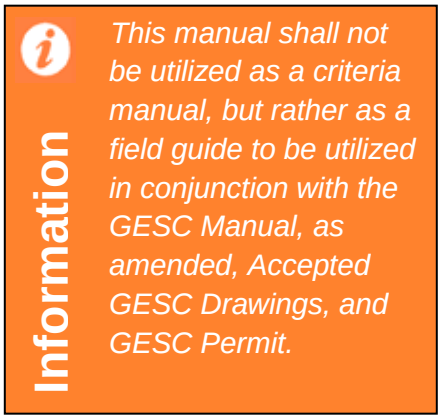
Grading, Erosion and Sediment Control (GESC) Field Manual (PDF Version)

Amended January, 2013

Douglas County Department of Public Works – Engineering
100 Third Street
Castle Rock, CO 80104

Introduction - If you are reading this Grading, Erosion and Sediment Control Field Manual (*GESC Field Manual*), you are most likely near the start of a new project that falls under the Douglas County GESC Permit Process. This *GESC Field Manual* is designed to familiarize Owners, GESC Managers, Project Managers, Contractors, and other field personnel with an overview of procedures and requirements for starting, conducting, and completing land development activities according to Douglas County requirements. This *GESC Field Manual* shall be kept on site for future reference on Douglas County GESC requirements.



The GESC Permit Program - The goal of the GESC Permit Process is to implement effective erosion and sediment control best management practices (BMPs) as a standard for all land disturbance activities to reduce increases in erosion and sedimentation over pre-development conditions. During the relatively short period of time when undeveloped land is converted to urban uses, a significant amount of sediment can erode from a construction site and be transported to adjacent properties and receiving waters. Erosion caused by construction and downstream sedimentation can damage property and degrade the quality of streams and lakes. Sediment is a transport mechanism for many stormwater pollutants. Sediment can disturb riparian and aquatic habitat and, since eroded sediments often contain significant phosphorus, and other nutrients can lead to unwanted algae growth in lakes and reservoirs. Douglas County is committed to protecting our water resources and ensuring that future development continues in an environmentally sound manner.

Getting Started - At this point, the County has accepted your GESC Plan and the process of implementing the GESC Plan in the field begins.

The first steps in starting the field portion of a new project in Douglas County shall entail selecting a GESC Manager, reviewing the *GESC Field Manual* and ensuring that the Permittee(s) and their representatives, including field personnel, understand all of the GESC Permit requirements.

Selection of the GESC Manager - As the Permittee(s)' focus shifts from applying for the GESC Permit to constructing the project, one of the first tasks is to select a GESC Manager. The GESC Manager is the designated contact person by the Permittee(s) to work with the County for all matters pertaining to the GESC Plan and Permit. The GESC Manager may be an employee of the Owner or Contractor, but shall have the authority to act on behalf of the Permittee(s) to ensure that the site remains in compliance with the GESC Plan and Permit. However, the Permittee(s) shall remain the responsible party(s). The GESC Manager shall be responsive to requests made by Douglas County staff and have any deficiencies in the work corrected.

Alternate GESC Manager - An Alternate GESC Manager, who is able to serve in the same capacity as the GESC Manager, shall also be selected. The Alternate GESC Manager shall be the contact person if the GESC Manager is not available. The GESC Manager shall inform the Alternate GESC Manager of any absences, fill the Alternate GESC Manager in on the status of the GESC Plan implementation, and ensure that the Alternate GESC Manager assumes the responsibilities during any absence.

Availability of the GESC Manager - The GESC Manager shall be present at the project site a majority of the time and (along with the Alternate GESC Manager) shall provide the County with a 24-hour emergency contact number. In the event the Contractor's GESC Manager (or Alternate GESC Manager) is not on-site, and cannot be reached during any level of violation, a Stop Work Order shall be issued.

Changing of the GESC Manager or Alternate GESC Manager - Notification in writing shall be provided to the County if the GESC Manager or Alternate GESC Manager leaves the company or the Permittee(s) intend to change personnel. A field meeting with the Erosion Control Inspector and new GESC Manager or Alternate GESC Manager shall be scheduled within 7 days of the change to discuss site conditions and responsibilities of the GESC Manager.

Implementing the GESC Plan in the Field - Constructing the project and implementing the GESC Plan in the field is a challenging part of the GESC Permit Process. The GESC Plan will not be effective unless the required measures are properly installed and maintained by the Permittee(s).

Maintenance procedures are not being followed on this site which may lead to additional costs from reinspection fees, sediment clean up and possible work stoppages

Diligence pays off - It is to the Permittee(s)' advantage to be diligent in controlling erosion from its start and implementing a GESC Plan effectively. This can save both time and money by reducing the need for regrading, repair, clean-up, rework, and avoids delays associated with Stop Work Orders.

As an example, the presence of gully erosion on a construction site means that inadequate measures have been taken to control the early stages of erosion. Gully erosion is costly to repair. However, Permittee(s) that work to stabilize graded areas quickly through surface roughening, mulching or reseeding, and deals with rill erosion as it develops, will likely prevent gully erosion from occurring. This saves time and money in the long run.

Surface roughening on this slope may have prevented this rill erosion.

The Permittee(s)' lack of effort in controlling erosion and sediment can increase the cost of construction due to the following additional obligations:

- *Frequent removal of sediment from basins and from behind silt fences and sediment control devices.*
- *Clean-up of accumulated sediments from off-site areas.*
- *Repair of downstream property damage resulting from sediment leaving the site.*
- *Regrading and refilling rill and gully erosion.*
- *Replacing lost topsoil.*
- *Undertaking second and third seeding and mulching operations.*
- *Work stoppage due to non-compliance and making a trip to the County offices to pay a reinstatement fee or reinspection fee.*

Review of the GESC Field Manual, Plan, GESC and Related Plans and Permits - Prior to the Preconstruction Meeting, the Permittee(s)' and specifically the GESC Manager shall thoroughly review the *GESC Field Manual*, *GESC Manual*, GESC Plan, Standard Notes and Details, and related plans and permits for the project. A review of the 10 elements of an effective GESC Plan in Section 3 of the *GESC Manual* would provide valuable insight. It is the GESC Manager's responsibility to understand all of the requirements of the GESC Permit Process as laid out in these documents. In addition, it is the GESC Manager's responsibility to ensure that site supervisors, subcontractors, and field personnel are aware of the GESC requirements.

Douglas County welcomes calls from Permittee(s) during this process and would be happy to answer any questions that the GESC Manager or other Permittee staff may have regarding the GESC Permit Process.

Preparing for the On-Site Preconstruction Meeting - The first step in preparing the site for the initial inspection shall be obtaining the Temporary Construction Access Permits for all access points to or from a construction site onto a right-of-way, as outlined in the *Douglas County Roadway Design and Construction Standard Manual (Roadway Manual)*, as amended, and comply with the terms of the permits. No ramps of dirt, gravel, asphalt, wood, concrete, or other materials are allowed in the curb section.

Curb ramps of earth, concrete, or lumber are not permitted in the curb section.

The second step entails installation of the Initial BMPs as shown on the accepted GESC Drawings prior to the on-site Preconstruction Meeting. The Initial BMPs are shown on the Initial BMPs Drawing for Staged GESC Plans (generally for sites greater than 1 acre), are indicated as "Initial BMPs" when shown on a combined Small Site and Utility GESC Plan.

No formal notification needs to be given to the County to install the Initial BMPs, other than receiving the signed GESC Drawings and the copy of this *GESC Field Manual*. However, all of the requirements of the *GESC Field Manual,* GESC Permit, *GESC Manual* and GESC Plan, including the Standard Notes and Details, shall be complied with.

If the Permittee(s) think that modifications to Initial BMPs shown on the GESC Drawings should be made to provide for a more effective plan, the Permittee(s) shall contact the Design Engineer and Douglas County Engineering to obtain acceptance of the proposed modifications and initiate a notice of change prior to installing the BMPs.

No Work Shall Start - No work is allowed on site other than the installation of the Initial BMPs shown on the GESC Plan until the executed permit is issued and on site. Failure to restrict additional activities shall result in issuance of a Stop Work Order.

Scheduling the Preconstruction Meeting - The Permittee(s) shall contact the Douglas County Engineering Permits Staff, 303-660-7487, to schedule the on-site Preconstruction Meeting. Three days notice (business days, not including Saturdays and Sundays) shall be provided to schedule the meeting.

For instance, if the call to the County takes place before 3:30 p.m. on a Monday, the Preconstruction Meeting can be scheduled for the next Thursday. If the call to the County takes place before 3:30 p.m. on a Thursday, the Preconstruction Meeting will be scheduled for the following Tuesday.

Before 3:30 p.m.


Three Business Days

Attendees at the Preconstruction Meeting - The on-site Preconstruction Meeting is a critical milestone prior to the start of construction. In addition to the Erosion Control Inspector, the following representatives shall attend:

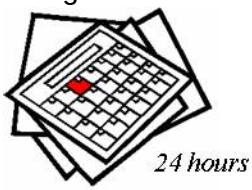
- ***General Contractor*.**
- ***GESC Manager and Alternate GESC Manager,*** (one or both may be the same as the Owner or General Contractor Representative).
- ***Grading Sub-Contractor*,** if different than the General Contractor.
- ***Design Engineer,*** (the Design Engineer's attendance is not mandatory; however, it is strongly recommended that the Design Engineer attend, to avoid possible delays if the County or the Permittee(s) determine that modifications to the GESC Plan are necessary).
- ***Owner or Owner's Representative,*** attendance is also strongly recommended to avoid possible delays.

Important!

If one of the mandatory attendees does not attend the Preconstruction Meeting, or if the GESC Field Manual and accepted GESC Plans are not in the GESC Manager's possession, or if the installation of the Initial BMPs is not approved by the Erosion Control Inspector, the meeting shall be rescheduled and the applicant will be assessed a $50.00 reinspection fee. The fee shall be paid at the Douglas County Engineering Permits and Inspection office prior to scheduling

Corrections to the Initial BMPs - If the Erosion Control Inspector determines that significant modifications or corrections to the Initial BMPs are necessary due to actual field conditions, the Erosion Control Inspector will inform the Permittee(s) that such corrections shall be made, that a follow-up inspection shall be scheduled with the County, and that acceptance of the corrected BMPs by the Erosion Control Inspector shall take place prior to the signing of the GESC Permit. Modifications to the GESC Plan will, in most cases,

require acceptance of the Professional Engineer (PE) who signed and stamped the Drawings. A notice of change should be processed through the Design Engineer and the Review Engineer to note changes in the field. The re-inspection requires one-day notice (by 3:30 pm the weekday prior to the inspection) and shall be scheduled with the Engineering Permits Staff.



Pick up the Executed GESC Permit - Douglas County will execute the GESC Permit generally within 24 hours of acceptance of the Initial BMPs (either at the Preconstruction Meeting or at a follow-up inspection). Once the Permittee(s) pick up the executed GESC Permit, construction can start.

Duration of the GESC Permit - A GESC Permit is valid for 1 year from the date the permit is issued (the date the GESC Permit is executed). If necessary a GESC Permit shall be renewed prior to its expiration. The Permittee(s) shall contact the County and start the renewal process at least 14 days prior to the original GESC Permit's expiration date.

The Permittee(s) shall have a valid GESC Permit until the project is transferred to the County Building Division's Drainage, Erosion and Sediment Control (DESC) Program for detached single-family residential projects or until Final Close-out Acceptance (after revegetation is established) for other projects.

Transfer of the GESC Permit - If a project or portion of a project is sold to a new Owner, or if the Contractor that is identified on the GESC Permit is replaced by a different Contractor, the GESC Permit shall be transferred to the new Owner and/or Contractor using a specific transfer procedure.

The transfer shall require a new GESC Permit Application Form, payment of a transfer fee, new Fiscal Security (if new Owner), and another Preconstruction Meeting on site: failure to transfer the GESC Permit if the Owner or Contractor changes will result in issuance of a Stop Work Order.

Documents Shall Remain On Site - A copy of the *GESC Field Manual*, GESC Drawings, Standard Notes and Details, and any project permits shall remain on the site at all times. Once the GESC Permit is obtained, it shall also remain on site at all times.

Other Related Permits - The following is a list of related permits that may be required when conducting land disturbing activities in Douglas County. This list does not reflect all permits that may be required, but rather describe permits most often associated with the GESC Permit.

Douglas County Permits

- ***Temporary Construction Access Permit –*** Required for all access points to/from the construction site onto right-of-way.
- ***Right-of-Way Use and Construction Permit –*** For projects that include use or construction in the County Right-of-Way as well as the construction of any public or private drainage facilities including detention and water quality facilities.
- ***Floodplain Development Permit –*** For any work located within the limits of the 100 year floodplain.

State Permits

- ***Stormwater Management Plan/Permit –*** For disturbances that exceed one (1) acre of disturbance.
- ***Dewatering Permits –*** For dewatering discharges associated with construction activities.
- ***Air Quality Plan/Permits –*** Required to control fugitive dust from construction sites.

Federal Permits

- ***Section 404 Permits –*** For work located in Waters of the United States. ***U.S. Fish and Wildlife Service Threatened and Endangered Species Clearance –*** Project specific based on the prevalence of a threatened or endangered species.

Start of Construction - The following activities shall be done when GESC Permit is issued:

Topsoil Stripping - With the executed GESC Permit picked up and on site, construction can start. The first construction operation shall consist of the stripping and stockpiling of topsoil within areas where construction is to occur (actual limits of topsoil stripping shall be confirmed at the Preconstruction Meeting). Topsoil stripping shall not take place outside the accepted limits of construction for the project.

Topsoil stripping and replacement is critical to the successful re-establishment of vegetation after a project is constructed. Topsoil shall be stripped to a depth of 6-inches unless otherwise accepted by the Erosion Control Inspector. Woody material in the area to be stripped shall be removed prior to stripping, but grasses shall be left in the topsoil layer to be stripped.

Topsoil Stockpiles - Topsoil stockpiles (as well as stockpiles of excess excavated material that may be generated later) shall have side slopes not steeper than 3 (horizontal) to 1 (vertical) and be placed in the area indicated on the GESC Drawings.

Topsoil Inspection - The Erosion Control Inspector will contact the Engineering Permits Staff; 303-660-7487 to schedule an inspection after the topsoil is stripped and stockpiled. Failure to strip and stockpile topsoil, and obtain an inspection from the Erosion Control Inspector shall result in the issuance of a Stop Work Order. If inadequate quantities of topsoil have been stockpiled, the Permittee(s) shall import additional adequate quantities of topsoil to the site (sufficient to replace at least 6-inches of topsoil in all areas to receive vegetation) to complete the GESC Permit requirements.

County GESC Inspections - During the Construction Phase, an Erosion Control Inspector will observe erosion and sediment controls regularly. County inspection staff will consider the overall effectiveness of the controls for reducing erosion and trapping sediment on the site and will check for proper installation and maintenance of the controls. Erosion Control Inspectors will coordinate with the GESC Manager, whose responsibility it is to ensure that the site remains in compliance with all GESC requirements.

Besides observations by Erosion Control Inspectors, selected inspections will be provided by Douglas County Engineering staff, including inspections of the initial traffic control and temporary access plan and any permanent drainage facilities.

Mandatory County Inspections - The Permittee(s) shall call the Engineering Permits Staff, 303-660-7487 to schedule the following mandatory inspections:

- Preconstruction Meeting/Inspection of Initial BMPs.
- Any time during construction when a new GESC Manager or Alternate GESC Manager is chosen.
- Prior to issuance of a County Right-of-Way Use and Construction Permit for construction of curb, gutter, and/or sidewalk or for paving roadways.
- Prior to any waterline flushing.
- Initial Close-out Inspection prior to CO or TCO is issued for commercial, industrial, rental, residential and multi-family projects, at end of construction if no Certificate of Occupancy (CO) or Temporary Certificate of Occupancy (TCO) is requested, and prior to transition to DESC Program for detached single family residential projects.

- Two years after final inspection, or when grass has reached required vegetative cover in accordance with the Vegetation Approval Section of this *GESC Field Manual*, prior to removal of on-site BMPs.
- Final Close-out Inspection (after vegetation has been accepted and sediment controls have been removed).

Sedimentation can impair aquatic habitat in downstream receiving waters.

- For Staged and Phased GESC Plans where more than 40 acres is disturbed (70 acres for soil mitigation) and where work occurs in multiple grading phases, the following inspection process is required:

Mandatory Inspections for Staged and Phased Projects:

1. *A phased project starts in the same manner as any other GESC permitted project, with the installation of the Initial BMPs as shown on the Initial GESC Drawing. The difference is that only the Initial BMPs for Phase I need to be installed and inspected in order to obtain the GESC Permit.*
2. *Once the Permittee(s) have obtained the GESC Permit, topsoil stripping/stockpiling and grading may begin on Phase I only. Failure to restrict grading operations to the limits of Phase I shall result in issuance of a Stop Work Order (see Section 5.10.3).*
3. *When the Permittee(s) are nearing the end of grading on Phase I, the Interim BMPs for Phase I shall be installed per the Interim GESC Drawing; in addition, the Initial BMPs shall be installed on Phase II as shown on the Initial GESC Drawing.*
4. *A **mandatory inspection** shall be scheduled, in accordance with this section, to inspect the Initial and Interim BMPs on Phase I as well as the Initial BMPs for Phase II. If the Erosion Control Inspector finds the BMPs to be installed and maintained in accordance with the approved GESC Plan and GESC Manual, the Erosion Control Inspector will sign the GESC Phasing Acceptance Sheet.*
5. *Once the Erosion Control Inspector has signed the GESC Phasing Acceptance Sheet, topsoil stripping/ stockpiling and grading may commence on Phase II.*
6. *All disturbed areas on Phase I shall be Drill Seeded and Crimp Mulched or otherwise stabilized in accordance with the accepted GESC Plan within 14 calendar days from the Erosion Control Inspectors sign-off for commencement of the next phase. Failure to complete the required seeding and mulching within the allotted time shall result in issuance of a Stop Work Order for the entire project. NO TIME EXTENTIONS SHALL BE GRANTED.*
7. *This process shall be repeated for each additional phase until all earthwork is complete.*

The Erosion Control Inspectors regulate grading, erosion and sediment control requirements for detached single-family projects from the commencement of the overlot grading operations through the Initial Close-out Acceptance of the subdivision improvements. Once Initial Close-out acceptance of the subdivision improvements for the entire project, or an approved phase, has been granted by the Engineering Inspector and Erosion Control Inspector, the Douglas County Building Division shall assume regulatory authority for control of grading, erosion and sediment control for the accepted project or phase. At this point, the Permittee(s) shall refer to the Douglas County Stormwater Ordinance and Zoning Resolution, Section 31, for permitting and inspection requirements.

Levels of Violations - Douglas County classifies GESC Violations in one of three categories, depending on the severity of the violation. Enforcement action varies for each category. Level I Violations have the most severe impact on people and the environment and Level III Violations have the least severe impact.

Level I Violations - are viewed by Douglas County to pose an immediate and serious risk to the health, safety, or welfare of people and/or the environment. Level I Violations result in an immediate issuance of a Stop Work Order. Example Level I Violations include the following:

- ***Clearing, grubbing or grading without a Douglas County GESC Permit.***
- ***Failure to schedule a Preconstruction Meeting.***
- ***Failure to be able to contact the GESC Manager or Alternate GESC Manager during any level of violation.***
- ***Failure to restrict operations to approved limits of construction.***
- ***Failure to clean up tracking of material onto roadways and adjacent paved areas.***
- ***Exporting material to or importing material from a non-permitted site.***
- ***Exporting/importing soil material without a variance.***
- ***Failure to follow approved phasing plan.***
- ***Failure to correct Level II violations per the directives of the Erosion Control Inspector.***

Level II Violations - are viewed by Douglas County to pose a moderate and immediate risk to the health, safety, or welfare of people and/or the environment; however, if not immediately corrected, will pose a serious risk. Remediation for Level II Violations shall commence immediately after the Permittee(s) are notified of the violation(s). Example Level II Violations include the following:

- ***Tracking of material onto roadways and adjacent paved areas.***
- ***Failure to make required plan revisions.***
- ***Failure to perform BMP maintenance as directed by the Douglas County Erosion Control Inspector.***

Level III Violations - are viewed by Douglas County to pose a low immediate risk to the health, safety, or welfare of people and/or the environment; however, if not corrected quickly will pose a more serious risk. Level III Violations shall be corrected within 48 hours of inspection unless otherwise specified in writing by the Erosion Control Inspector. Example Level III Violations include the following:

- ***Failure to provide routine maintenance for erosion and sediment controls.***
- ***Installation of non-Douglas County-accepted erosion and sediment control BMPs.***
- ***Failure to provide temporary inlet protection within 48 hours or pouring of inlet.***
- ***Failure to provide inlet protection within 48 hours of placement of asphalt or concrete pavement.***
- ***Staging of equipment outside of Stabilized Staging Area.***
- ***Failure to have accepted GESC Permit, accepted GESC Drawings and GESC Field Manual on-site.***

Stop Work Orders - The Engineering Services Director, or his/her designated representative, is authorized to order work to be stopped on any project that disturbs the land and which is not in compliance with the requirements of the GESC Permit. **When a Stop Work Order is issued, the GESC Permit for that project is suspended -** In addition, the State of Colorado Department of Public Health and Environment may be notified.

If a project is issued a Stop Work Order, all work on site shall be stopped. Safety-related items (e.g., backfilling of holes and trenches) as well as corrective actions may be completed; however, the Permittee(s) shall inform the Erosion Control Inspector of such activities.

Important!

If a Permittee works without a GESC Permit, a fee of 3 times the permit fee will be assessed as a reinstatement fee. This fee shall apply each time the project is found to be working without or prior to issuance of a GESC Permit. The County will enforce the GESC Permit.

The Permittee(s) shall do the following to reinstate a GESC Permit and resume work on the site:

1. Correct the deficient practices that precipitated the Stop Work Order.
2. Pay the Permit reinstatement fee at the Douglas County Engineering Permits and Inspections Office. (Note: Low Impact GESC Permits are not subject to the reinstatement fee.)
3. Call the Engineering Permits Staff to schedule a site inspection.
4. Obtain a new GESC Permit after approval of the corrected work from an Erosion Control Inspector.

A posted Stop Work Order shall not be removed from the site, except by the County. A Douglas County Inspector is the only authorized agent to remove a posted Stop Work Order.

Stormwater Ordinance Civil Enforcement Action – Douglas County may pursue a Civil Enforcement action for violations of the *GESC Manual* through the Ordinance No. 013-001, as amended.

Section 31 Zoning Civil Enforcement – Douglas County may pursue a Civil Enforcement action for violations of the *GESC Manual* through the Douglas County Zoning Resolution, as amended.

Remedies Not Exclusive – The remedies listed in this Handbook are not exclusive of any other remedies available under any applicable Federal, State or local law, and it is within the discretion of Douglas County to seek cumulative remedies. This shall include but not be limited to, remedies available to the Douglas County Sheriff's Office, the Colorado Department of Public Health and Environment and the U.S. Environmental Protection Agency.

Re-Inspection Fees - To offset the cost of additional inspections on non-compliant sites, Douglas County requires that re-inspection fees be paid in person at Douglas County offices prior to receiving subsequent inspections and approval of work. Re-inspection fees shall be charged for all projects that are deficient due to the following:

- *Permittee(s) fail to properly install all Initial BMPs prior to the scheduled Preconstruction Meeting.*
- *The required attendees fail to attend the scheduled Preconstruction Meeting.*
- *Permittees) fail to have the GESC Field Manual and GESC Drawings on-site during the Preconstruction Meeting.*
- *Permittee(s) receive a Stop Work Order (fee consists of a reinstatement fee in this case).*
- *Permittee(s) fail to obtain vegetation acceptance from the County prior to requesting a final release of Fiscal Security.*
- *Permittee(s) remove any BMPs prior to receiving authorization by Douglas County.*
- *Erosion Control Inspector finds violations of GESC Permit requirements during routine inspections.*
- *Failure to cancel any inspection before 3:30 pm the day prior to the inspection in the event that a site is not ready for an inspection and an inspection had already been scheduled.*

Correct Installation and Maintenance of BMPs - The overall effectiveness of the GESC Plan depends on the correct installation and maintenance of BMPs. With this goal in mind, the County has prepared the GESC Plan Standard Notes and Details, a set of drawings that identify correct installation and maintenance procedures for all of the County-accepted BMPs. These drawings are provided in Your Douglas County accepted GESC Plan set. The Standard Notes and Details allow Permittee(s) and field personal to become familiar with one set of BMPs and consistent installation and maintenance requirements. It is the responsibility of the GESC Manager to ensure that Interim and Final BMPs are installed at the earliest opportunity that grading or construction of new facilities allows. Some BMPs have specific time requirements for installation that are identified on the GESC Plan Standard Notes and Details; these time requirements shall be adhered to (e.g., temporary and area inlet protection shall be installed within 48 hours of the pouring of an inlet).

For BMPs where a specific time frame is not given, the controls shall be installed as soon as construction of the infrastructure is substantially complete or when grading activities have produced grades close to the final grade. In any case, it is up to the

discretion of the Erosion Control Inspector to make the final determination of Initial and Final BMP installation time frames.

Following are brief descriptions of the standard erosion and sediment control BMPs accepted for use in Douglas County, some important installation and maintenance requirements, and example photographs illustrating correctly-installed BMPs and practices to avoid.

Check Dam (CD) - A check dam is a small rock dam, designed to withstand overtopping, that is placed in a drainageway. The purpose of the check dam is to trap sediment in the backwater zone upstream of the check and, when used in series, to reduce flow velocities.

Key Installation and Maintenance Requirements:

- Riprap utilized for check dams shall have a median stone size of 12".
- Riprap pad shall be trenched into the ground a minimum of 1'-8".
- The ends of the check dam shall be a minimum of 1'-6" higher than the center of the check dam.

- The GESC Manager shall inspect check dams weekly and during and after any storm event and make any repairs or clean out as necessary.

This check dam was not keyed in adequately to the channel bank, leading to its failure.

- Sediment accumulated upstream of check dams shall be removed when the sediment depth up stream of the check dam is within ½ of the height of the crest.

Properly installed check dam.

What about straw bales?

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

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

Key Installation and Maintenance Requirements:

- Compost blanket shall only be utilized in areas where sheet flow conditions prevail and shall be prohibited in areas of possible concentrated flow.
- Compost shall be evenly applied at a depth of 2 inches.
- Compost may be applied utilizing a pneumatic blower or by hand.
- Compost shall be Class 1.
- Filter Berms shall run parallel to the contour and shall have a minimum height of 1-foot and minimum bottom width of 2-feet.
- Filter Berms shall be constructed utilizing pneumatic blower or hand.
- The GESC Manager shall inspect the Compost Blanket and Filter Berms weekly and during and after and storm event.

DO *Compost blanket can be used in areas not subject to concentrated flows and shall be applied with a pneumatic blower or by hand.*

DON'T *Utilizing non-approved application methods of compost blanket can cause additional cost due to re-application and additional clean up costs.*

5.7.3 Concrete Washout Area (CWA) - A concrete washout area is a shallow excavation with a small perimeter berm to isolate concrete truck washout operations.

Key Installation and Maintenance Requirements:

- Vehicle Tracking Control (Section 5.7.22) is required at the access point to the concrete washout area.
- Signs shall be placed at the construction entrance, at the washout area, and elsewhere as necessary to clearly indicate the location of the concrete washout area to operators of concrete trucks and pump rigs.
- Excavated material shall be utilized in perimeter berm construction.
- The GESC Manager shall inspect the CWA weekly and during and after any storm event. The concrete washout area shall be repaired and enlarged or cleaned out as necessary to maintain capacity for wasted concrete.

Weekly

- At the end of construction, all concrete shall be removed from the site and disposed of at an approved waste site.

DO *A properly installed concrete washout area with Vehicle Tracking Control.*

DON'T *Extensive wasting of concrete on the construction site requires additional effort to clean up and can impair subsequent revegetation operations.*

Construction Fence (CF) and **Construction Markers (CM) -** Construction fence consists of orange plastic fencing or other County-accepted material attached to support posts and used to delineate limits of construction and to control access to the construction site. If approved by the County, construction markers (CM), consisting of orange painted survey lath at 100-foot maximum spacing, may be used to delineate limits of construction.

Key Installation and Maintenance Requirements:

- Steel tee posts shall be utilized for support of construction fence.
- Maximum spacing of tee posts is 15-feet.
- Any damaged fence or markers shall be repaired on a daily basis.

DO *Use construction fence to restrict access to site and demark limits of disturbance.*

DON'T *This construction fence is in need of repair. Inspections shall be made daily and downed sections repaired immediately.*

Dewatering (DW) - Dewatering controls consist of a gravel filter provided on the suction end of a pump to reduce the pumping of sediment, a riprap pad at the discharge end of the pump for erosion protection, and a sediment basin to provide for settling before the water is discharged into receiving waters.

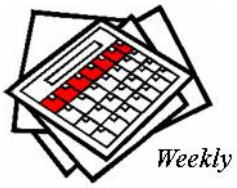
Key Installation and Maintenance Requirements:

- At a minimum, the Dewatering BMPs shall consist of the following:
  1) Pre-filter on the suction end of the pump/hose,
  2) Filter BMP prior to final discharge, and
  3) Energy dissipating BMP at the discharge end of the hose/pump.
- The type and placement of Dewatering controls shall be coordinated with, and approved by, the Erosion Control Inspector prior to the discharge of any water.
- The GESC Manager shall obtain a Construction Dewatering Permit (Dewatering Permit) from the Colorado Department of Public Health and Environment (CDPHE) prior to any dewatering operations that require a Dewatering Permit.
- The GESC Manager shall inspect dewatering systems and perform any necessary repairs or maintenance on an hourly basis.

Diversion Ditch (DD) - A diversion ditch is a small earth channel used to divert and convey runoff, generally to a sediment basin, check dam, or reinforced rock berm. Depending on slope, the diversion swale may need to be lined with erosion control blanket, plastic (for temporary installations only), or riprap.

Key Installation and Maintenance Requirements:

- In locations where construction traffic must cross a diversion ditch, the Permittee(s) shall install a temporary culvert with a minimum diameter of 12 inches.
- The GESC Manager shall inspect all diversion ditches weekly and during and after any storm event and make any repairs or clean out as necessary.



DO *This diversion ditch provides protection for an adjacent drainageway.*

DON'T *Lack of a diversion ditch at the top of this slope to divert upstream runoff has led to severe rill and gully erosion.*

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

Key Installation and Maintenance Requirements:

- All erosion control blankets and netting shall be made of 100% natural and biodegradable material; no plastic or other synthetic material, even if photodegradable, shall be allowed.
- In areas where erosion control blanket is shown on the plans, the Permittee(s) shall place topsoil and perform final grading, surface preparation, and seeding below the blanket in accordance with the requirements of Detail 17 of the GESC Plan Standard Notes and Details.
- Subgrade shall be smooth and moist prior to blanket installation and the blanket shall be in full contact with the subgrade; no gaps or voids shall exist under the blanket.
- Perimeter anchor trench shall be used at the outside perimeter of all blanket areas.
- Joint anchor trench shall be used to join rolls of blankets together (longitudinally and transversely) unless it is a slope where concentrated flows are not present. In that case, the trenches will only be needed along the perimeter for all blankets except 100% straw, which may use an overlapping joint.

- The GESC Manager shall inspect erosion control blankets weekly and during and after any storm event and make repairs as necessary.

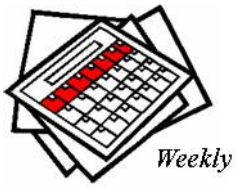
DO *Ample erosion control blanket is used on this hill slope.*

DON'T *The edges of this erosion control blanket are not trenched in, allowing the blanket to become displaced.*

Inlet Protection (IP) - Inlet protection consists of a small reinforced rock berm and cinder block frame placed in front of (but not blocking) a curb inlet or around an area inlet to reduce sediment in runoff entering the storm sewer system.

Key Installation and Maintenance Requirements:

- Interim configuration of inlet protection in streets (before paving) shall be installed within 48 hours of pouring inlet. Inlet protection (after paving) shall be installed within 48 hours after paving is placed.
- Inlet protection at area inlets shall be installed within 48 hours of pouring inlet.
- Crushed rock shall be fractured face (all sides) and shall comply with gradation shown on the GESC Plan Standard Notes and Details (1-1/2" min.). Recycled concrete meeting this gradation may be used.
- Wire mesh shall be fabricated of 20-gauge wire twisted into a mesh with a maximum opening of 1.0 inch (commonly termed "Chicken Wire"). Roll width shall be 48 inches.
- Wire mesh shall be secured using "Hog Rings" or wire ties at 6-inch centers along all joints and at 2-inch centers on ends of berm.
- Reinforced rock berm shall be constructed in one piece or shall be constructed using joint detail of Detail 10 of the GESC Plan Standard Notes and Details.
- The top of reinforced rock berm shall be ½ "- 1" below top of curb.
- Tubular markers shall meet requirements of *Manual on Uniform Traffic Control Devices (MUTCD),* as amended.
- Reinforced rock berm shall be placed tightly against curb face.
- The GESC Manager shall inspect inlet protection weekly and during and after any storm event and make repairs or clean out as necessary. More frequent inspections and repairs shall be required during winter conditions due to freeze/thaw problems.



- Inlet protection is to remain in place until the upstream disturbed area is stabilized and grass cover approved, unless the County approves earlier removal of inlet protection in streets.

DO *Properly installed inlet protection for continuous-grade curb-inlets.*

DO *Properly installed inlet protection for curb-inlets in a sump condition.*

DO ***Temporary Inlet Protection.*** *This interim configuration of blocks protects a street inlet prior to paving.*

DO *Properly installed area inlet protection.*

Tubular markers were not placed in front of this inlet protection installation, making it more susceptible to damage from snowplows and other vehicles. This installation is in need of immediate repair.

STOP WORK

DON'T *This inlet protection is overdue for sediment removal.*

STOP WORK

DON'T

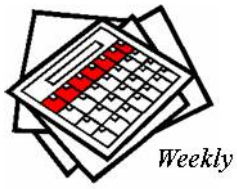
DON'T *Blocking the inlet opening or use of alternate materials for inlet protection is prohibited.*

DON'T *No gaps shall exist between sections of reinforced rock berm.*

Reinforced Check Dam (RCD) - A reinforced check dam is a rock dam contained within a twisted wire gabion, designed to withstand overtopping, that is placed in a major drainageway (upstream watershed area in excess of 100 to 130 acres). Like a check dam, the purpose of the reinforced check dam is to trap sediment in the backwater zone upstream of the check. The reinforcement increases the ability of the rock dam to withstand the larger overtopping flows of major drainageways.

Key Installation and Maintenance Requirements:

- The check dam shall be trenched into the ground a minimum of 1'-6".
- Erosion Control Blanket shall be placed in the reinforced check dam trench extending a minimum of 1'-6" on both the upstream and downstream sides of the reinforced check dam.
- Gabions shall have galvanized twisted wire netting with a maximum opening dimension of 4 ½" and a minimum wire thickness of 0.10". Wire mesh shall be secured using "Hog Rings" at 4" spacing or other approved means shall be used at all gabion seams and to secure the gabion to the adjacent gabion.
- Riprap utilized for check dams shall have a D_{50} median stone size of 12".
- The GESC Manager shall inspect check dams weekly and during and after any storm event and make repairs or clean out as necessary.



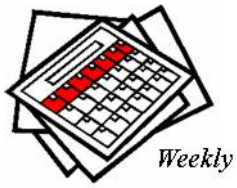
- Sediment accumulated upstream of check dams shall be removed when the sediment depth upstream of check dam is within ½ of the height of the crest.

DO *Reinforced check dams are required in major drainageways to resist breaching from overtopping flows.*

Reinforced Rock Berm (RRB) - A reinforced rock berm 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.

Key Installation and Maintenance Requirements:

- Crushed rock shall be fractured face (all sides) and shall comply with gradation shown on the GESC Plan Standard Notes and Details. Recycled concrete meeting this gradation may be used.
- Wire mesh shall be fabricated of 20-gauge wire twisted into a mesh with a maximum opening of 1.0-inch (commonly termed "Chicken Wire"). Roll width shall be 48-inches.
- Wire mesh shall be secured using "Hog Rings" or wire ties at 6-inch centers along all joints and at 2-inch centers on ends of berm.
- For concentrated flow areas the ends of the reinforced rock berm shall be 12” higher than the center of the berm.
- The GESC Manager shall inspect reinforced rock berm weekly and during and after any storm event and make repairs of clean out as necessary.
- Sediment accumulated upstream of reinforced rock berm shall be removed when the sediment depth upstream of filter is within 5-inches of the crest.



DO *A reinforced rock berm may be used downgradient of disturbed areas in lieu of silt fence.*

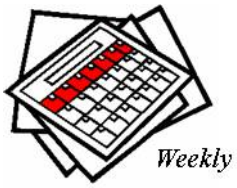
Reinforced rock berms are especially useful over bedrock outcroppings or pavement where silt fence and sediment control logs cannot be installed.

DO

RRB for Culvert Protection (RRC) - A reinforced rock berm for culvert protection consists of a reinforced rock berm placed in front of a culvert to reduce sediment in runoff approaching the culvert.

Key Installation and Maintenance Requirements:

- Crushed rock shall be fractured face (all sides) and shall comply with gradation shown on the GESC Plan Standard Notes and Details. Recycled concrete meeting this gradation may be used.
- Wire mesh shall be fabricated of 20-gauge wire twisted into a mesh with a maximum opening of 1.0-inch (commonly termed "Chicken Wire"). Roll width shall be 48-inches.
- Wire mesh shall be secured using "Hog Rings" or wire ties at 6-inch centers along all joints and at 2-inch centers on ends of berm.
- For concentrated flow areas the ends of the reinforced rock berm shall be 12-inch higher than the center of the berm.
- The GESC Manager shall inspect reinforced rock berm weekly and during and after any storm event and make repairs of clean out as necessary.
- Sediment accumulated upstream of reinforced rock berm shall be removed when the sediment depth upstream of filter is within 5 inches of the crest.



Weekly

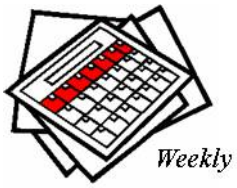
DO *A properly installed reinforced rock berm for culvert protection.*

DON'T *Without a reinforced rock berm for culvert protection, culverts fill with sediment.*

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

Key Installation and Maintenance Requirements:

- Schedule 40 pipe or greater shall be used for outlet pipe and riser.
- A check dam shall be provided within the basin conforming to the Detail in the GESC Plan Standard Notes and Details.
- A gravel pack of 1 to 2-inch rock around the pipe outlet shall be provided.
- The GESC Manager shall inspect sediment basin weekly and during and after any storm event and make repairs or clean out as necessary.
- Sediment accumulated within the sediment basin shall be removed when the sediment depth is 1.0-feet deep.



A Sediment Basin shall be incorporated into any permanent detention or water quality basins:

- A Right-of-Way Use and Construction Permit shall be obtained prior to installing the permanent outlet works.
- At least one-half of the sediment basin design volume shall be constructed below the lowest orifice of the permanent outlet works. A temporary gravel pack shall be placed in front of the permanent orifices.
- The sediment basin volume shall be kept active and in a maintained condition until vegetation in upstream watershed is fully established and accepted.

DO *Properly installed outlet pipe.*

This sediment basin is improperly in stalled due to:
- *Lack of an armored spillway.*
- *Pipe perforations set above the spillway crest elevation.*

DON'T

Sediment Control Log (SCL) - A sediment control log consists of a cylindrical bundle of excelsior, straw, compost, or coconut material designed to form a semi-porous filter, able to withstand overtopping. The log shall be staked into the ground to promote sediment deposition on its upstream side and reduce flow velocities.

Key Installation and Maintenance Requirements:

- The sediment control log shall be trenched into the ground a minimum of 2 inches.
- The GESC Manager shall inspect sediment control logs daily and during and after any storm event and make repairs or clean out as necessary.

Daily

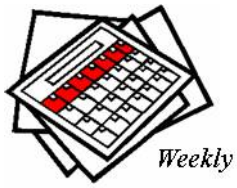
DON'T *Sediment control logs shall not be installed in roadside ditches or other concentrated flow areas.*

DO *Sediment control logs may be used instead of silt fence on steep slopes.*

Sediment Trap (ST) - A sediment trap consists of a riprap berm with a small upstream basin that acts to trap coarse sediment particles. It can be used for upstream disturbed areas less than 1.0 acre. Disturbed areas greater than 1.0 acre require a sediment basin.

Key Installation and Maintenance Requirements:

- The top of the earthen berm shall be a minimum of 6-inches higher than the top of the riprap outlet structure.
- The ends of the riprap outlet structure shall be a minimum of 6-inches higher than the center of the outlet structure.
- The GESC Manager shall inspect the sediment trap weekly and during and after any storm event and make repairs or clean out as necessary.



DO *A properly installed sediment trap.*

Seeding and Mulching (SM) - Seeding and mulching consists of drill seeding disturbed areas with the approved Douglas County seed mix 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.

Key Installation and Maintenance Requirements:

- All areas to be seeded and mulched shall have native topsoil spread to a depth of at least 6-inches (loose depth). All disturbed areas shall be loosened to a depth of 6-inches prior to spreading topsoil.
- Soil shall be thoroughly loosened (tilled) to a depth of at least 6-inches prior to seeding. The top 6-inches of the seed bed shall be free of rocks greater than 4-inches and soil clods greater than 2-inches. Seeding over any compacted areas that haven't been loosened to a depth of at least 6-inches shall be rejected.
- Seed shall be applied using a mechanical drill to a depth of not less than 1/4-inch and not more than 3/4-inch. Row spacing shall be no more than 6-inches. Material used for mulch shall consist of long-stemmed straw. At least 50% of the straw, by weight, shall be 10-inches or more in length. Mulch shall be applied and mechanically anchored to a depth of at least 2-inches. Mulch shall be applied at a rate of 4.000-pounds of straw per acre.
- Copies of seed tickets shall be provided to the Erosion Control Inspector upon request.
- The GESC Manager shall inspect seeded and mulched areas for required coverage monthly for a period of two years following initial seeding. Repairs and re-seeding and mulching shall be undertaken after the first growing season for any areas failing to meet the required coverage.

- See page 60 of this *GESC Field Manual* for a definition of required vegetation coverage.

DO *A drill seeder shall be used to plant seed in Douglas County. With the County's approval, seed may be hand broadcast, at twice the drilled rate, raked and crimp mulched in small areas where it is not possible to drill seed.*

DO *A mechanical crimper shall be used to anchor long-stemmed straw mulch.* →

DON'T *Hydraulic seeding/mulching is not allowed.*

The area on the left was hydraulic seeded at the same time as the area on the right (across the street) was drilled. Due to poor performances like this example, Hydraulic seeding/mulching is not allowed as a seeding method.

Silt Fence (SF) - Silt fence 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.

Key Installation and Maintenance Requirements:

- The bottom portion of the silt fence shall be trenched in and compacted so that the silt fence resists being pulled out by hand. Silt fence installation machines that use trenching or slicing may be utilized to install silt fence.
- Use of road graders, backhoes and similar equipment for installation of silt fence is prohibited.
- The GESC Manager shall inspect silt fence daily and during and after any storm event and make repairs or clean out as necessary.
- Sediment accumulated upstream of silt fence shall be removed when the upstream sediment reaches a depth of 6-inches.

Source: Storm Water Control

DO *Properly installed silt fence cannot easily be pulled out of the ground.*

DON'T *The lower edge of this silt fence is not anchored in a backfilled trench.*

Stabilized Staging Area (SSA) - A stabilized staging area consists of stripping topsoil and spreading a layer of 1-1/2-inch rock, recycled concrete or CDOT Class 6 road base 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.

Key Installation and Maintenance Requirements:

- Stabilized staging area shall be large enough to fully contain parking, storage, and unloading and loading operations.
- Stabilized staging area shall consist of a minimum thickness of 3-inches of granular material (gravel or recycled concrete).
- Stabilized staging area shall be inspected weekly and during and after any storm event and repaired (by adding more granular material) or enlarged as necessary.

DO *Properly installed stabilized staging area.*

DON'T *Parking, staging, and storage are spread out all over this site, increasing disturbance and erosion.*

Surface Roughening Area (SR) - Surface roughening 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.

Key Installation and Maintenance Requirements:

- Disturbed surfaces shall be roughened using ripping or tilling equipment on the contour or tracking up and down a slope using equipment treads.
- The GESC Manager shall inspect surface roughening weekly and during and after any storm event and make repairs (re-roughen soil or repair rill erosion) as necessary.

DO *Properly executed surfacing roughening.*

DON'T *Surface roughening on this slope may have prevented this rill erosion.*

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

Key Installation and Maintenance Requirements:

- A riprap pad shall be placed at the outfall of the slope drain.
- The GESC Manager shall inspect slope drains weekly and during and after any storm event and make repairs as necessary.

DO *Properly installed temporary slope drain pipe alternative).*

DO *This plastic lined temporary slope drain allows runoff to be conveyed down a slope without causing rill and gully erosion.*

Temporary Stream Crossing (TSC) - A temporary stream crossing consists of a riprap layer (for a ford crossing) or culverts covered with riprap (for a culvert crossing) to allow construction equipment to cross a stream. In either case, excavation of the existing channel banks is not allowed and, in general, disturbance is to be kept to a minimum.

Key Installation and Maintenance Requirements:

- Permittee(s) shall confirm that all related stream permitting is obtained prior to installing temporary stream crossings and that all work will be in compliance with such permitting (see Sections 2.5.6 and 2.7.2 of the *GESC Manual*).
- The GESC Manager shall inspect stream crossings weekly and during and after any storm event and make repairs or clean out upstream sediment as necessary.
- Sediment accumulated upstream of stream crossings shall be removed when the sediment depth upstream of crossing is within 6-inches of the crest (ford crossing) or greater than an average depth of 12-inches (culvert crossing).

DO *Properly installed temporary stream crossing.*

This temporary stream crossing is constructed of soil and is not acceptable.

Terracing (TER) - Terracing 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.

Key Installation and Maintenance Requirements:
The GESC Manager shall inspect terracing weekly and during and after any storm event and make repairs (repair rill erosion, re-roughen soil, or re-seed and mulch) as necessary.

DO *This terraced bench interrupts slope drainage and reduces rill and gully erosion.*

Vehicle Tracking Control (VTC) - Vehicle tracking control consists of a 3 to 6 inch crushed rock pad 12 inches thick at all entrance/exit points for a site, that is intended to help strip mud from tires prior to vehicles leaving the construction site. A Temporary Construction Access Permit is required and access to the site may only be taken at a permitted access point (see Section 2.5.3 of the *GESC Manual*).

Key Installation and Maintenance Requirements:

- Vehicle tracking control pads shall be installed at every access point to or from the site.
- Vehicle tracking control pads shall consist of hard, dense, durable stone, angular in shape and resistant to weathering. Rounded stone or boulders will not be acceptable. The stones shall be 3-to 6- inches in size and have a specific gravity of at least 2.6.
- A stop sign installed in accordance with the *MUTCD*, as amended, shall be installed for exiting traffic from the vehicle tracking control pad.
- The GESC Manager shall inspect the VTC daily and during and after any storm event.

Daily

DO *Properly installed vehicle tracking control.*

No vehicle tracking control means mud on streets and an immediate Stop Work Order.

DON'T

STOP WORK

DON'T *Curb ramps of earth, concrete, or lumber are not permitted in the curb section.*

Vehicle Tracking Control with Wheel Wash (WW) - Wheel wash consists of a gravel and riprap pad at the main entrance/exit point for the site with an adjacent washwater/sediment trap. If Douglas County requires a contractor to implement this BMP, each wheel of all vehicles coming in contact with dirt or mud shall be cleaned using a high-pressure washer prior to the vehicle leaving the site.

Key Installation and Maintenance Requirements:
Specific requirements will be specified by the County in cases where vehicle tracking control with wheel wash is required.

DO *A high-pressure washer effectively cleans mud from wheels.*

General Construction Practices - Sheet 1 of the GESC Plan Standard Notes and Details (see Appendix B of the *GESC Manual*) contains a series of standard notes governing construction practices in the County. Permittee(s) working in the County have the responsibility to review, understand, and comply with these notes. Several of the County's requirements pertaining to general construction practices are highlighted in the following paragraphs.

Complying with Limits of Construction - No work, storage of equipment, stockpiling, or parking of vehicles shall be allowed outside of the approved limits of construction. The source of Construction water shall also be within the limits of construction. Violating the limits of construction is considered a Level I Violation subject to a Stop Work Order. The Permittee(s) shall obtain written approval for use of any adjacent property for stockpiling, etc. from the legal owner and Douglas County and shall provide erosion and sediment control BMPs for the adjacent area.

Street Cleaning - Streets shall be kept clean throughout the life of a project. In the event of accidental tracking of mud on streets, the mud shall be cleaned immediately using a vacuum-type street sweeper, a brush-type street sweeper with dust control, or manually using shovels and brooms. If a large quantity of mud needs to be cleaned up, initial removal may take place using a small road.

Failure to keep streets clean, or washing mud off streets with water, shall result in issuance of a Stop Work Order.

A vacuum or brush-type street sweeper is recommended to clean up any tracking of mud.

grader or loader, but care shall be exercised to avoid damage to the roadway. Any damage shall be repaired at the Permittee(s) expense. Streets shall not be washed with water under any circumstance.

Haul roads and other disturbed areas shall be kept watered or otherwise stabilized to preclude visible dust emissions; otherwise a Stop Work Order shall be issued.

Dust Control - The GESC Manager shall be responsible for dust control on the site. Disturbed areas not yet ready to be seeded, landscaped, paved, or otherwise stabilized shall be watered, sprayed with a tackifier, mulched (without seed) or ripped as necessary to preclude visible dust construction emissions.

Stockpiles - Stockpile areas for stripped topsoil, excess excavated material, and other materials shall be located within the limits of construction and at least 100-feet from the banks of a drainageway. Stockpile areas shall be sized to fully contain the material based on maximum allowable stockpile side slopes of 3 (horizontal) to 1 (vertical). Soils that will be stockpiled for more than 30-days shall be seeded and mulched within 14-days of stockpile construction.

As stated on page 12, topsoil shall be stripped from all disturbed areas of a site, stockpiled, and inspected by the County prior to other construction work on the site. Failure to strip and stockpile topsoil and call for an inspection will result in the issuance of a Stop Work Order.

Import and Export of Soil - Section 3.6 discusses the importance of balancing earthwork on site. If earthwork is not balanced on site, a variance, accepted by Douglas County

Engineering, is required. Any import of soil to a site or export of soil from a site without a County variance will result in the issuance of a Stop Work Order. This does not apply to the import of aggregates, concrete, or asphalt used for development.

Placement of Fill - Unless otherwise specified and approved, all embankment material placed on an approved project in the County shall be essentially free of debris, organic matter, frozen material, and particles greater than six inches in diameter.

Subgrade areas to receive embankment material shall be prepared by removing vegetation and any organic material, stripping topsoil, scarifying the subgrade to a depth of at least six inches and wetting or drying as necessary to meet moisture requirements. All material that is placed outside of the Right-of-Way shall be placed in accordance with recommendations from a Geotechnical Engineer.

Unless County acceptance has been granted, fill shall not be placed in streams and drainage channels.

Imported fill material that contains concrete, asphalt, or other non-earthen material may be considered for use when the Colorado Department of Public Health and Environment has issued a recommendation for approval for a certificated of designation and Douglas county has approved a Use by Special Review per Section 21 of the Douglas County Zoning Resolution.

Fill material that contains concrete, asphalt, or other non-earthen material that is generated on-site may be considered for disposal on-site provided that the Colorado Department of Public Health and Environment, Hazardous Materials and Waste Management Division, has issued a positive determination, based upon review of an Engineering Design and Operations Report prepared and submitted by the owner.

Recycled fill material that contains concrete, asphalt, or other non-earthen material may be considered for use as fill material

provided that the Colorado Department of Public Health and Environment, Hazardous Materials and Waste Management Division, has issued a positive determination, based upon review of an Engineering Design and Operations Report prepared and submitted by the owner.

Utility Construction - As Douglas County grows so does the demand for installation of new underground utility lines and upgrade and maintenance of existing utility lines. Within street rights-of-way, utility work is in close proximity to storm sewer systems. Although the work is generally short lived, construction provides ample opportunity for contamination of stormwater runoff. Additionally, installation of new utility lines in open space areas may cross or run parallel to drainageways, again providing opportunities for contamination of stormwater runoff.

The following requirements are designed to reduce the contamination of stormwater runoff from the installation and maintenance of underground activities.

Utility line installation shall comply with the following:

- All utility work within a Douglas County Right of Way shall be required to obtain a Douglas County Right of Way Use and Construction Permit in accordance with the *Roadway Manual*.
- Provide adequate erosion and sediment controls in accordance with the *GESC Manual*.
- No more than 1,000 feet of trench are to 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 on the street, sidewalk or in a drain line.
- 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 rip rap pad shall be placed at the discharge end of the hose to prevent any additional erosion.

- Storm sewer inlet protection shall be provided whenever soil erosion from the excavated area has the potential of entering the storm drainage system.
- All disturbed areas shall be drill seeded and crimp mulched within five days after utility installation or maintenance is completed.
- All other applicable criteria as outline in the *GESC Manual*.

Utility work can contribute significantly to the degradation of Douglas County's water resources.

Construction Site Chemical Control - Many potential pollutants other than sediment are associated with construction site activities. These pollutants include pesticides (insecticides, fungicides, herbicides, and rodenticides); fertilizers used for vegetative stabilization; petrochemicals (oils, gasoline, and asphalt degreasers); construction chemicals such as concrete products, sealers, and paints; wash water associated with these products; paper; wood; garbage; and sanitary wastes. The Permittee(s) shall comply with the following construction site management practices for proper chemical control:

Potential Pollutants on a Construction Site:

Pesticides. *Insecticides, rodenticides, and herbicides are used on construction sites to provide safe and healthy conditions, reduce maintenance and fire hazards, and curb weeds and woody plants. Rodenticides are also used to control rodents attracted to construction sites. Common insecticides employed include synthetic, relatively water insoluble chlorinated hydrocarbons, organophosphates, carbamates, and pyrethrins.*

Petroleum Products. *Petroleum products used during construction activities include fuels and lubricants for vehicles, for power tools, and for general equipment maintenance. Specific petroleum pollutants include gasoline, diesel oil, kerosene, lubricating oils, and grease. Asphalt paving also can be particularly harmful since it releases various oils for a considerable time period after application. Asphalt overloads might be dumped and covered without inspection. However, many of these pollutants adhere to soil particles and other surfaces and can therefore be more easily controlled.*

Nutrients. *Fertilizers are used on construction sites when revegetating graded or disturbed areas. Fertilizers contain nitrogen and phosphorus, which in large doses can adversely affect surface waters, causing eutrophication.*

Solid Wastes. *Solid wastes on construction sites are generated from trees and shrubs removed during land clearing and structure installation. Other wastes include wood and paper from packaging and building materials, scrap metals, sanitary wastes, rubber, plastic and glass, and masonry and asphalt products. Food containers, cigarette packages, leftover food, and aluminum foil also contribute solid wastes to the construction site.*

Construction Chemicals. *Chemical pollutants such as paints, acids for cleaning masonry surfaces, cleaning solvents. Asphalt products, soil additives used for stabilization, and concrete-curing compounds, may also be used on construction sites and carried in runoff.*

Properly Store, Handle, Apply, and Dispose of Pesticides - Pesticide storage areas on construction sites should be protected from the elements. Warning signs should be placed in areas recently sprayed or treated. Persons mixing and applying these chemicals should wear suitable protective clothing, in accordance with the law.

Other practices include setting aside a properly labeled, locked storage area, tightly closing lids, storing in a cool, dry place, checking containers periodically for leaks or deterioration, maintaining a list of products in storage, using plastic sheeting to line the storage area, and notifying neighboring property owners prior to spraying.

Properly Store, Handle, Use, and Dispose of Petroleum Products - When storing petroleum products, follow these guidelines:

- Line the storage area for fuel storage with a double layer of plastic sheeting or similar material;
- Create an impervious berm around the perimeter with a capacity of 110 percent of the capacity of the largest container;
- Clearly label all products;
- Keep tanks off the ground; and
- Keep lids securely fastened.

Oil and oily wastes such as crankcase oil, cans, rags, and paper dropped into oils and lubricants should be disposed of in proper receptacles or recycled.

Fueling and vehicle maintenance operations shall take place in the stabilized staging areas (SSA). Unless an emergency maintenance is needed.

Equipment maintenance shall take place in the stabilized staging area; fluids shall be captured and contained. Fluid spills not properly contained or cleaned up shall result in a Stop Work Order.

Sanitary Facilities – Sanitary facilities shall be provided for construction workers. These facilities shall be staked down to assist in preventing vandalism and being blown over. Trailer facilities are also acceptable. Sanitary facilities shall be located in the stabilized staging area (SSA) away from drainageways. Sanitary facilities shall never be placed near storm sewer inlets.

Sanitary facilities shall be located in the stabilized staging area away from drainageways and storm sewer

Other Construction Site Pollutants – The County requires that proper management of other construction site pollutants occur. Store, cover, and insolate construction materials, including topsoil and chemicals, to prevent runoff of pollutants and contamination of ground water.

Develop and implement a spill prevention and control plan. Agencies, contractors, and other commercial entities that store, handle, or transport fuel, oil, or hazardous materials should develop a spill response plan.

Post spill response procedure information in a conspicuous place(s) and have persons trained in spill handling on site and/or on call at all times. Materials for cleaning up spills should be kept on site and made easily available. Spills should be cleaned up immediately and the contaminated material properly disposed. Spill control plan components should include:

- Identify and stop the source of the spill.
- Contain any liquid.
- Cover the spill with absorbent material such as kitty litter or sawdust, but do not use straw. Dispose of the used absorbent properly.

Adequate disposal facilities shall be utilized for solid waste, including excess asphalt, concrete, wood, rebar and other construction wastes produced during construction.

Washing of equipment and machinery shall not be allowed on site.

Spills Response - <u>All</u> chemical or hazardous material spills which **<u>may</u>** enter waters of the State of Colorado, which include but are not limited to, surface water, ground water and dry gullies or storm sewer leading to surface water, shall be immediately reported to the CDPHE per CRS 25-8-601, and Douglas County. Releases of petroleum products and certain hazardous substances listed under the Federal Clean Water Act (40 CFR Part 116) must be reported to the National Response Center as well as the CDPHE. Spills that pose an immediate risk to human life shall be reported to 911. Failure to report and clean up any spill shall result in issuance of a Stop Work Order.

Installation of Interim and Final BMPs - It is the responsibility of the GESC Manager to ensure that Interim and Final BMPs are installed at the earliest opportunity that grading or construction of new facilities allows. Some BMPs have specific time requirements for installation that are identified on the GESC Plan Standard Notes and Details; these time requirements shall be adhered to (for example, temporary and area inlet protection shall be installed within 48 hours of the pouring of an inlet).

Temporary Inlet Protection is an Interim BMP that shall be installed within 48 hours of pouring of an inlet.

For BMPs where a specific time frame is not given, the controls shall be installed as soon as construction of the infrastructure is substantially complete or when grading activities have produced grades close to the final grade. In any case, it is up to the discretion of the Erosion Control Inspector to make the final determination of Interim and Final BMP

installation time frames.

Preparing for Inspection - In preparation for the Initial GESC Acceptance Inspection prior to the Permittee(s) leaving the site, the GESC Manager shall undertake the following:

1. *Clean all streets, sidewalks and flowlines of sediment with a street sweeper.* ***WASHING OF STREETS, SIDEWALKS AND FLOWLINES IS IN DIRECT VIOLATION OF DOUGLAS COUNTY CRITERIA.*** *Clean all inlets, trickle channels and all other drainage features.*

2. *Remove temporary erosion and sediment controls (if directed by approved GESC Plan or Erosion Control Inspector) and install/maintain erosion and sediment control BMPs per the Douglas County approved Final GESC Plan.*

3. *Ensure all disturbed areas are Drill Seeded and Crimp Mulched, or otherwise stabilized, per Douglas County criteria.*

Scheduling the Inspection - Once all items are completed, the GESC Manager shall call the Douglas County Engineering Permits Staff prior to 3:30 pm the day before the inspection and schedule an Initial GESC Acceptance Inspection. This inspection should be scheduled at the same general time as the Subdivision Improvements Agreement (SIA) Initial Acceptance walkthrough with an Engineering Inspector. To allow time for resolution of issues, the Initial Acceptance Inspections should be scheduled a minimum of 2 weeks prior to a scheduled request for a Building Permit, Temporary Certificate of Occupancy (TCO) or Certificate of Occupancy (CO).

Attendees for the Initial Close-out Inspection - Representatives of the Permittee(s), including the GESC Manager, shall attend the Initial Close-out Inspection along with the Engineering Inspector (for detached single-family projects) or Development Review Engineer (for commercial, industrial, or multi-family projects) and Erosion Control Inspector.

General Meeting Agenda - The following agenda items are addressed at the Initial Close-out Inspection:

1. **Inspection of Final BMPs**. Installation of all Final BMPs are inspected, including topsoil spreading, soil preparation, and drill seeding and crimp mulching.
2. **Inspection of Site Cleanup**. Cleanup of the site and adjoining streets is checked.
3. **Transition to DESC Program**. For detached single-family residential projects, the transition to the County DESC Program is discussed.
4. **Discussion of Vegetation Requirements**. For projects not moving into the DESC Program, the required vegetation inspections and coverage are described.

Important!

It is imperative that the items listed on page 56 are completed per GESC Criteria prior to the Initial Close-out Inspection. Failure to properly complete these items may result in an Engineering hold being placed on the issuance of any Building Permits or Certificates of Occupancy. If all items are completed in accordance with GESC Criteria, the Engineering Division shall release any holds on issuance of Building Permits or

Detached Single-Family Residential Projects - Initial acceptance sign-offs are required from both the Engineering and Erosion Control Inspectors prior to any release of Engineering holds on Building Permits for detached single-family residential projects. After initial acceptance by both the Erosion Control and Engineering Inspectors, the Permittee(s) shall follow the (DESC) requirements discussed in Section 2.5.5 of the *GESC Manual*.

If the filing is divided into separate grading phases, as discussed in Sections 2.4.4 and 3.7 of the *GESC Manual*, Initial Close-out Acceptance (part of the GESC Permit Process) and Engineering Inspections are required for each phase until the entire filing is accepted. Additional information on partial acceptance of phased residential projects is provided in Section 6.3 of the *GESC Manual*.

Commercial, Industrial, and Multi-Family Residential Projects - For commercial, industrial and multi-family sites, the Development Review Engineer and the Erosion Control Inspector must sign-off prior to release of a CO or TCO. An Initial Close-out Inspection shall be scheduled in accordance with Section 6.1 of the *GESC Manual*. Prior to the inspections, the GESC Manager shall prepare the site in accordance with Section 6.1 of the *GESC Manual*.

Corrections to Site - The Permittee(s) shall make any corrections to the site as requested by the County Erosion Control Inspector. If the corrections are substantial, the Erosion Control Inspector may require a follow-up inspection to be scheduled prior to issuing Initial Close-out Acceptance.

Multi-family projects require approval from both the Review Engineer and GESC Inspector.

Engineering Acceptance - Engineering acceptance shall be accordance with the improvement agreements.

Coordination with Street Acceptance Plan - Phasing of the Subdivision Improvements and lots shall be such that the streets and lots are accessible by a street that has already received preliminary acceptance by Douglas County, or will receive preliminary acceptance as part of the accepted phase. As discussed in Section 3.14 of the *GESC Manual*, careful consideration should have be given when developing the Street Acceptance Plan for GESC and Subdivision Improvements, since the Street Acceptance Plan will be the guide by which a subdivision phase will be released from the conveyance and building permit restriction. A phased GESC Plan that matches the phasing plan in the SIA is required to be included with the approved construction plans. The phased GESC Plan includes

erosion and sediment control measures for each phase in order to protect the phase that will obtain Initial Close-out Acceptance by the County.

All site improvements or subdivision improvement requirements shall be complete for each phase for which Initial Close-out Acceptance is applied for, including all drainage improvements necessary to serve that phase. Detention and water quality facilities that serve one or more phases shall be installed when the first phase that drains to the facility is constructed. Once all the streets, curb, gutter and storm sewer drainage improvements have been completed in a phase and all the grading, erosion and sediment controls have be installed or repaired per the Final GESC Plan, inspections shall be made by the Engineering Inspector and Erosion Control Inspector, per Section 5.9 of the *GESC Manual*. If both the Engineering and Erosion Control Inspectors find all items to be compliant with Douglas County requirements, a release of

An aerial view of a phased single-family residential subdivision.

Engineering hold shall be granted and a request to the Building Division may be made to obtain building permits. If there are deficient items, the Permittee(s) shall make the necessary corrections and reschedule an inspection.

Required Inspections and Maintenance for Establishment of Vegetation - The Permittee(s) shall undertake the following inspections and maintenance operations:

Inspection and maintenance requirements include the following:

1. *Seeded and mulched areas shall be inspected monthly by the Permittee(s) for a period of 2 years following initial seeding. Repairs and reseeding and mulching shall be undertaken at least twice per year or as requested by the Erosion Control Inspector for any areas failing to meet the required coverage.*

2. *Rill and gully erosion shall be filled with topsoil prior to reseeding. Reseeding method shall be approved by the County.*

3. *Noxious weeds shall be controlled in a manner approved by the Douglas County Weed Inspector.*

In addition, the Erosion Control Inspector will make periodic inspections of the revegetation area.

Required Vegetation Coverage - Required vegetation coverage is defined as follows:

Required coverage for permanent, temporary and low growth seed mixes shall be defined as follows:

1. *At least 3 plants per square foot with a minimum height of 3 inches. The 3 plants per square foot shall be of the variety and species found in the Douglas County-approved mix (Appendix E).*
2. *No bare areas larger than 4 square feet, 2 x 2 feet or equivalent.*
3. *Free of eroded areas.*
4. *Free from infestation of noxious weeds in accordance with Section 6.5.*

Required Coverage for turf grass areas shall be defined as follows:

1. *At least 80% vegetative cover of grass species planted.*
2. *No bare areas larger than 4 square feet, 2 x 2 feet or equivalent.*
3. *Free of eroded areas.*
4. *Free from infestation of noxious weeds in accordance with Section 6.5.*

Control of Noxious Weeds - Douglas County, through its Undesirable Plant Management Plan, requires landowners to control noxious weeds on their property. Noxious weeds negatively impact agriculture, water quality, recreational opportunities, and wildlife. For these reasons, all projects subject to acceptance for final revegetation shall be free of noxious weed infestation.

The following information is intended to be used as a guide for landowners, developers and Contractors to identify noxious weeds on project sites. This will ensure measures to control the weeds can commence in the early stages of infestation and reduce the likelihood of costly eradication measures prior to final acceptance by the County. Help in controlling noxious weeds may be found by contacting the Douglas County Weed Inspector.

Douglas County has designated the following as noxious weeds:

Diffused Knapweed

Spotted Knapweed

Russian Knapweed

Leafy Spurge

Canadian Thistle

Musk Thistle

Perennial Pepperweed
Photo-Steve Dewey, Utah State University

Scotch Thistle

Yellow Toadflax

HoaryCress

Dalmation Toadflax

Vegetation Acceptance Inspection - Once vegetation has reached the required coverage as defined in Section 6.4 of the *GESC Manual*, the Permittee(s) shall call the Engineering Permits Staff at (303) 660-7490 to schedule a Vegetation Acceptance Inspection.

Written Acceptance - The Erosion Control Inspector will confirm that vegetation has met the required coverage and that noxious weeds have been controlled. If the required coverage has been met, the Erosion Control Inspector will issue written acceptance of the vegetation and give the Permittee(s) instructions to remove remaining on-site BMPs. If the required coverage is not met, repairs or corrections will have to be made by the Permittee(s) and a follow-up Vegetation Acceptance Inspection scheduled once the vegetation meets the required coverage.

Removal of On-Site BMPs - After obtaining written acceptance of the vegetation coverage, the remaining on-site BMPs shall be removed and properly disposed. The site shall be cleaned up and any areas disturbed as a result of the BMP removal shall be seeded and mulched. The Final Close-out Inspection shall then be scheduled with the County.

Final Close-Out Inspection - The Erosion Control Inspector will check the removal of BMPs and either accept the work or stipulate the corrections that have to be made. If corrections are substantial, the Erosion Control Inspector may require that a follow-up inspection be scheduled with the County.

Release of Fiscal Security - Once Final Close-out Acceptance has been obtained, the Permittee(s) may submit a Release of Fiscal Security Request Form to the Douglas County Engineering Agreements Technician. A copy of this form is included in Appendix M of the *GESC Manual*. After the Engineering Agreements Technician has received a completed request form, it will be signed-off by the Erosion Control Inspector and the project's Fiscal Security will be released.

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RESPONSIBLE PARTY DESIGNATION

DV#:_____Location:_____
Site Name:_____ Date: _____

I have been designated the on-site GESC Manager/Alternate GESC Manager. I am responsible for maintaining and repairing all erosion and sedimentation controls on the approved site. Additionally, I have read and understand the GESC Field Manual and understand not all Douglas County requirements are included in the Field Manual. It is my responsibility to insure compliance with the GESC Manual, GESC Permit and accepted GESC Plan. I additionally understand I shall be on-site the majority of the time and must be able to be reached by the below given mobile phone/pager number 24 hours a day.

Printed Name:_____ Company: _____

Telephone Number:_____Mobile/Pager Number:_____

Signature:_____Date:_____

Alternate GESC Manager:_____ Phone #_____

Signature:_____Date:_____

I, being the owner/owner's representative understand it is my responsibility to insure my GESC Manager understands and complies with all applicable Douglas County Criteria and will ensure if I change contractors or the GESC Manager is removed form this project, the new contractor will contact Douglas County to receive the information listed in the Field Manual and become designated as the new onsite GESC Manager. I further understand the Permittee(s), as listed on the GESC Permit shall remain the legally responsible party(s).

Printed Name:_____Company: _____

Telephone Number_____Mobile/Pager Number_____

Signature:_____Date:_____