outlets, riprap aprons or erosion control matting selection.

Standard TESC Report Requirements, continued

14. Other information or data – As may be reasonably required by the Town of Castle Rock.
15. The following note – “THIS *TEMPORARY EROSION AND SEDIMENT CONTROL PLAN* HAS BEEN PLACED ON FILE AT THE TOWN OF CASTLE ROCK AND APPEARS TO FULFILL THE APPLICABLE TOWN OF CASTLE ROCK *TEMPORARY EROSION AND SEDIMENT CONTROL* CRITERIA. ADDITIONAL 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 TESC Plan.

Submittal Requirements for Related Plans

3.20

3.20.1 Submittal Requirements for Temporary Batch Plant/TESC

Drawings. Submittal requirements for Temporary Batch Plant TESC Drawings are as follows:

- A TESC Drawing for the site in accordance with the requirements found in this *TESC Manual*. The Batch Plant TESC Drawing shall comprise two plan sheets, an Initial and Final TESC Drawing (example drawings are shown in Appendix D). The Initial Drawing shall utilize at a minimum the following control measures:
 - 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 (3.17.22) 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 TESC 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 Surety (see Section 4.9) for the installation and maintenance of the temporary erosion and sediment controls and site reclamation.
- A lease agreement from the property owner (if applicable).

Submittal Requirements for Related Plans, continued

- A copy of all associated State and Federal permits.
- All access points to or from a construction site must be shown on the TESC Drawings and reviewed and approved as part of the TESC Permit. No ramps of dirt, gravel, asphalt, wood, or other materials are allowed in the curb section.

3.20.2 Submittal Requirements for Early Grading TESC Permits. As discussed in Section 2.5.1, the Town of Castle Rock generally discourages requests for Early Grading Permits-TESC Drawing reviews, followed by applications for a TESC Permit, separate from and in advance of an “Entire Project” approval.

(“Entire Project” refers to all documents, processes and hearings that are required by the Town of Castle Rock for a complete project submittal and approval.)

However, the Town of Castle Rock recognizes the fact that there may be an occasional circumstance where consideration may be made to accept an application for a TESC 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 is not generally preferred by the Town of Castle Rock, and it should not be considered to be a standard of practice.

The following considerations may be weighed in the determination to accept or deny an application for Early Grading TESC permit:

- If the anticipated entire project approval will occur in less than four weeks.
- If it is recognized that the entire project is just beginning the review process.
- If TESC Permit applications are considerably ahead of the formal Public Improvement Construction Plans.
- If requests to begin grading in advance of the entire project approval are for an area less than five acres.
- The necessity for and approval of a Construction Permit through the Public Works Department for grading operations.
- The need for an administrative TESC Permit extension, Field Change Order or separate Permit and applicable inspection fee at the time of entire project approval.

If circumstances warrant this special consideration, a formal request shall be made to the Town. If the request is accepted a Early Grading TESC Drawing shall be submitted for review and acceptance. The Early Grading TESC Drawing Submittal shall include, but not be limited to, each of the following items:

- A detailed explanation why special consideration should be given

Submittal Requirements for Related Plans, continued

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 Town standards.

- Payment of all review fees.
- A Early Grading TESC Drawing Set shall be submitted on 22" x 34" or 24" x 36" sheets containing a cover sheet, plan sheets, Town-approved details and notes per the Town of Castle Rock TESC Manual, and shall be signed and stamped by a Colorado Registered Professional Engineer.
- Submittal of a Phase II Drainage Report.
- Approval of a Construction Permit for grading operations, as applicable.
- Submittal of a "Hold Harmless" letter-shall be provided with the written explanation for the TESC Permit request.

The review schedule for a Early Grading-TESC Drawing is the same as required when a TESC Drawing is submitted as a part of the entire project. The initial review period will begin when the construction plans are submitted to the Town of Castle Rock. A new TESC Drawing and applicable review and inspection fees may be required at the time of full submittal.

3.20.3 Submittal Requirements for Temporary Stockpiles. The Town recognizes that circumstances may arise in the planning and phasing of a project that warrant the need for a temporary stockpile. Requests for Early Grading TESC Permits, specifically for temporary stockpiles, must include application for a variance (see Section 3.22) using the standard variance process through Development Services. The variance shall address the following, at a minimum:

- Reason for variance.
- Amount of material to be stockpiled.
- Documented compliance with zoning and land-use regulations and written authorization from landowner.
- The general configuration of the temporary stockpile in accordance with Section 3.13.6.
- Authorization for Haul Route Application through Public Works.
- Drainage letter in lieu of a Phase II Drainage Report quantifying impacts to historic drainage patterns and applicable mitigation measures, prepared and signed by a Professional Engineer.
- Maintenance agreement during and after the revegetation process (Fiscal Surety may be required for the duration of the temporary stockpile.)

If the variance is accepted, TESC Drawings shall be prepared for the export site in accordance with the TESC Manual and applicable Fiscal Surety shall be required.

Submittal Requirements for Related Plans, continued

Submittal Requirements for Vertical Residential Construction

3.20.4 Submittal Requirements for Permanent Drainage Facilities.

Construction drawings and a Phase III Drainage Report shall be submitted in accordance with Town requirements for any permanent drainage or water quality facilities as part of the Public Improvement Construction Drawings. The design of permanent drainage facilities shall be accepted prior to issuing a Standard TESC Permit. At a minimum, a Phase II Drainage Report shall be approved prior to issuing an Early Grading TESC Permit.

3.20.5 Submittal Requirements for Vertical Residential Construction (for use on residential projects only).

To be submitted separate from the standard TESC Plan and at the time of Construction Drawing approval or prior to issuance of Building Permits. This drawing is to be prepared in a separate, stand-alone set and shall provide temporary erosion and sediment controls for Vertical Residential Construction following completion of subdivision improvements. Control measures should generally be sufficient to cover construction activities, including over-excavation, through the completion of all residential homes. At a minimum, it shall contain:

1. Only existing Final erosion control measures shall be shown, (screened; dimension information shall not be shown) including seeding and mulching, erosion control blanket and perimeter controls.
2. Cover sheet per Section 3.18.1.
3. Topography at one- or two-foot contour intervals.
4. Directional flow arrows on all drainage features.
5. Limits of disturbance required for all vertical construction activities
6. Shade all tracts and lots not owned by the permittee.
7. New control measures behind back of sidewalk and all abutting open tracts and existing sediment controls that will become the responsibility of the permittee shall be shown in bold.
8. Location of Staging Area(s), VTCs, Concrete Washout Area(s) and Stockpile Area(s). If these items are intended to be relocated throughout the construction process, show the initial location on the drawing.
9. Location of other control measures considered by the designer to be appropriate.
10. Label lot numbers, street addresses and lot grading type (A or B) on each lot. Interior lot control measures do not need to be shown as standard details for A and B lots are provided in the Standard Notes and Details.
11. The Control Measure Legend from the cover sheet of the Town of Castle Rock Standard Notes and Details.
12. Include the following notes:
 - CONTROL MEASURES INSTALLED PER FINAL TESC DRAWING TRANSFER TO THE PERMITTEE AND SHALL BE LEFT, OR REPLACED, UNTIL REVEGETATION ESTABLISHMENT IS APPROVED BY THE TOWN OR VERTICAL LOT CONSTRUCTION IS COMPLETE.

Submittal Requirements for Vertical Residential Construction, continued

- IF LOCATION(S) OF VTC(S), STOCKPILE(S), STAGING AREA(S) AND CONCRETE WASHOUT AREA(S) CHANGE DURING CONSTRUCTION, THE PERMITTEE SHALL REVISE THE DRAWING ACCORDINGLY AND MUST SHOW APPROPRIATE CONTROL MEASURES IMPLEMENTED AT ALL TIMES.
 - ALL STRUCTURAL CONTROL MEASURES MUST BE MAINTAINED IN EFFECTIVE OPERATING CONDITION AT ALL TIMES AND ARE SUBJECT TO INSPECTION AND ENFORCEMENT UNDER THE TESC PERMIT.
 - IF SEDIMENT OR OTHER POLLUTANTS ARE TRACKED, SPILLED, OR WASHED ONTO STREETS, PERMITTEE SHALL CLEAN THE STREETS IN ACCORDANCE WITH TOWN APPROVED METHODS, OR AS DIRECTED BY THE STORMWATER INSPECTOR. FAILURE TO CLEAN UP TRACKING OF MATERIAL ONTO STREETS WILL RESULT IN AN IMMEDIATE STOP WORK ORDER.
 - PERMITTEE SHALL NOT STOCKPILE, PLACE OR STORE ON STREETS, SIDEWALKS OR STORM WATER FLOW LINES EARTH MATERIALS AND LANDSCAPE MATERIALS, SUCH AS SOD, COMPOST, DIRT, ROCK AND MULCH. STOCKPILING OF SUCH MATERIALS IN THE RIGHT-OF-WAY MAY RESULT IN AN IMMEDIATE STOP WORK ORDER.
 - PERMITTEE SHALL ENSURE THAT ALL CONCRETE WASHOUT AREAS ARE PROPERLY INSTALLED, POSTED AND CLEANED SUCH THAT ALL WASTEWATER IS CONTAINED AND DOES NOT ENTER THE STORM DRAIN SYSTEM. FAILURE TO PROPERLY MAINTAIN CONCRETE WASHOUT AREAS SUCH THAT A DISCHARGE OCCURS WILL RESULT IN A STOP WORK ORDER AND/OR AN IMMEDIATE CLEANUP ORDER.
 - PERMITTEE SHALL ENSURE THAT ALL SANITARY FACILITIES ARE PROPERLY SECURED TO THE GROUND TO PREVENT TOPPLING AND DISCHARGE OF LIQUID WASTE. FAILURE TO PROPERLY SECURE SANITARY FACILITIES WILL RESULT IN A VIOLATION.
 - PERMITTEE SHALL ENSURE THAT THE TESC DRAWING REMAINS UPDATED WITH CURRENT FIELD CONDITIONS. FAILURE TO MAINTAIN THE TESC DRAWING MAY RESULT IN A VIOLATION.
 - REMOVAL OF TEMPORARY EROSION AND SEDIMENT CONTROL MEASURES SHALL NOT OCCUR WITHOUT THE APPROVAL OF THE STORMWATER INSPECTOR.
13. FEMA Floodplain limits shall be shown if within planned or adjacent areas.
 14. Town of Castle Rock acceptance block.
 15. Design Engineer's signature block.
 16. Other information as may be reasonably required by the Town of Castle Rock.

**Control Measure
Cost Issues**

3.21

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

1. Installation of the control measures indicated on the Initial, Interim, and Final TESC Drawings according to the number, types, dimensions, and quantities called for.
2. Provision of TESC Manager (see Section 5.1 for a description of the TESC Manager role) to supervise, inspect, and interface with the Town on the project's TESC Drawing.
3. Installation of additional control measures that the permittee(s) think are appropriate or that are called for by the Stormwater Inspector to address actual site conditions. (As stated in Section 1.7, the TESC Permit process is a dynamic, not static, process; the permittee(s) are responsible for adapting the original TESC Drawing as necessary to effectively reduce erosion and sediment, and must comply with any modifications to the plan required by the Stormwater Inspector.)
4. Maintenance costs for control measures. 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 TESC Drawing. Appendix H provides approximate unit cost information that shall be used to generate a cost opinion.

Variances

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

3.22

The Town of Castle Rock may consider 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 Town Development Review Manager and copy the Stormwater Manager. The letter shall define:

- The criteria from which the applicant seeks a variance.
- 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 *TESC 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 the Town of Castle Rock prior to installation. Such practices must be thoroughly described and detailed.

3.22.2 Approval of Variances. Variances shall be considered by the Water Department and require approval by the Director or designee.