



Grading, Erosion and Sediment Control Manual



Public Works and Development

Acknowledgements

The Arapahoe County Grading Erosion and Sediment Control (GESC) Manual is an adaptation of the Douglas County GESC Manual. Arapahoe County has provided refinements to this 2009 edition of the GESC Manual and continues to tout the Douglas County GESC Program and Manual to be State of the Art in the field of Erosion and Sediment Control. As such, it continues to provide the basis for this document and is appropriate for use in Arapahoe County. Arapahoe County appreciates the amount of effort and expertise that went into the development of the original Douglas County GESC Program and GESC Manual.

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Section 1. Regulatory and Permitting

Overview of Section 1

1.0

Section 1 addresses the following introductory topics:

Section 1.1, **The GESC Permit**, introduces Arapahoe County's Grading, Erosion, and Sediment Control (GESC) Permit Program.

Section 1.2, **Reasons for the Permit**, points out the need to control the high rates of erosion and sedimentation from construction sites in an effort to protect valuable land and water resources.

Section 1.3, **Legislative Mandate**, summarizes how the GESC Permit Program is mandated by legislation, including the Federal Clean Water Act's National Pollutant Discharge Elimination System (NPDES) Stormwater Phase II Regulations and the Colorado Water Quality Control Act.

Section 1.4, **Authorization of the GESC Manual**, states that the GESC Manual is authorized by passage and adoption of a resolution by the Board of County Commissioners. This section discusses the interpretation and enforcement of the GESC Permit requirements described herein.

Section 1.5 discusses **State Permitting**, such as the following:

- ◆ Stormwater Management Plan.
- ◆ Dewatering Permit.
- ◆ Air Quality Permitting.

Section 1.6 discusses **Federal Permitting**, including:

- ◆ Federal Emergency Management Agency map revisions.
- ◆ Department of Army Corps of Engineers Section 404 Permit.
- ◆ Threatened and Endangered Species approvals.
- ◆ The Migratory Bird Treaty Act

Gradating,
Erosion, and
Sediment
Control



Rates of erosion increase dramatically during construction.

The GESC Permit

1.1

Arapahoe County has a permitting program for grading, erosion, and sediment control on public and private construction projects within the unincorporated areas of the County. This Grading, Erosion and Sediment Control Manual (*GESC Manual*) describes the permitting program that has been adopted to promote environmentally-sound construction practices in the County.

Terminology

The Grading, Erosion, and Sediment Control Permit is termed simply the “GESC” Permit for short (“GESC” has a hard “g” and is pronounced like “desk”).

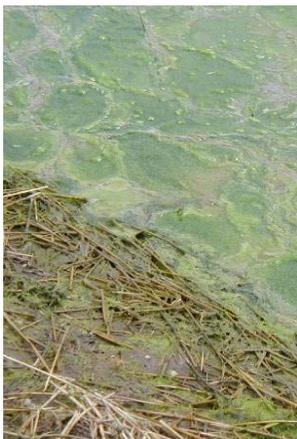
Reasons for the GESC Permit

1.2

The goal of the GESC Permit Program 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, can lead to unwanted algae growth in lakes and reservoirs.



Eroded sediment can clog downstream receiving waters.



Nutrients associated with eroding sediments can lead to undesirable algae blooms.

Arapahoe County is committed to protecting water resources and ensuring that future development continues in an environmentally-sound manner.

Legislative Mandate

1.3

1.3.1 NPDES Regulations. The development, implementation, and enforcement of the Arapahoe County GESC Permit Program is mandated by both the Federal Government and the State of Colorado. The Federal Clean Water Act's National Pollutant Discharge Elimination System (NPDES) Stormwater Regulations require that stormwater discharges from certain types of facilities be authorized under discharge permits (40 C.F.R., 122.26). The goal of the NPDES stormwater permits program is to reduce the amount of pollutants entering streams, lakes, and rivers as a result of stormwater runoff from residential, commercial, and industrial areas.

The original 1990 regulation (**Phase I**) covered municipal (i.e., publicly-owned) storm sewer systems for municipalities over 100,000 population. The regulation was expanded in 1999 to include smaller municipalities, as well as some counties, including Arapahoe County. This expansion of the program is referred to as **Phase II**.

In Colorado, stormwater discharge permits are issued by the Colorado Department of Public Health and Environment, Water Quality Control Division ("Division"). Such permits are part of the Colorado Discharge Permit System, or CDPS, under Regulation No. 61. Regulation No. 61 was promulgated to assist the Division in implementing its stormwater permits program. The Phase II municipal separate storm sewer systems (MS4s) will be covered under a general permit for stormwater discharges from MS4s. As per the Division's regulation, the main requirement of this general permit will be for Arapahoe County to develop and implement six stormwater management programs, or minimum control measures. One of these six measures is **construction site stormwater runoff control**.



Control of construction site erosion in Arapahoe County is mandated by Federal and State law.

Regulation No. 61 states that the County must "develop, implement, and enforce a stormwater management program designed to reduce the discharge of pollutants from unincorporated lands in the County to the Maximum Extent Practicable (MEP), to protect water quality, and to satisfy the appropriate water quality requirements of the Colorado Water Quality Control Act (CWQCA) (Colorado Code of Regulations (CCR) 61.8(11)(a)(i))."

In short, the County must develop a stormwater management program that meets the requirements of the six minimum control measures and protects state waters from pollution, contamination, and/or degradation.

Section 1. Regulatory and Permitting

Legislative Mandate, continued

1.3.2 Cherry Creek Reservoir Control Regulation No. 72. In addition to the CDPS program requirements, Arapahoe County is responsible for complying with Cherry Creek Reservoir Control Regulation No. 72, promulgated by the Division pursuant to the CWQCA, Sections 25-8-202(1)(c)

The Colorado Water Quality Control Act (CCR 61.8(11)(a)(ii)(D)) Requires Arapahoe County to:

“...develop, implement, and enforce a program to reduce pollutants in any stormwater runoff to the MS4 from construction activities that result in a land disturbance of greater than or equal to one acre. Reduction of pollutants in stormwater discharges from construction activity disturbing less than one acre must be included in the program if that construction activity is part of a larger common plan of development or sale that would disturb one acre or more. The program must be developed and implemented to assure adequate design, implementation, and maintenance of best management practices (BMPs) at construction sites within the MS4 (Arapahoe County) to reduce pollutant discharges and protect water quality. The program must include the development and implementation of, at a minimum:

- ◆ *An ordinance or other regulatory mechanism to require erosion and sediment controls, as well as sanctions to ensure compliance, to the extent allowable under State or local law;*
- ◆ *Requirements for construction site operators to implement appropriate erosion and sediment control BMPs;*
- ◆ *Requirements for construction site operators to control waste such as discarded building materials, concrete truck washout, chemicals, litter, and sanitary waste at the construction site that may cause adverse impacts to water quality;*
- ◆ *Procedures for site plan review which incorporate consideration of potential water quality impacts;*
- ◆ *Procedures for receipt and consideration of information submitted by the public; and*
- ◆ *Procedures for site inspection and enforcement of control measures.”*

The GESC Permit Program complies with these requirements.

and 25-8-205, *et seq.*, C.R.S. This regulation, affecting approximately 18.6 square miles of Arapahoe County within the Cherry Creek Watershed, identifies specific requirements for erosion and sediment control BMPs on construction sites, including placing limits on the area of land that can be disturbed at any one time. The intent of the regulation is to protect the water quality of Cherry Creek Reservoir.

Section 1. Regulatory and Permitting

Authorization of the GESC Manual

1.4

The *GESC Manual* is authorized and approved by the Arapahoe County Board of County Commissioners (adopted February 22, 2005).

1.4.1 Jurisdiction. The GESC Permit Program shall apply to all land within the unincorporated areas of Arapahoe County.

1.4.2 Amendments and Revisions. These policies and criteria may be amended and revised as new technology is developed and experience is gained. The Board of County Commissioners (BOCC), following the recommendations of the Public Works and Development Director (herein referred to as "Director"), may consider such amendments and revisions. Minor revisions that do not affect policy may be made without the action of the Board.

1.4.3 Enforcement Responsibility. The Board of County Commissioners, acting through the Director, shall enforce the provisions of the *GESC Manual*.

1.4.4 Review and Acceptance. The County, or its designated agent, will review all *GESC* Plan submittals for general compliance with these criteria contained herein. An acceptance by the County does not relieve the Permittee(s) or Design Engineer from responsibility of ensuring that calculations, plans, specifications, construction and as-built drawings are in compliance with the criteria contained herein. Additionally, acceptance by the County does not alleviate the Permittee(s) or Design Engineer from complying with all other applicable Federal, State, or Local regulations.

1.4.5 Interpretation. In the interpretation and application of the provisions of this *GESC Manual*, the following shall govern:

These provisions shall be regarded as the minimum requirements for the protection of the public health, safety, comfort, convenience, prosperity, and welfare of the residents of the County. The



The GESC Permit Program is designed to fulfill a legislative mandate and significantly reduce construction erosion.

Section 1. Regulatory and Permitting

Authorization of the GESC Manual, continued

GESC Manual shall therefore, be regarded as remedial and shall be liberally construed to further its underlying purposes.

Whenever a provision in these criteria and any other provision of the Arapahoe County Land Development Code or any provision in any law, ordinance, resolution, rule or regulation of any kind, contain any restrictions covering any

The GESC Manual shall be considered the minimum requirements and Arapahoe County reserves the right to apply more stringent criteria. Additionally, the County reserves the right to change, modify, or alter these requirements at any time.

of the same subject matter, **whichever are more restrictive or impose higher standards shall govern.** In the event that there is a discrepancy in the interpretation of the *GESC Manual*, the Director shall have the final determination of the intent of the *GESC Manual*.

The *GESC Manual* shall not abrogate or annul any permits or accepted drainage reports and construction plans issued before the effective date of the *GESC Manual*.

1.4.6 Relationship to Other Standards. Relationship to Other Standards. If a special district imposes more stringent criteria, such differences are not considered conflicts. For example, the Arapahoe County Public Airport Authority, Centennial Airport, may require additional control measures on development within this special district. As such, those more stringent requirements are applicable. When differences arise, the more stringent requirements shall apply. If Federal or State law imposes stricter criteria, standards or requirements, these shall be incorporated into the County's requirements after proper notice and public hearing(s) needed to modify the County's regulations, standards, and ordinances.

State Permitting

1.5

The State of Colorado requires permits for construction-related activities, which are in addition to permitting requirements of Arapahoe County. The Applicants or the Design Engineer shall contact the State of Colorado, Water Quality Control Division (WQCD) for specific State permitting information for their specific projects. Contact information for the WQCD is provided in Appendix A.

Information on some of the State permits that may be applicable includes the following (this is not to be considered an exhaustive list; therefore, applicants are advised to contact the State):

1.5.1 Stormwater Management Plan. In compliance with the NPDES Stormwater Permit Program, the State requires that Stormwater Management Plans (SWMPs) be prepared for construction projects exceeding one (1) acre of disturbance.

1.5.2 Construction Dewatering Permits. The State issues a permit for Discharges Associated with Construction Activities to manage dewatering discharges from construction projects. The permit establishes water quality standards and BMPs for dewatering discharges.

Section 1. Regulatory and Permitting

State Permitting, continued



Control of airborne emissions is included in the GESC Plan Standard Notes and may be subject to State regulations.

1.5.3 Air Quality Plans. As described in the Urban Drainage and Flood Control District's *Urban Storm Drainage Criteria Manual -Volume 3, (Volume 3)*, as amended, the surface stabilization measures identified for control of precipitation-induced erosion generally inhibit soils from becoming windborne. Applicable State regulations pertaining to air quality shall be addressed by the Permittee.

The Air Pollution Control Division of the Colorado Department of Public Health and Environment (CDPHE) has passed air quality regulations consistent with Federal legislation. Regulation No. 3 requires submittal of an Air Pollutant Emission Notice (APEN) for sources of fugitive dust from construction sites, as well as other sources.

Regulation No. 1 defines particulate emission control regulations for haul roads and roadways.

Haul Roads, as defined by the Air Quality Control Commission, Regulation 1 (5 CCR 1001-3), are roads which are used for commercial, industrial or governmental hauling of materials and which the general public does not have a right to use. Any owner or operator of any new or existing haul road which has vehicle traffic exceeding 40 haul vehicles or 200 total vehicles per day (averaged over any consecutive 3-day period) from which fugitive particulate emissions will be emitted shall be required to use all available practical methods which are technologically feasible and economically reasonable in order to minimize such emissions in accordance with the requirements of Section III.D. of Regulation 1. Additional control measures or operating procedures, including but not limited to road watering, chemical stabilization, road carpeting, paving, suggested speed restrictions and other methods or techniques approved by the Air Quality Control Division, may be necessary to fully comply with these regulations at the construction site. The CDPHE should be contacted about APENs and other air quality requirements.

Federal Permitting

1.6

Applicants are also responsible for complying with all applicable Federal permitting. This may include, but is not limited to the FEMA map revision process, the Department of the Army Corps of Engineers Section 404 Permit and US Fish and Wildlife Service, Endangered Species Action Section 10 and/or Section 7 Permits.

Information on some of the Federal programs and permits that may be applicable include the following (this is not to be considered an exhaustive list; therefore, applicants are advised to confirm the Federal requirements that may apply):

1.6.1 FEMA Map Revisions. As mentioned in Section 2.9.9, projects that impact the regulatory floodplain may need to obtain a Conditional Letter of Map Revision (CLOMR) and/or Letter of Map Revision (LOMR) from FEMA. In this case, proper documentation needs to be submitted to

Section 1. Regulatory and Permitting

Federal Permitting, continued



*A Preble's Meadow
Jumping Mouse.*

FEMA for review and approval.

Contact Information for FEMA is provided in Appendix A. from FEMA. In this case, proper documentation needs to be submitted to FEMA for review and approval.

Contact Information for FEMA is provided in Appendix A.

1.6.2 Section 404 Permitting. Excavation activity associated with a dredge and fill project in "Waters of the United States" (including streams, open water lakes, ponds, wetlands, etc.) may require a Section 404 Permit. The level of permitting is dependent on the extent of disturbance along the water body of interest. It should be reviewed with the U.S. Army Corps of Engineers as to whether a Nationwide Permit or an Individual Permit is required. Individual Permits will require more detailed information about the project and preparation of exhibits specific to the project site.

Contact Information for the U.S. Army Corps of Engineers is provided in Appendix A.

1.6.3 U.S. Fish and Wildlife Service Threatened and Endangered Species Clearance. The U.S. Fish and Wildlife Service has established guidelines for surveys to determine the presence or absence of threatened and endangered species within a project's limits. The most prominent of these species in this area are the Preble's Meadow Jumping Mouse (*Zapus hudsonius preblei*) and Ute Ladies' Tresses Orchid (*Spiranthes diluvialis*). Clearance of these species from a project site is dependant on spatial, regional requirements determined by the U.S. Fish and Wildlife Service.

Contact Information for the U.S. Fish and Wildlife Service is provided in Appendix A.



*Ute Ladies' Tresses
Orchid.*

1.6.4 Migratory Bird Treaty Act. The Migratory Bird Treaty Act (MBTA) is an Act of Congress which prohibits, unless permitted by regulations, to “pursue, hunt, take, capture, attempt to take, capture or kill, possess...” all migratory birds, nests, and eggs protected by the MBTA. The MBTA protects almost all birds, including common species such as swallows, crows, and geese. The U.S. Fish and Wildlife Service is responsible for administering the MBTA.

Contact Information for the U.S. Fish and Wildlife Service is provided in Appendix A.

Section 2. Submittal and Permit Process

Overview of Section 2

2.0

Section 2 addresses the following topics in the GESC Permit Process:

Section 2.1, **Projects Requiring a GESC Permit**, indicates the types of land-disturbing activities in unincorporated Arapahoe County that require a GESC Permit.

Section 2.2, **Types of GESC Permits**, identifies the three types of GESC permits issued by the County and the projects in which each applies.

Section 2.3, **Who Obtains a GESC Permit?**, states that the Property Owner and Contractor, together referred to as the “Applicants” before a GESC Permit is issued and “Permittee(s)” afterwards, are the parties who sign the GESC Permit Application form and are legally responsible for complying with the requirements of the GESC Permit.

Section 2.4, **What Steps are Included in the GESC Permit Process?**, outlines the steps involved in the Standard GESC Permit process.

Confirm that a Standard GESC Permit is Required.

Section 2.5, **Projects that Require a Standard GESC Permit**, identifies the kinds of projects that require a Standard GESC Permit.

Retain a Professional Engineer to prepare a GESC Plan

Section 2.6, **Who Prepares GESC Plans?** confirms that the State Board of Registration has stipulated that a GESC Plan must be prepared under the responsible charge of a licensed Professional Engineer. This section emphasizes the value of continued training in the field of construction site erosion and sediment control.

Determine type of GESC Drawings and identify what additional plans and permits are required for the project (Presubmittal Meeting with the County is recommended).

Section 2.7, **Presubmittal Meeting**, points out that an efficient way to clarify GESC Permit requirements is to schedule a Presubmittal Meeting with County staff at the outset of the process. A Presubmittal Meeting, although optional, gives County staff an opportunity to understand the Applicant’s plans for the site and to offer guidance in developing a GESC Plan.

Section 2.8, **Types of GESC Drawings**, discusses five types of GESC Drawings and their submittal formats. Depending on the size and nature of a construction project, Low Impact, Small Site/Utility, Staged, Staged and Phased, or Temporary Batch Plant GESC Drawings are required.

Section 2. Submittal and Permit Process

Overview of Section 2, continued

Section 2.9, **Other County Plans and Permits**, describes the County submittal packages that GESC plans and reports may be submitted simultaneously with and permits that may need to be submitted along with the development of a GESC Plan, including the following:

- ◆ Drainage Plans.
- ◆ Street Cut and Right-of-Way Use Permit.
- ◆ Construction Permit.
- ◆ Floodplain Development Permit.

Submit the GESC Plan and Report and related plans and permits to the County for review and acceptance and revise documents as necessary to address County comments.

Section 2.10, **Submittal of the GESC Plan and Report**, describes procedures for submitting a GESC Plan and Report.

Section 2.11, **Plan and Report Revisions Based on County Comments**, discusses the Design Engineer's revisions to the GESC Plan and Report based on the County's comments.

After County acceptance of the GESC Plan and Report, submit 6 sets of the drawings and 3 copies of the report, bound, for signatures, along with the GESC Permit Application, Fee, and Collateral.

Section 2.12, **Preliminary Acceptance of the GESC Plan and Report**, describes submittal requirements for multiple sets of GESC Drawings and Reports to obtain the signature of the Director.

Section 2.13, **Final Acceptance of GESC Plan and Report**, describes the County signing process for multiple sets of GESC Drawings.

Section 2.14, **Applying for a GESC Permit**, discusses filling out the GESC Permit Application Form.

Section 2.15, **Permit Fees**, covers procedures for paying Permit fees.

Section 2.16, **Posting Collateral**, discusses acceptable forms and amounts of Collateral.

When ready, obtain the signed GESC Drawings and a copy of the GESC Field Manual.

Section 2.17, **Duration of GESC Permits**, discusses the duration of GESC Permits and the need to renew GESC Permits prior to expiration.

Section 2.18, **Transfer of GESC Permits**, describes procedures for transferring a GESC Permit if either the Permittee(s) changes during the life of a GESC Permit.

Section 2.19, **GESC Permits for Single Family Residential Projects**, describes the GESC responsibilities of each party involved in a Single Family Residential project.

Section 2.20, **GESC Permits for Multi-lot Development Projects (Not Including Single-Family Residential Projects, See Section 2.19)**, describes the GESC responsibilities of each party involved in a Multi-lot Development project.

Projects Requiring a GESC Permit

2.1

2.1.1 Projects that Require a GESC Permit. Arapahoe County requires that a GESC Permit be obtained prior to the start of the following land-disturbing activities within the unincorporated areas of the County:

Projects Requiring a Standard GESC Permit

- ◆ *New development and redevelopment of all sites (regardless of size).¹*
- ◆ *Any land disturbance of 1.0 acre or more not otherwise exempt by these Criteria.*
- ◆ *Installation of underground utility lines for a new development exceeding one single-family residence and appurtenant structures, prior to the start of over lot clearing and grading.*
- ◆ *New public and private roadway construction.*
- ◆ *Installation or maintenance of underground utility lines in excess of 1000 linear feet in length.*
- ◆ *Fill or excavations of 50 or more cubic yards of material.*
- ◆ *Any clearing, grubbing, grading, or filling operations within 100 feet of a drainageway.*
- ◆ *Any clearing, grubbing, grading, or filling operations that has the potential to adversely impact drainage patterns or result in sedimentation of the storm sewer system or drainageway.*
- ◆ *Mining projects, even when subject to State mining permit.*
- ◆ *Drilling sites and operations not otherwise exempt by these Criteria.*
- ◆ *Any project that the Director determines to have an adverse impact on the public right-of-way, public infrastructure, or adjacent property, with respect to grading, erosion and sediment control.*

¹ *New development and redevelopment refers to all projects which are required to submit site construction plans to the County, for review and approval excluding building permit plans, in accordance with the County's Land Development Code Requirements.*

2.1.2 Projects that Require a Low-Impact GESC Permit. Arapahoe County requires that a Low-Impact GESC Permit be obtained prior to the start of the following land-disturbing activities within the unincorporated areas of the County:

Projects that Require a Low-Impact GESC Permit

- ◆ *Land disturbance with an area less than 1 acre hat has the potential to adversely impact drainage patterns or result in sedimentation of a storm sewer system or drainage-way or as determined by County staff .*
- ◆ *Installation or maintenance of underground utility lines less than 1000 linear feet in length outside of the County right-of-way and serving more than one single-family residence and appurtenant structures. (Utility lines within County right-of-way must also comply with the Street Cut and Right-of-Way Use Permit requirements. See Section 10.)*

Section 2. Submittal and Permit Process

Projects Requiring a GESC Permit, continued

2.1.3 Projects that Do Not Require a GESC Permit. Some types of projects, listed below, are automatically exempt from the GESC Permit Program.

Projects that Do Not Require a GESC Permit

- ◆ *Land disturbance with an area less than 1 acre that does not have the potential to adversely affect drainage patterns or result in sedimentation to a storm sewer system or drainageway.*
- ◆ *Agricultural activities, including but not limited to tilling, conservation terracing planting, harvesting, live-stock operations or the installation or maintenance of agricultural-related underground utilities and irrigation systems located on private property.*
- ◆ *Maintenance of pavement repair, including mill and overlay and signal projects, on existing public and private roadways. (Although a GESC Permit is not required, implementation of appropriate erosion and sediment control BMPs is strongly encouraged.) Right-of-Way permits may be required. New public and private roadway construction is subject to the requirements contained in the County Infrastructure and Construction Standards.*
- ◆ *Emergency situations that pose an immediate risk to life, health or property, including but not limited to hazardous waste clean-up or containment, flooding, underground utility repair, and fire.*
- ◆ *Underground utility line installation less than 1000 linear feet in length within public right-of-way. (Although a GESC permit is not required, GESC requirements associated with a Right-of-Way Use Permit are required. See Section 10.)*
- ◆ *Mowing.*
- ◆ *Cemetery Grave.*
- ◆ *Weed Control.*
- ◆ *Burning.*
- ◆ *Fencing and maintenance of fencing.*
- ◆ *Irrigation and associated activities (including: operation, maintenance and construction of irrigation facilities; ditch maintenance and pumping; and maintenance, operation and construction of diversions and head gate structures).*
- ◆ *Fill of less than 50 cubic yards that does not have the potential to affect drainage patterns or result in sedimentation of a storm sewer system.*
- ◆ *Exploratory excavations or drilling as part of a pre-development site assessment under the direction of soil engineers or engineering geologists.*
- ◆ *Refuse disposal sites controlled by other regulations.*
- ◆ *Drilling or maintenance of a water well to serve one single-family residence and appurtenant structures.*

Important! *The projects shown that do not need a GESC Permit are not free from the obligation to control erosion and sediment; BMPs shall still be required in accordance with the information shown in the GESC Manual.*

Arapahoe County GESC Permits are required even for projects covered under a State or Federal permit.

The projects shown that do not need a GESC Permit are not free from the obligation to control erosion and sediment; BMPs shall still be required in accordance with the information shown in the *GESC Manual*.

2.1.4 Projects Covered Under Other Permits. GESC Permits are required for projects meeting the criteria identified herein even if a Federal or State agency or another jurisdiction has approved the project and issued a permit for the work. Examples include mining projects possessing a State mining permit and projects for which a Nationwide or Individ-

Types of GESC Permits

2.2

The following three types of GESC Permits are issued by Arapahoe County:

1. *Standard GESC Permit,*
2. *Low Impact GESC Permit, and*
3. *Temporary Batch Plant/GESC Permit*

2.2.1 Standard GESC Permit. A Standard GESC Permit is required for all of the land-disturbing activities identified in Section 2.1.1 other than the activities qualifying for a Low Impact GESC Permit or a Temporary Batch Plant/GESC Permit.

2.2.2 Low Impact GESC Permit. Some land-disturbing activities may have a minor impact on adjacent properties and downstream receiving waters. For projects with a disturbed area less than one acre where minor impacts can be adequately demonstrated to the Engineering Division, streamlined submittal requirements apply. If, after reviewing the submitted information, County staff concur that there is low impact, a Low Impact GESC Permit will be designated for the project.



Low Impact GESC Permits have a streamlined permitting and inspection process.

2.2.3 Temporary Batch Plant/GESC Permit. A Temporary Batch Plant is a temporary plant for the manufacture or mixing of concrete, cement, and concrete and cement products, including any apparatus and uses incident to such manufacturing and mixing. See Section 11 for further discussion, process, and additional submittals.

2.3

Typically, GESC Permits are signed by both the Project Owner and the Contractor. Prior to issuance of a GESC Permit, the Owner and the Contractor are referred to as “Applicants”. After the Permit is issued, both are considered “Permittee(s)”. For single family residential projects, as lots are sold (usually to builders), the new owners are required to become a party to the GESC permit for the development project by completing a Letter of GESC Permit Compliance. The Letter of GESC Permit Compliance is further described in Section 2.19. Therefore builders will also be considered “Permittees”.

Who Obtains a GESC Permit?

Information
The Low Impact GESC Permit process is described in Section 8.

Important!
Failure to meet the requirements of a GESC Permit may lead to enforcement action against the Permittee(s).

A Permittee is defined as “any person who is issued a GESC Permit by the County” or is a party to a GESC permit via a Letter of GESC Permit Compliance. The Permittee(s) shall be legally responsible for compliance with the GESC Permit. If the Applicant is not an individual, an authorized agent of the entity must sign the permit on behalf of the Permittee.

Section 2. Submittal and Permit Process

Who Obtains a GESC Permit?, continued

What Steps are Included in the GESC Permit Process?

Projects that Require a Standard GESC Permit

Information *If a Low Impact GESC Permit is required, see Section 8 for applicable Permit Steps and information.*

Who Prepares GESC Plans?

Permittee(s) (Owners and Contractors) undertaking land-disturbing activities are responsible for meeting all of the requirements of the County's GESC Permit Program that are summarized in Sections 2.4 through 2.18 and described in detail within the *GESC Manual*. Failure to meet the requirements of the GESC Permit may lead to enforcement action, as described in Section 5.9.

2.4

The steps involved in the Arapahoe County GESC Permit Process for the Standard GESC Permit are summarized in the following sections. The GESC Permit Process as a whole is intended to be dynamic, responding to individual site conditions to provide effective erosion and sediment control during construction.

The steps involved in the Low Impact GESC Permit are outlined in Section 8.

The steps involved for the Temporary Batch Plant/GESC Permit are outlined in Section 11.

Information *The GESC Permit Process is a dynamic, not static, process. The Permittee(s) are responsible to adapt the original GESC Plan so as to effectively reduce erosion and sediment and comply with any modifications to the GESC Plan required by Arapahoe County.*

2.5

The first step in the process is to examine the information in Section 2.1.1 to confirm that a Standard GESC Permit is required for the project. These GESC Permits apply to most land disturbing activities in the County other than small (less than 1 acre) projects with minor impact (requiring a Low Impact GESC Permit) and most agricultural or emergency activities (exempt activities). Land development cases should follow the submittal requirements summarized in Section 2.9.2 or 2.9.3 (as appropriate). Engineering submittals, or E-Cases, should follow the submittal requirements outlined in Section 2.9.4.

The Arapahoe County Engineering Services Division can be contacted to clarify GESC Permit requirements and to help interpret which GESC Permit, if any, applies to a particular project. Contact information is provided in Appendix A.

Important! *If a GESC Permit is not required, the process described herein is not applicable; however, BMPs shall still be required in accordance with the information shown in Sections 4 and 6.*

2.6

Laying out erosion and sediment controls on a site may involve engineering design issues such as embankment stability and spillway sizing (for sediment basins), pipe material and installation requirements (for temporary stream crossings), and peak discharge estimates and

Who Prepares GESC Plans?, continued

hydraulic computations (for determination of flood elevations and velocities and for sizing conveyance facilities). Because of these issues, Colorado State Statutes require that GESC Plans be prepared by or under the responsible charge of, and signed and stamped by, a Professional Engineer registered in the State of Colorado, see Statutory Requirements in §§ 12-25-101, *et seq.*, C.R.S. For the purpose of this manual the Professional Engineer is referred to as the Design Engineer. Non-PEs with experience in erosion and sediment control may assist in the development of a GESC Plan, but they must conduct their work under the supervision of the Design Engineer.



GESC Plans are to be prepared under the responsible charge of a Professional Engineer.

It is the responsibility of the Design Engineer to use professional judgment in the development of the GESC plans. If the Design Engineer determines that any GESC requirements, as applied to their specific project, pose a safety hazard, it is the Design Engineer's responsibility to notify the County of these issues, as well as to recommend an approach to alleviate the concerns.

The Design Engineer is responsible for preparing the GESC Plan in accordance with the requirements of this *GESC Manual* and is one of the key personnel who should attend the on-site Preconstruction Meeting at the start of the construction phase.

Information Arapahoe County highly recommends that the Design Engineer attend the Presubmittal meeting to reduce delays in the start of construction.

Presubmittal Meeting

2.7

Prior to preparing GESC Plans and other submittal documents for a proposed construction project, a Presubmittal Meeting with the Public Works and Development Department, or its designated representative, is recommended. The purpose of the meeting is to confirm the type of GESC Plan appropriate for a specific development site. The meeting will help to clarify the GESC Permit Program and confirm what related plans and permits may be required. Also, initial discussions can take place regarding the general configuration of controls that may be appropriate for the site.



A Presubmittal Meeting with County staff is recommended to clarify GESC Permit requirements.

Section 2. Submittal and Permit Process

Presubmittal Meeting, continued

The Presubmittal Meeting is not a requirement, but is recommended for larger projects and projects in which applicants are not familiar with the County's GESC process and requirements. The Presubmittal Meeting shall be scheduled through the County's Public Works and Development Department.

It is anticipated that the Owner and/or the Design Engineer of the GESC Plan would attend the Presubmittal Meeting. The Owner or Owner's

Information Needed at Presubmittal Meeting

- ◆ *Name, type, and location of development.*
- ◆ *Brief description of site topography and drainage features.*
- ◆ *Size of development site and anticipated disturbed area, in acres.*
- ◆ *Anticipated type of GESC permit.*
- ◆ *Anticipated plans and permits to accompany GESC Plan.*

representative shall bring the following information to the meeting:

Types of GESC Drawings

2.8

Depending on the degree of disturbance and the amount of area to be disturbed, one of four types of GESC Drawings is applicable. Each type of GESC Drawing has unique formatting requirements, as described in detail in Section 3. Table 2-1, on the next page, summarizes permit types, site areas, and GESC Drawing requirements.

A brief description of each type of GESC Drawing follows. See Chapter 11 for information on Temporary Batch Plants.

2.8.1 Small Site and Utility GESC Drawing. For disturbed areas of new developments less than one acre and utility construction over 1000 linear feet, erosion and sediment controls for the Initial, Interim, and Final stages of construction may be shown on a single drawing (as opposed to three separate drawings).

2.8.2 Staged GESC Drawing. For disturbed areas greater than one acre, separate GESC Drawings are required for the Initial, Interim and Final stages of a project. This is to clarify, both to the Design Engineer and field personal, what erosion and sediment controls are appropriate at the outset of construction, during site development, and at the end of construction prior to final establishment of vegetation.

If the applicant can adequately demonstrate to the County that the Initial, Interim and Final phases of construction can be clearly shown on a single plan (for sites with disturbed areas up to five acres), then the Small Site/Utility Construction requirements identified above may be followed. However, this will be the exception, not the rule, and the County reserves the right to make this determination.

Section 2. Submittal and Permit Process

Types of GESC Drawings, continued

Table 2-1. Types of GESC Plans

Type of GESC Permit	Type of GESC Drawing	Site Size Criteria	Drawing Format
<i>Low Impact GESC Permit</i>	<i>Low Impact See Section 8</i>	<i>1 acre or Less, or as determined by County.</i>	<i>Initial, Interim, and Final Stage BMPs may be shown on a single sheet. (may be hand-drawn)</i>
<i>Standard GESC Permit</i>	<i>Small Site/ Utility</i>	<i>Less than 1 acre or as determined by County.</i>	<i>Initial, Interim, and Final Stage BMPs may be shown on a single sheet. (may be hand-drawn)</i>
	<i>Staged</i>	<i>1 acre to 40 acres</i>	<i>Projects shall be organized into an Initial, Interim, and Final Stage; Initial, Interim, and Final BMPs shall be shown on separate sheets.</i>
	<i>Staged and Phased</i>	<i>Greater than 40 acres</i>	<i>Projects shall be divided into separate construction phases each disturbing less than 40 acres (70 acres for soil mitigation operations), with each phase showing Initial, Interim, and Final BMPs on separate sheets.</i>
<i>Temporary Batch Plant/ GESC Permit</i>	<i>Temporary Batch Plant</i>	<i>No Size Criteria</i>	<i>Projects shall be organized into an Initial (Site Plan) and Final (Reclamation) Plan</i>

2.8.3 Staged and Phased GESC Drawing. For sites where the total disturbed area will exceed 40 acres, grading operations shall not take



Large areas of disturbance create huge potential for erosion and sedimentation; limiting the area of disturbance substantially reduces the problem.

Section 2. Submittal and Permit Process

Types of GESC Drawings, continued

place all at one time unless otherwise approved by the County, see Section 3.4. Instead, the site shall be divided into separate grading phases each disturbing 40 acres or less. If over excavation, stockpiling, and replacement of soils is necessary for mitigating expansive soils or addressing similar issues, each phase may disturb up to a maximum of 70 acres. During construction, each grading phase shall be approved by the County Inspector and drill seeded and crimp mulched prior to starting the subsequent phase. Additional information on drawing requirements for these stages is provided in Section 3.1.

If a GESC Plan can not adequately be shown on one plan sheet (see scale requirements in Section 3.1), multiple sheets shall be used. However, at least one overall plan sheet shall be provided as an index to

Phasing Requirements for Adjacent Projects

An owner or developer may have several adjacent projects that, individually, may or may not be subject to the area phasing requirements. This situation typically occurs in large developments, part of a larger common plan of development or sale, which is platted in numerous individual filings. For design and construction purposes, the projects are typically submitted to the County as separate projects and they are reviewed accordingly. However, for purposes of grading, erosion and sediment control, when the individually platted projects are contiguous and the grading operations could be occurring simultaneously, the County shall treat the sum of the individual projects as one large project. The sum of the individual projects shall be subject to the area phasing requirements and the issuance of individual project grading permits shall be based on the disturbance and/or stabilization that has been accomplished in the adjacent projects.

Other County Plans and Permits

subsequent sheets.

2.9

GESC Plans shall be submitted along with the following related Arapahoe County plans and permit applications. These related plans and permits do not reflect all requirements for development in the County, but rather describe plans and permits that shall be considered when proceeding through the GESC Permit Process.

2.9.1 Submittal Packages. GESC plans and reports may be submitted and processed through the County in several ways, including:

- Associated with a platting or planning development process (submitted and reviewed concurrently).
- Associated with a platting or planning development process (accelerated review and approval schedule).
- An Engineering submittal (not associated with a platting or planning process).

Processing of the three above types of GESC reviews is summarized in the following sections.

2.9.2 Planning Submittals. For GESC plans and reports submitted and

**Other County
Plans and Permits,
continued**

reviewed concurrently with a land development process, the GESC plan and report shall be reviewed and processed in accordance with the Planning Submittal package. The GESC report and plans shall be submitted as a separate document, and shall not be included within the drainage report and construction plans. The review, processing, and approval of the GESC documents will be completed concurrently with the other engineering documents of the projects. Modifications to the other engineering documents shall be incorporated into the GESC plans throughout the review and approval process.

2.9.3 Accelerated Planning Submittals. For GESC plans and reports associated with a land development submittal, the applicant may request that the GESC package be accelerated and reviewed independently of the planning submittal package. The applicant must provide justification for an accelerated review. The County will consider the applicant's request and justification, and provide for an accelerated review if warranted. At a minimum, a Phase II level drainage report must be approved by the County and the project must have been to, and received a favorable recommendation from the Planning Commission before a GESC permit will be approved. For projects that do not go to the Planning Commission, a BOCC approval is required.

Information
At a minimum, the Phase II Drainage Plan shall be submitted, reviewed, and accepted by the County before a GESC Permit is issued.

For accelerated reviews, the applicant shall provide the GESC plan and report consistent with the Engineering Submittal requirements described below. Because the GESC permit may be approved prior to final approval of other engineering documents, the applicant assumes the risk of being required to modify and resubmit GESC plans to reflect revisions made throughout the review process. In addition, the applicant assumes the risks of completing grading prior to approval of the development plans for the site. A "Hold Harmless" letter shall also be provided to the County which includes a statement from the Owner accepting responsibility for the liabilities associated with early grading of the project. A sample "Hold Harmless" letter can be found at the end of this section.

Approval of GESC plan does not imply approval in any manner of the other engineering concepts or documents associated with a planning submittal.

2.9.4 Engineering Submittals (E-cases). GESC reports and plans not associated with a land development planning submittal shall be reviewed and processed as E-cases. These may include utility projects, regional stormwater improvement projects, drainageway maintenance projects, floodplain development permits, roadway and other capital improvement projects and other site grading or land disturbance not associated with new development or redevelopment.

Section 2. Submittal and Permit Process

Other County Plans and Permits, continued

E-cases must include the following documents:

- ◆ GESC plan (in accordance with Section 3.1)
- ◆ GESC report (in accordance with Section 3.2)
- ◆ Engineer's Cost Estimate of GESC improvements (in accordance with Section 3.3)
- ◆ Approved drainage study and plan - minimum Phase III drainage report. See Section 2.9.6 for drainage plan requirements.

E-cases shall be reviewed for GESC requirements only. All other required reviews and approvals must be processed through the County in accordance with other County criteria and requirements. **Approval of a GESC plan and report does not imply approval in any manner of any other Arapahoe County requirements.**

2.9.5 Review Fees. Review fees must be submitted with the original submittal package. GESC review fees are required independently of other engineering review fees for both engineering and planning submittals. Review fees for GESC reports and drawings shall be specified in the current Arapahoe County Engineering Fee Schedule.

2.9.6 Drainage Plans. The GESC Plan shall be consistent with an approved drainage plan for the development or site. Drainage plans must be prepared in accordance with the County's *Stormwater Manual*, as amended, and must be approved by the Director.

For Planning Submittals associated with a new land development project: At a minimum, the Phase II drainage plan must be submitted, reviewed, and accepted by the County prior to issuance of the GESC permit.

For E-cases not associated with a new land development project: If there is an existing Phase III drainage report on file for the property, and the proposed grading differs from the report on file, it must be revised and submitted as an amendment to the Phase III drainage plan for the site. The amended Phase III drainage plan must be approved by the County prior to issuance of the GESC permit. If there is not an existing Phase III drainage report for the site, one shall be required.

The requirements of a Phase III drainage plan may be waived by the County for Low-Impact GESC Permits, where it can be demonstrated that there is negligible drainage impact.

Permanent drainage facilities shall be addressed in the Drainage Plans per the requirements found in the *Stormwater Manual*. Permanent water quality or detention basins shall incorporate sediment basins during construction and shall be constructed as soon as possible once site disturbance occurs. GESC Plan BMPs shall be provided for permanent drainage features and shall be staged and removed at the appropriate time relative to drainage facility construction and final site stabilization.

**Other County
Plans and Permits,
continued**

2.9.7 Street Cut and Right-of-Way Use Permit. Projects that include the use of or construction within the County Right-of-Way must obtain a Street Cut and Right-of-Way Use Permit. More information on the Arapahoe County Street Cut and Right-of-Way Use Permit can be found in the County *Infrastructure Design and Construction Standards*.

The Street Cut and Right-of-Way Use Permit require that all permittees comply with the GESC requirements as defined in Section 10.

2.9.8 Construction Permit. Projects that include the installation or maintenance of public improvements are required to obtain an Arapahoe County Public Improvements Construction Permit. Information on the Public Improvements Construction Permit is found in the County *Infrastructure Design and Construction Standards*.

All projects that require a Construction Permit must comply with the GESC requirements applicable to the project, as described in this Manual.

2.9.9 Floodplain Development Permit. Projects that include work within designated 100-year floodplain limits of drainageways in the County require a Floodplain Development Permit. This permit shall be obtained from the Public Works and Development Department. The ob-



Streams and drainage channels comprise valuable resources and are not to be disturbed unless accepted in advance by Arapahoe County.

jective of this permit is to ensure that the proposed project activities are in compliance with approved floodplain management standards. If the floodplain is altered as a result of the project, a flood insurance map change approval may be needed from the Federal Emergency Management Agency (FEMA). Drainageways comprise valuable resources and shall not be disturbed unless accepted in advance by the County. Erosion and sediment controls addressing work in and around drainageways are described in Section 4.5 along with illustrations in the example GESC Plans. Any acceptance obtained from the County does not release an Applicant from the need to comply with the requirements of Sections 7 and 9 of the Endangered Species Act of 1973, 16 U.S.C. 1531 *et seq.*, as amended, or with any other applicable Federal, State or

Section 2. Submittal and Permit Process

Other County Plans and Permits, continued

local laws or regulations.

A GESC permit shall be required for all Floodplain Development Permits which include activities listed in Section 2.1.1 (Projects requiring a Standard GESC Permit) or Section 2.2 (Projects that Require a Low-Impact GESC Permit).

Submittal of the GESC Plan and Report

2.10

GESC reports and plans shall be prepared according to the requirements in Sections 3 and 4. The GESC report shall be submitted for review as a separate document not embedded within a drainage study. GESC plans shall be submitted as separate plans, not inserted within Construction Plans. An Engineer's Cost Estimate (Section 3.3) shall be provided independently of other Development Improvement Costs. GESC documents shall be submitted to the County for review in accordance with Section 2.9.

Plan and Report Revisions Based on County Comments

2.11

The County will review the GESC plan and report for consistency with the requirements set forth herein, and provide review comments to the applicant. When the review comments are significant or extensive, the County may recommend a meeting with the applicant to go over the comments with the applicant's engineer to ensure that the County's GESC requirements are understood and avoid a lengthy review process. GESC review comments are to be addressed by the applicant and the revised GESC Plan and Report resubmitted to the County for a follow-up review.

Preliminary Acceptance of the GESC Plan and Report

2.12

When all GESC comments are addressed, the GESC plan and report will be preliminarily accepted. Final copies of the GESC drawings must be submitted for approval and signature. Contact the case engineer for the number of final copies that need to be submitted.

Each set of GESC Drawings and Report shall be signed and stamped by a Professional Engineer registered in the State of Colorado, bound and stapled.

Final Acceptance of GESC Plan And Report

2.13

2.13.1 Signed GESC Drawings and Report. The GESC documents will be considered accepted when the submitted copies of the GESC Drawings and Reports are signed by the Director. Applicants will be notified by the County when the GESC Drawings have been signed and are ready to be picked up. Arapahoe County will retain three sets of signed GESC Drawings and GESC report; SEMSWA will retain two copies of said drawings and report.

GESC Plans and Reports are considered valid for two years following the signature date. After this time, GESC Plans and Reports will need to be resubmitted to the County for re-review and re-acceptance.

***Final Acceptance
of GESC Plan,
continued***

2.13.2 GESC Field Manual. A copy of the GESC Field Manual shall be obtained from the County at the same time the signed Drawings are picked up. The GESC Field Manual provides information pertaining to the construction phase of the GESC Permit Process and is discussed further in Section 5.

2.14

Once the GESC Plan is approved, the Applicants may apply for a GESC Permit. The information required on the Standard GESC Permit Application shall be filled out and the form shall be signed by personnel who are legally authorized to sign on behalf of the company, corporation, entity or organization.

***Applying for a
GESC Permit***

A copy of the Standard GESC Permit Application is provided in Appendix J.

2.15

Permit Fees are to be paid prior to the approval of the GESC Permit. Fees for a GESC Permit consist of a base fee and a per-acre charge and are collected to help offset costs of administering the GESC Program. Permit fees are identified in the current Arapahoe County fee schedule, available through the County Public Works Department.

Permit Fees

2.16

2.16.1 General. Arapahoe County requires that all non-governmental projects requiring a Standard GESC Permit, as well as some projects requiring a Low Impact GESC Permit, post collateral.

Posting Collateral

The conditions under which the GESC Collateral is held is separate from any other security relating to the project site's Subdivision Improvements Agreement (SIA) or any other permits relating to the site and will be held and released separately. Collateral shall be submitted with the GESC Permit Application.

2.16.2 Amount of Collateral. The amount of collateral for a GESC Permit is based on the cost estimate of installing and maintaining the grading, erosion and sediment controls required on a site. A copy of the worksheets to be used for preparing the engineer's GESC cost estimate for erosion and sediment control are included in Appendices F and G.

The engineer's GESC cost estimate worksheet shall be completely filled out and submitted separately from the GESC Report (see Section 3.2 for GESC Report requirements). The GESC cost estimate worksheet will be reviewed for acceptance by Arapahoe County or its designated agent.

2.16.3 Forms of Collateral. Arapahoe County accepts two forms of financial collateral:

1. Irrevocable Letter of Credit from a Colorado financial institution in a form acceptable to the County (the format for Letters of Credit is pro-

Section 2. Submittal and Permit Process

Posting Collateral, continued

vided in Appendix L).

2. Irrevocable Letter of Credit from out-of-state financial institution in a form acceptable to the County.
3. Cash Escrow. An example of a cash escrow agreement is available upon request from the County.

- | |
|---|
| <ol style="list-style-type: none">1. <i>Irrevocable Letter of Credit.</i>2. <i>Cash Escrow</i> |
|---|

Cash deposits will be held in a non-interest-bearing account.

The conditions of each form of collateral shall allow for the collateral to be held by Arapahoe County until seeding, mulching and revegetation is complete, typically a minimum of two (2) years. The two-year period should allow for completion of all GESC and Site Improvement Plan requirements, including two growing seasons to allow time for revegetation to reach the required coverage (see Section 7.3.2). Information regarding the release of collateral is provided in Section 7.5.

2.16.3.1 Collateral Waiver for Governmental and Quasi Governmental Entities. Arapahoe County may waive collateral from governmental and quasi governmental entities based on an executed written agreement addressing GESC requirements, BMP implementation and revegetation.

2.16.4 Expiration of Collateral. If the construction of the project and/or revegetation process takes longer than two (2) years, the Permittee shall extend the posted letter of credit a minimum of fourteen (14) days prior to the expiration date. Failure to extend the collateral, for a minimum of one (1) additional year, prior to the fourteen (14) day deadline shall result in the County drawing upon the collateral.

Duration of GESC Permits

2.17

A GESC Permit is valid for two years from the date the permit is granted (the date the GESC Permit Application Form is approved). 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. Failure to renew the GESC permit prior to its expiration may result in a Stop Work Order, per Section 5.9. Renewal fees for the GESC permit shall be in accordance with the current Arapahoe County fee schedule (see www.co.arapahoe.co.us for fee schedule).

Permittee(s) shall have a valid GESC Permit until Final Close-out Acceptance (after revegetation is established) for all projects.

Transfer of GESC Permits

2.18

If a project is sold (in whole) to a new Owner, the GESC Permit shall be transferred to the new Owner using a specific transfer procedure. The transfer shall require a new GESC Permit Application Form, payment of

Transfer of GESC Permits, continued

GESC Permits for Single Family Residential Projects



a transfer fee, new collateral, and another Preconstruction Meeting on-site (the preconstruction meeting is discussed in Section 5.3). Failure to transfer the GESC Permit when the Owner changes will result in issuance of a Stop Work Order per Section 5.9.

For projects that have portions of the original property sold off to multiple owners, the original owner will be required to coordinate the new property owners under the original GESC Permit. Refer to Section 2.19 and 2.20 for multi-owner permitting requirements.

If the Contractor that is identified on the GESC permit is replaced by a different Contractor, the GESC Permit must be updated to reflect the new Contractor for the site.

2.19

2.19.1 GESC Permitting for Single Family Residential Projects. Single family residential projects typically involve the transfer of ownership several times throughout the life of the project. Also, the project is often sold off to more than one owner, either as individual or multiple lot blocks. Usually, the project is initiated by a developer and then developed lots are sold off to builders. Eventually the lots are sold to homeowners. It is important that the GESC requirements be maintained throughout the life of the project, and throughout these transfers of ownership.

When a single family residential project is sold as a whole to a new owner, the GESC permit shall be transferred to the new Owner in accordance with Section 2.18.

When developed lots are sold off to multiple owners, special consideration must be given to ensure that the GESC responsibilities are clearly defined. Unless there is clear understanding of responsibilities throughout the life of the project, there will be confusion among the parties that are involved, and enforcement will be difficult.



Common areas are often neglected during the construction of single family residential projects. Adequate perimeter controls were not installed at this site, resulting in sedimentation and weed infestation.

Often, the areas that are most neglected in these types of projects are the common areas of the Development. These include the streets and right-of-ways, the common open space areas, drainage tracts and easements, stormwater detention and water quality facilities, and other areas which are not associated with individual lots. These common areas are affected by all development within the project, regardless of ownership. In addition, these areas are most impacted if adequate GESC measures are not being implemented. Therefore, it is necessary that all parties involved cooperate and be held to certain requirements throughout the life of the project.

GESC Permits for Single Family Residential Projects, continued

The life of the project shall be defined as the period, which begins at initial overlot grading and ends when the final landscaping or adequate vegetative cover is established and accepted for all of the property within the Development, and Final Close-Out for the GESC permit is granted. The GESC responsibilities for each of the parties are defined in the following sections.

2.19.2 Developer’s Responsibilities for Single Family Residential Projects. The County shall define the party that originates the development of the property, through a County planning and/or zoning process as the “Developer”. The Developer creates the initial land disturbance, and therefore, as a condition of development approval, shall be held ultimately responsible for the restoration of the land. Arapahoe County will require the Developer to obtain and maintain the original GESC permit for the development project until Final Close-out of the GESC permit. Final Close-out for the original GESC permit shall not occur until all of the lots within the Development have been built upon and stabilized in accordance with the GESC requirements. The Developer will be directly responsible for the common areas of the development throughout the life of the project.

The Developer may transfer this responsibility for the entire Development, in whole, to another party, provided that the new party is an entity that is acceptable to the County. The new party will be required to ob-

Transfer of the GESC Permit from the Developer

The Developer may transfer the responsibility for the GESC permit for the Development, in whole, to another party- provided that party is an acceptable entity to the County. In determining whether another party is acceptable, the County shall evaluate the following criteria:

- ◆ *The party is willing to, and is capable of accepting the responsibilities and liabilities associated with the GESC permit for the entire project area, including those areas owned by others.*
- ◆ *The Party is capable of providing the required collateral for the entire project areas, and is capable of managing the administration of the collateral through-out the life of the project.*
- ◆ *The party is capable of requiring and enforcing the GESC requirements for all of the areas within the project, through appropriate agreements with the property owners.*
- ◆ *The party is made up of entities that have a vested interest in ensuring that the GESC requirements are implemented and enforced.*
- ◆ *The party is not made up of, and does not have the potential to be made up of individual homeowners, or Homeowner’s Associations, who do not typically take on construction related requirements, and in particular, grading and erosion control requirements.*
- ◆ *The party agrees to be directly responsible for immediate action and enforcement measures to ensure the GESC compliance for the project.*

The County will have the ultimate final decision in determining whether the GESC permit may be transferred or obtained initially by a party other than the Developer.

GESC Permits for Single Family Residential Projects, continued

tain a GESC permit and provide the appropriate collateral to guarantee the GESC requirements for the entire project area. The County will not allow the GESC permit for the Development to be transferred to multiple parties, creating multiple permits within the original development. This does not adequately address the common areas, which serve the entire site. It shall be the Developer's responsibility to obtain the appropriate agreements with others, through the transfer of property, to allocate responsibilities and costs for the GESC requirements within the development to all future owners.

All property owners, except individual homeowners, within a Development project are required to become a party to the GESC permit for the project by completing and signing a Letter of GESC Permit Compliance. The Letter of GESC Permit Compliance requires all property owners to agree to the terms and conditions of the GESC permit. It is the Developer's (or party to which the original permit is transferred) responsibility to notify all new owners of this requirement. Failure to submit a Letter of GESC Permit Compliance may result in the issuance of a Stop Work order in accordance with Section 5.9. A copy of the Letter of GESC Permit Compliance is provided in Appendix O.

Requirements of Individual Homeowners
Individual homeowners, which have purchased homes from builders are not required to submit a Letter of GESC Permit Compliance, but shall be required to provide BMPs in accordance with Section 9.7.

The original GESC permit for the development may be adjusted throughout the life of the subdivision build-out to reflect only those improvements that are necessary. The cost estimate and collateral will be reduced accordingly throughout the project at the request of the permittee. Revised GESC plans may be required to reflect the adjusted requirements.

2.19.3 New Owner's/Builder's Responsibilities for Single Family Residential Projects. When any portion of the Development project is sold off to a new owner (usually a Builder), the new owner shall be required to become a party to the original GESC permit for the development. All Owners within a Development must complete a Letter of GESC Permit Compliance. The Letter of GESC Permit Compliance requires all property owners to comply with the terms and conditions of the GESC permit. Failure to submit a Letter of GESC Permit Compliance may result in the issuance of a Stop Work order to the violating entity(s) in accordance with Section 5.9. A copy of the Letter of GESC Permit Compliance is provided in Appendix O. The Builder (new owner) will not be required to provide additional collateral, but shall be held accountable via the Arapahoe County Building Code.

GESC Permits for Single Family Residential Projects, continued

The Builder shall be responsible for the implementation of all GESC requirements associated with their property ownership. These requirements are defined further in Section 9 of this Manual. Separate plans are generally not required, unless the lot conditions differ significantly from those shown on the typical site plans shown in Section 9. In those cases, the County shall request plans for the specific lot.

Builders will be required to install temporary erosion control measures on properties that are not final landscaped or revegetated adequately prior to issuance of the Certificate of Occupancy (C.O.). The temporary erosion control measures must be designed to function for a minimum of 90 days after the transfer of ownership. The Builder will be responsible for maintenance of the temporary BMPs until the transfer of ownership of the lot. The Builder will also be responsible for notifying the new owner of the need to maintain the temporary erosion control BMP's on the site until the lot is final landscaped or revegetated in accordance with the County's GESC requirements. A certification will be required prior to issuance of the C.O. to certify the Builder's acknowledgement of these requirements.

The individual lot requirements defined in Section 9 are enforced through the Building Permit, and violations will be subject to delays or denial of building permits and inspections, delays or denials of Certificates of Occupancy or other measures as described in the Arapahoe County Building Code

2.19.4 Individual Lot Owner's Responsibilities for Single Family Residential Projects. Individual lot owners are responsible for maintenance of temporary BMPs or establishment of vegetative cover to ensure that erosion is not occurring and soil is not being transported from their property.

Individual lot owners shall be required to be responsible for the GESC requirements on their lot, by complying with the Arapahoe County Land Development Code. Temporary BMPs as described in Section 9 must be maintained on all individual lots until the landscaping is completed and revegetated in accordance with Section 7.3 is established. All disturbed areas must maintain adequate vegetative cover (such as sod or native grasses) or provide other appropriate landscaping methods to retain the soil on their site.

2.20

2.20.1 GESC Permitting for Multi-lot Development Projects (Not Including Single-Family Residential Projects, See Section 2.19).

Multi-lot development projects are similar to single-family residential projects, in that they typically involve the transfer of ownership of portions of the property during the life of the project, and they include common areas, which may serve or be impacted by multiple owners. Again, it is important that measures are in place to ensure that the GESC requirements are maintained on all portions of the original development throughout the life of the project.

GESC Permits for Multi-lot Development Projects

GESC Permits for Multi-lot Development Projects, continued

Multi-lot development projects differ from single family residential in the fact that as individual lots are developed, they typically must go through an Arapahoe County planning and development process, such as a Final Development Plan (FDP). Typically, lot specific site plans, drainage reports and plans, and individual GESC plans are required with this process. GESC permits will be required with each individual lot.

When a multi-lot development project is sold as a whole to a new owner, the GESC permit shall be transferred to the new Owner in accordance with Section 2.18.

When developed lots are sold off to multiple owners, individual lot owners will be required to obtain separate GESC permits for their ownership, and provide the required collateral to guarantee compliance with the GESC requirements.

The Developer will be required to maintain the GESC permit for the common areas of the original development for the life of the project. The life of the project shall be defined as the period, which begins at initial overlot grading and ends when the final landscaping or adequate vegetative cover is established and accepted, for all of the property within the Development and Final Close-Out for the GESC permit is granted. The Developer may be released from the GESC requirements for individual properties as they are sold off, and a new lot specific GESC permit is obtained.

The GESC responsibilities for each of the parties are defined in the following sections.

2.20.2 Developer's Responsibilities for Multi-lot Development Projects. The Developer creates the initial land disturbance, and therefore, as a condition of development approval, shall be held ultimately responsible for the restoration of the land. Arapahoe County will require the original Developer to obtain and maintain the GESC permit for the development project until Final Close-Out of the GESC permit. Final Close-out for the project shall not occur until all of the lots have been built upon and landscaped or vegetated in accordance with the County's GESC requirements. The Developer will be directly responsible for the common areas of the development throughout the life of the project.

The Developer may transfer this responsibility, in whole, to another party in accordance with Section 2.18. The new party will be required to obtain a GESC permit and provide the appropriate collateral to guarantee the GESC requirements for the entire site.

It shall be the Developer's responsibility to obtain the appropriate agreements with others, through the transfer of property, to allocate responsibilities and costs for the GESC requirements to all future Owners within a development project.

GESC Permits for Multi-lot Development Projects, continued

The Developer's GESC permit may be adjusted through out the life of the project to reflect only those improvements that are needed for the common areas of the project, and those properties that the Developer owns. The cost estimate and collateral can be reduced accordingly throughout the project. Revised GESC Plans may be required to reflect the appropriate GESC measures.

2.20.3 New Owner's Responsibilities for Multi-lot Development Projects. When any portion of the Development project is sold off to a new owner the new owner shall be required to obtain an individual GESC permit for their property. A GESC plan and report for the property must be provided. This is typically required through the FDP process. The GESC plan must include all necessary GESC measures for control of the site. The new owner will be required to provide collateral in accordance with the GESC permit requirements.

2.20.4 Builder's Responsibilities for Multi-lot Development Projects. Builders are required to comply with the County's GESC requirements and the GESC plan for the property. The GESC requirements will be enforced through the Building Permit, and violations will be subject to delays or denial of building permits and inspections, delays or denials of Certificates of Occupancy or other measures as described in the Arapahoe County Building Code.

Section 3. Plan & Report Submittal Requirements

Overview of Section 3

3.0

Section 3 summarizes the GESC Plan Drawing and Report Requirements:

Sections 3.1 and 3.2, **Standard GESC Drawing Requirements and Report Requirements** lists detailed information to include on the various GESC documents. This checklist shall be used in preparation of the GESC documents. If text within this Section 3 conflicts with text in checklist, the checklist shall control. The checklist of requirements can be found in Appendix E.

Section Highlight – Example GESC Drawings—Appendix C

Several example sets of GESC Drawings have been prepared to illustrate the selection and depiction of erosion and sediment control BMPs.

Section 3.3, **Engineer’s GESC Cost Estimate**, describes the cost estimate associated with the installation and maintenance of BMPs .

Section 3.4, **Variations**, provides guidance for requesting variations to the criteria presented in the GESC Manual.

Standard GESC Plan Drawing Requirements

3.1

The following GESC Drawing requirements shall be adhered to when preparing a Standard GESC Drawing. Specific requirements vary based on the three types of Standard GESC Drawings described in Section 2.8.

Drawing requirements for a Staged GESC Permit (separate drawings for the Initial, Interim, and Final Stages) are discussed in the following paragraphs. Requirements for Utility GESC Drawings and Staged and Phased GESC Drawings are described in Sections 3.1.8 and 3.1.9, respectively. Submittal requirements for the Temporary Batch Plant GESC Drawings are described in Section 11.

The Arapahoe County Drawing and Report Checklist is located in Appendix E which provides all drawing requirements in a checklist format. This checklist must be filled out and signed by the Design Engineer, and submitted with the GESC Documents to ensure that each of the requirements is addressed.

All GESC Drawings, which are also required for off-site borrow or disposal areas, shall be prepared on 24" by 36" sheets at a scale of 1-inch to 20-feet up to 1-inch to 200-feet, as appropriate, to clearly show sufficient detail for review. An example set of GESC Drawings for Staged/ Phased permits is provided in Appendix C.

As discussed in Section 2.6, GESC Drawings shall be signed and stamped by the Design Engineer.

3.1.1 GESC Drawing Cover Sheet. Arapahoe County requires that all GESC submittals are independent of other Construction Drawings, and therefore a cover sheet will be required with the submittal. The cover sheet shall include the following information:

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. Case number in the lower left hand corner.
8. The following note:

THE **GRADING, EROSION AND SEDIMENT CONTROL PLAN** INCLUDED HEREIN HAS BEEN PLACED IN THE ARAPAHOE COUNTY FILE FOR THIS PROJECT AND APPEARS TO FULFILL APPLICABLE ARAPAHOE COUNTY GRADING, EROSION AND SEDIMENT CONTROL CRITERIA, AS AMENDED. ADDITIONAL GRADING, EROSION AND SEDIMENT CONTROL MEASURES MAY BE REQUIRED OF THE PERMITTEE(S) DUE TO UNFORESEEN EROSION PROBLEMS OR IF THE SUBMITTED GESC PLAN DOES NOT FUNCTION AS INTENDED. THE REQUIREMENTS OF THIS GESC PLAN

Section 3. Plan & Report Submittal Requirements

Standard GESC Plan Drawing Requirements, continued

SHALL RUN WITH THE LAND AND BE THE OBLIGATION OF THE PERMITTEE(S) UNTIL SUCH TIME AS THE GESC PLAN IS PROPERLY COMPLETED, MODIFIED OR VOID-ED.

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

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

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

"I hereby attest that the attached Grading, Erosion, and Sediment Control (GESC) Plan for (Name of Subdivision/Development) has been prepared by me or under my direct supervision, and to the best of my knowledge and ability has been prepared in accordance with the latest version of the Arapahoe County GESC Manual. The signature and stamp affixed hereon certifies that the GESC Plan was prepared in accordance with the required regulations and criteria; however, the stamp and signature does not certify or guarantee future performance of the execution of the plan by the Contractor. The Contractor is responsible for executing the construction work according to the information set forth in the plan and in accordance with all applicable requirements."

Registered professional Engineer _____

State of Colorado No. _____

Affix Seal

10. Arapahoe County GESC Approval Block (see Appendix H).
11. 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.

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

3.1.3 Initial GESC Drawing. This plan sheet shall provide grading, erosion and sediment controls for the initial clearing, grubbing and grading of a project. This plan shall identify existing easements with their reception number or notation of dedication of conveyance by Book and Page number, including easements that abut the exterior boundary

Section 3. Plan & Report Submittal Requirements

Standard GESC Plan Drawing Requirements, continued

of the subdivision. This plan shall not include any proposed infrastructure. Only existing conditions shall be shown.

At a minimum, it shall contain:

1. Property Lines.
2. Existing and proposed easements.
3. Existing topography at one- or two-foot contour intervals, extending a minimum of 100 feet beyond the property line, as appropriate.
4. Location of any existing structures or hydrologic features within the mapping limits.
5. USGS Benchmark used for project.
6. Limits of construction encompassing all areas of work, access points, storage and staging areas, borrow areas, stockpiles, and utility tie-in locations in on-site and off-site locations. Stream corridors and other resource areas to be preserved and all other areas outside the limits of construction shall be lightly shaded to clearly show area not to be disturbed.
7. Location of stockpiles, including topsoil, imported aggregates, and excess material.
8. Location of storage and staging areas for equipment, fuel, lubricant, chemicals (and other materials) and waste storage.
9. Location of borrow or disposal areas.
10. Location of temporary roads, including haul roads.
11. Location, map symbol, and letter callouts of all initial erosion and sediment control BMPs.
12. Information to be specified for each BMP, such as type and dimensions, as called for in the Standard Notes and Details.
13. The following note:
SEE COVER SHEET OF ARAPAHOE COUNTY STANDARD NOTES AND DETAILS (SHEET 1 OF 3) FOR LEGEND OF BMP NAMES AND SYMBOLS.
14. Other information as may be reasonably required by Arapahoe County.

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

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

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

Section 3. Plan & Report Submittal Requirements

Standard GESC Plan Drawing Requirements, continued

3. Items 1, 2, and 4 through 10 from the Initial GESC Drawing (see Section 3.1.3).

In addition, the Interim GESC 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. Outlines of cut and fill areas.
6. Location of all interim erosion and sediment controls, designed in conjunction with the proposed site topography, but also considering the controls designed in the Initial GESC Drawing.
7. Location of all buildings, drainage features and facilities, paved areas, retaining walls, cribbing, water quality facilities, or other permanent features to be constructed in connection with, or as a part of, the proposed work, per approved plat or land use plan, Site Improvement Plan (SIP), Rural Site Plan (RSP), or other improvement plan.
8. The following notes:
 - SEE COVER SHEET OF ARAPAHOE COUNTY STANDARD NOTES AND DETAILS (SHEET 1 OF 3) FOR LEGEND OF BMP NAMES AND SYMBOLS.
 - SHADED BMPS WERE INSTALLED IN INITIAL STAGE AND SHALL BE LEFT IN PLACE IN INTERIM STAGE UNLESS OTHERWISE NOTED.
 - ALL INTERIM BMPS, INCLUDING SEEDING AND MULCHING OF DISTURBED AREAS, MUST BE COMPLETED WITHIN 14 DAYS IF THE AREAS WILL REMAIN UNDISTURBED FOR A PERIOD GREATER THAN 30 DAYS AND PRIOR TO ISSUANCE OF ANY CURB AND GUTTER PERMITS.
 - ALL PROPOSED SLOPES ON THIS PLAN HAVE A MAXIMUM SLOPE OF 4:1. ANY SLOPES BETWEEN 3:1 AND 4:1 WILL REQUIRE THE USE OF EROSION CONTROL BLANKETS OR FLEXIBLE GROWTH MEDIUM.
 - SEE CONSTRUCTION PLANS FOR DETAILS OF PERMANENT DRAINAGE FACILITIES SUCH AS DETENTION FACILITIES, WATER QUALITY FACILITIES, CULVERTS, STORM DRAINS, AND OUTLET PROTECTION.
9. Summary of cut and fill volumes showing how earthwork balance is attempted on site.
10. Design Engineer sign-off block.

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

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

1. Existing topography in areas of proposed contours need not be shown.

Section 3. Plan & Report Submittal Requirements

Standard GESC Plan Drawing Requirements, continued

2. Existing Initial and Interim BMPs shall be shown (**screened**). Dimension information shall not be shown.

In addition, the following information shall be shown:

3. Directional flow arrows on all drainage features.
4. Any Initial or Interim BMPs that are to be removed and any resulting disturbed area to be stabilized.
5. Location of all Final erosion and sediment control BMPs, permanent landscaping, and measures necessary to minimize the movement of sediment off site until permanent vegetation can be established.
6. Show area of buildings, pavement, sod, and permanent landscaping (define types) per approved plat or land use plan, SIP, RSP, or other improvement plan.
7. Show seeding (SE) and mulching (MU) everywhere except buildings, pavement areas and permanent landscaping areas.
8. Show other BMPs considered by the Design Engineer to be appropriate.
9. Show the following BMPs to be removed at the end of construction:
 - Dewatering (DW)
 - Temporary stream crossings (SC)
 - Stabilized staging area (SSA)
 - Street inlet protection (IP)
 - Vehicle tracking control (VTC)
 - Construction fence (CF)
10. Include the following notes:
 - SEE COVER SHEET OF ARAPAHOE COUNTY STANDARD NOTES AND DETAILS (SHEET 1 OF 3) FOR LEGEND OF BMP NAMES AND SYMBOLS.
 - SHADED BMPS WERE INSTALLED IN INITIAL STAGE AND SHALL BE LEFT IN PLACE IN INTERIM STAGE.
 - ALL INTERIM BMPS, INCLUDING SEEDING AND MULCHING OF DISTURBED AREAS, MUST BE COMPLETED WITHIN 14 DAYS IF THE AREAS WILL REMAIN UNDISTURBED FOR A PERIOD GREATER THAN 30 DAYS AND PRIOR TO ISSUANCE OF ANY CURB AND GUTTER PERMITS.
 - ALL PROPOSED SLOPES ON THIS PLAN HAVE A MAXIMUM SLOPE OF 4:1. ANY SLOPES BETWEEN 3:1 AND 4:1 WILL REQUIRE THE USE OF EROSION CONTROL BLANKETS OR FLEXIBLE GROWTH MEDIUM.
 - SEE CONSTRUCTION PLANS FOR DETAILS OF PERMANENT DRAINAGE FACILITIES SUCH AS DETENTION FACILITIES, CULVERTS, STORM DRAINS, AND OUTLET PROTECTION.
11. Other information as may be reasonably required by Arapahoe County.

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

Section 3. Plan & Report Submittal Requirements

Standard GESC Requirements, continued

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

3.1.8 Drawing Requirements for Utility GESC Drawings. These Drawing requirements are the same as for GESC Staged/Phased Permit, although the erosion and sediment controls for the Initial, Interim, and Final Stages of construction may be shown on a single drawing, as long as this can be accomplished clearly. Refer to Section 10 which further describes special requirements for utility construction.

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

3.1.10 Submittal Requirements for Related Plans. GESC Drawing requirements for Temporary Batch Plant GESC Drawings are described in Section 11. Requirements for Low Impact GESC Drawings are described in Section 8.

Standard GESC Report Requirements

3.2

Information relating to grading, erosion and sediment control shall be included in a separate GESC Report. The following information shall be provided for a Standard GESC Report.

1. Name, address, telephone number of the applicant, and the County case number – The name, address, the County case number, and telephone number of the Design Engineer preparing the GESC Plan shall also be included, if different from the applicant.
2. Project description – A brief description of the nature and purpose of the land-disturbing activity, the total area of the site, the area of disturbance involved, related project reference, and project location including township, range, section and quarter-section.
3. Existing site conditions – A description of the existing topography, vegetation, and drainage; a description of any wetlands on the site; and any other unique features of the property.
4. Adjacent areas – A description of neighboring areas such as streams, lakes, residential areas, roads, etc., which might be affected by the land disturbance.
5. Soils – A brief description of the soils on the site including information on soil type and names, mapping unit, erodibility, permeability, hydrologic soil group, depth, texture, and soil structure. (This information may be obtained from the soil report for the site, for

Section 3. Plan & Report Submittal Requirements

Standard GESC Report Requirements, continued

- adjacent sites if acceptable to the County, or the applicable Soil Survey prepared by the Natural Resources Conservation Service (NRCS)).
6. Areas and Volumes – An estimate of the quantity (in cubic yards) of excavation and fill involved (attempting to achieve an earthwork balance), haul road information, and the surface area (in acres) of the proposed disturbance.
 7. Erosion and sediment control measures – A description of the methods presented in this *GESC Manual* that will be used to control erosion and sediment on the site.
 8. Timing/Phasing schedule – A schedule indicating the anticipated starting and completion time periods of the site grading and/or construction sequence, including the installation and removal of erosion and sediment control BMPs. Indicate the anticipated starting and completion time periods of individual project phases.
 9. Permanent stabilization – A brief description, including applicable specifications, of how the site will be stabilized after construction is completed.
 10. Stormwater management considerations – Explain how stormwater runoff from and through the site will be handled during construction.
 11. Maintenance – Any special maintenance requirements over and above what is identified in the standard notes and details.
 12. Calculations – Any calculations made for the design of such items as sediment basins or erosion control matting selection.
 13. Other information or data – As may be reasonably required by Arapahoe County.
 14. The following note – “THIS GRADING, EROSION AND SEDIMENT CONTROL PLAN HAS BEEN PLACED IN THE ARAPAHOE COUNTY FILE FOR THIS PROJECT AND APPEARS TO FULFILL THE APPLICABLE ARAPAHOE COUNTY GRADING, EROSION AND SEDIMENT CONTROL CRITERIA. ADDITIONAL GRADING, EROSION AND SEDIMENT CONTROL MEASURES MAY BE REQUIRED OF THE OWNER OR HIS/HER AGENTS, DUE TO UNFORESEEN EROSION PROBLEMS OR IF THE SUBMITTED PLAN DOES NOT FUNCTION AS INTENDED. THE REQUIREMENTS OF THIS PLAN SHALL RUN WITH THE LAND AND BE THE OBLIGATION OF THE LAND OWNER, OR HIS/HER DESIGNATED REPRESENTATIVE(S) UNTIL SUCH TIME AS THE PLAN IS PROPERLY COMPLETED, MODIFIED OR VOIDED.”
 15. Signature Page For landowner/authorized agent acknowledging the review and acceptance of responsibility as follows:
“I hereby certify that the GESC measures for (*Name of Subdivi-*

Engineer's Cost Estimate

sion/Development/address) shall be constructed according to the design presented in this report. I understand that additional erosion control, sediment control and water quality enhancing measures may be required of the owner and his or her agents due to unforeseen pollutant discharges or if the submitted plan does not function as intended. The requirements of the plan shall be the obligation of the land owner and/or his successors or heirs; until such time as the plan is properly completed, modified or voided."

Owner or Authorized Agent _____

Authorized Signature _____

3.3

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

1. Installation and maintenance of the BMPs indicated on the Initial, Interim, and Final GESC Drawings according to the number, types, dimensions, and quantities called for. (Maintenance costs will vary based on many factors, including the magnitude and number of storm events occurring during the project.)
2. Installation of additional BMPs that the Permittee(s) think are appropriate or that are called for by the County Inspector to address actual site conditions. (The Permittee(s) are responsible for adapting the original GESC Drawing as necessary to effectively reduce erosion and sediment, and must comply with any modifications to the plan required by the County Inspector.)

3.3.1 Engineer's GESC Cost Estimate. As a stand alone document, applicants are required to provide an engineer's GESC cost estimate for erosion and sediment control including anticipated maintenance during the construction phase associated with implementing the GESC drawings. Examples of the Cost Estimate Spreadsheets are provided in Appendices F and G and they provide Unit cost information that shall be used to generate the cost estimate. The costs provided are not necessarily the costs that the applicant would incur, but reflect an opinion of the costs the County would incur in the event that the applicant does not perform as required. It is anticipated that the costs will be updated as needed, and therefore the applicant should check with the County to ensure that the most recent cost data is used.

Two cost estimate spreadsheets are required. The first is for the combined Initial and Interim costs associated with the Initial and Interim GESC drawings. The second spreadsheet is for the Final BMP costs associated with the Final GESC drawing. Each spreadsheet requires signature of acceptance and approval by applicant/developer, engineer, and case engineer. The Engineer's GESC cost estimate will be reviewed by County staff and used as a basis for collateral (discussed in Section 2-16 of this GESC Manual) .

Engineer's Cost Estimate, continued

Since the Initial and Interim GESC BMPs are completed prior to the Final GESC BMPs, the costs are not cumulative. Therefore only the greater of the two cost estimate spreadsheets will be the amount that is required to be guaranteed with collateral.

In most cases, the greater costs will be the combined Initial and Interim BMP costs, and this will be the amount that is required to be guaranteed. At the Initial Close-Out, the Final BMPs will be in effect, and as applicable, the collateral will be reduced to the Final BMP cost estimate amount.

As applicable, the collateral required for the Final BMPs will be held by the County until the Final Close-Out Acceptance.

3.3.2 Phased Projects. For projects that will be phased, the Engineer's GESC Cost Estimate spreadsheets must be separated and sub-totaled for each phase, for both the Initial and Interim BMPs and Final BMPs Cost Estimate spreadsheets.

Initial and Final Close-Out may be processed individually for each of the phases, provided public improvements are completed and specific close-out requirements are met.

3.4

Arapahoe County may consider waiving or modifying criteria that are deemed inappropriate or too restrictive for site conditions. Variances may be granted at the time of plan submission or request for plan revision prior to the work being completed in the field. Variances that would cause a non-compliance with the County's Municipal Separate Storm Sewer System Permit (MS4) permit will not be considered. Variances requested after the work has been completed shall not be considered.

Variances

3.4.1 Variance Submittal Requirements. Any request for a variance shall be in a separate letter addressed to the Director. 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 *GESC Manual* relate to the application of specific erosion and sediment control practices. Other practices or modifications to specified practices may be used if approved by Arapahoe County prior to installation. Such practices must be thoroughly described and detailed.

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

3.4.2 Staff vs. Administrative Variances. Some variances may be minor in nature; these staff variances may be granted by the Arapahoe County Engineering Services Case Engineer and/or the Engineering Services Division Manager. A minimum amount of supporting documentation will be required for such variances. More complicated

Section 3. Plan & Report Submittal Requirements

Variations, continued

variances will require a more extensive review. These administrative variances shall be reviewed by the Director and use the process listed above.

3.4.3 Comprehensive Grading Plan. The County recognizes that, on large-scale projects, where there are long term continual earthwork operations, certain criteria within the GESC requirements may need to be adjusted in order to allow the grading operations to progress in an efficient, cost effective manner. The overall goal of completing grading operations with minimal disruption and impact may best be achieved by preparing a site-specific grading plan, which addresses the grading and erosion control measures necessary to reflect the intended construction sequence and schedule.

For these types of projects, the County has included a provision to allow for a Comprehensive Grading Plan (CGP). The CGP will be considered for sites in which the applicant demonstrates a need to waive certain specific GESC requirements in order to perform the grading operations in an efficient manner. See Appendix I for additional information, applicable projects, and requirements for completing a Comprehensive Grading Plan.

3.4.4 Permitting Requirements. The County recognizes the need for flexibility in the permitting requirements of the GESC program. In some cases, it may not be feasible, or practical to require the original Developer of a project to maintain the responsibility for the original GESC permit (as a whole) throughout the life of the project. The County, therefore, agrees to consider projects on a case by case basis to allow for alternative permitting scenarios. Projects which seek consideration of a variance of the standard permitting requirements outlined in Section 2 must demonstrate that the standard permit requirements are not feasible and must provide appropriate justification to warrant consideration.

Requests for a variance of the County's Standard Permitting requirements must be submitted as early in the development review process as possible. GESC permits will not be approved for any of the property within the Development, until an alternative permitting scenario for the entire project has been approved by the County.

The intent of the permitting requirements, specifically that one entity is assigned specific responsibility for common areas of the project will be required to be addressed in the alternate permitting scenario(s).

Section 4. Grading Criteria, Ten Elements of an Effective GESC Plan, BMP Sizing

Overview of Section 4

4.0

Section 4 addresses grading criteria and the elements of an effective GESC Plan.

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

Section 4.1, **Grading Guidance and Criteria**, provides design guidance and criteria for developing a proposed grading plan for a site.

Section 4.2, **Principles of Erosion and Sedimentation**, recommends addressing erosion near its start and employing sediment control BMPs to reduce downstream damages.

Section 4.3, **BMPs to Address Erosion and Sediment**, identifies a number of standard BMPs accepted for use in Arapahoe County to control erosion and sediment on construction sites.

Section Highlight – Standard BMP Drawings

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

Section 4.4, **Ten Elements of an Effective GESC Plan**, presents a systematic approach to select BMPs for a GESC Plan. **The Ten Elements are described in Sections 4.5 through 4.14.**

Section Highlight – Ten Elements of an Effective GESC Plan

These ten elements provide Design Engineers with a step-by-step approach for selecting BMPs to include on a GESC Plan.

Section 4.15, **Design and Sizing Criteria for BMPs**, identifies the design parameters to be specified for each BMP on the GESC Plan and provides criteria for sizing BMPs.

Grading Guidance and Criteria

4.1

This section provides design guidance and criteria for developing a proposed grading plan for a site. Although the existing topography and planned uses of development sites and individual lots are unique, several principles apply when designing permanent land grading.

4.1.1 Preservation Areas. Most land parcels include areas that are best left undisturbed, where grading will not take place. These include the following:

- ◆ **Drainageways.** Drainageway corridors comprise an important natural resource with habitat, open space, and aesthetic value. The function of drainageways is to convey runoff during rainfall and snowmelt events. The vegetation that exists in drainageways helps to keep the systems stable. Because of the value that they offer, the County encourages land owners and developers, when possible, to preserve all existing drainageways, regardless of size, that offer a high natural resource value including wetland vegetation, wildlife habitat, and aesthetic value. It is recognized that this is not always practical, nor feasible, and therefore the County provides this as a recommendation, and not a requirement. The County has, however, developed criteria in the *Stormwater Manual* to address the County's requirements for filling in and modifying major drainageways. These criteria must be addressed in a Phase II drainage report prior to grading. Section 4.5 discusses GESC Plan requirements for drainageways.



The County encourages the preservation of existing drainageways that offer a high natural resource value.

- ◆ **High-value Resources.** In addition to drainageways, other high value resources may exist on a site, such as wetlands, forested areas, or riparian corridors. 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. Section 4.6 indicates how high-value resources areas are to be shown on the GESC Drawings.

4.1.2 Slopes and Retaining Walls. On steep or sloping sites, or flat sites where more variation in grade is desired, the proposed grading plan may incorporate slopes and/or retaining walls. The following guidance pertains to the layout of slopes and retaining walls.

Section 4. Grading Criteria, Ten Elements of an Effective GESC Plan, BMP Sizing

Grading Guidance and Criteria, continued

- ◆ **Slopes.** Preferred slopes are 4:1 or flatter, designed with variation and shaping (as a landscape architect may design). Slopes between 3:1 and 4:1 are discouraged; these slopes require terracing and stabilization with Erosion Control Blanket as discussed in Section 4.12. Slopes steeper than 3:1 shall not be used.

- ◆ **Retaining walls.** The County prefers that the use of retaining walls be limited, or that walls not be used at all. Walls greater than 30-inches in height require handrails per the Arapahoe County Building Code, latest revision, and shall be structurally designed by a registered professional engineer. Other than headwalls or wingwalls at culverts and bridges, retaining walls greater than 30-inches or that surround more than “two sides” of a structure or detention basin shall not be used. Multiple retaining walls configured in a terrace shall have a horizontal offset at least equal to the height of the wall.



The County discourages the use of retaining walls. If no other option exists, the County provides specific criteria for retaining walls.

Grades shall match existing ground at property lines; therefore retaining walls shall not be permitted on the property line (single-family residential projects are excluded from this requirement). Retaining walls should allow adequate room for construction and maintenance between the wall and the property line.

4.1.3 Stockpiles. Stockpiling of material on construction sites or undeveloped lots shall only be allowed as a temporary condition, for a maximum of six months. Stockpiles must be reviewed and approved by the County, either in conjunction with a development submittal or as a stand alone engineering submittal. The following criteria apply to all approved stockpiles:

- ◆ Stockpiles shall be placed a minimum of 100 feet away from drainage-ways; a vegetated buffer must be maintained between the stockpile and the drainageway.
- ◆ Stockpiles are limited to a maximum height of 10 feet above the existing grade. Stockpile side slopes must be flatter than 3:1.
- ◆ A sedimentation pond, or other appropriate BMP shall be used to control sediment from leaving the site.
- ◆ If stockpiles remain undisturbed for a period greater than 30 days they shall be properly seeded and mulched within 14 days and appropriate BMPs must be installed to protect against erosion.

If material is removed from the stockpile periodically throughout the life of the stockpile, appropriate BMPs must be provided to address the disturbance caused by the removal operations.

Grading Guidance and Criteria, continued

Principles of Erosion and Sedimentation

4.1.4 Departures in Grade from Existing Conditions. In general, proposed grades shall be laid out in a manner that reflects existing grades on the site. Substantial departures from existing grade, such as creating high mounds or massive cuts, are discouraged. Proposed changes in grade that are viewed by the County to be excessive, especially if adjacent properties, views or sight lines would be impacted, will not be accepted. Representative cut and fill depths shall be indicated on proposed grading plans to assist in this evaluation.

4.1.5 Earthwork Balance. To help control excessive departures from existing grades and to reduce impacts on roadways, the County encourages earthwork cut and fill volumes balance onsite. The closer that proposed grades follow existing landforms, the easier it is to balance earthwork onsite. Careful attention to potential shrink or swell factors is necessary, especially if over excavation is proposed to manage expansive soils, to develop a grading plan that has a high likelihood of balancing. Refer to Section 4.7 for all required information needed to address earthwork balance.

4.1.6 Site Drainage. Historic drainage patterns must be preserved on sites, except as approved by the County. It is critical that proposed grading plans not block or restrict the conveyance of storm runoff from upstream offsite areas, and reduce impacts associated with the discharge of runoff onto downstream properties. In addition, the proposed site grading shall provide adequate conveyance paths for storm runoff in conformance with the County's *Stormwater Manual*, as amended.

4.2

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

4.2.1 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.

Once vegetation is removed, erosion proceeds unchecked.

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:

Principles of Erosion and Sedimentation, continued

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

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



Raindrop erosion.



Sheet erosion.

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

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



Rill erosion.



Gully erosion.

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

Channel Erosion. 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.



Channel erosion.

Section 4. Grading Criteria, Ten Elements of an Effective GESG Plan, BMP Sizing

Principles of Erosion and Sedimentation, continued

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

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

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



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

4.2.2 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.

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.



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



The burden of cleaning up deposited sediments can be substantial.

Section 4. Grading Criteria, Ten Elements of an Effective GESC Plan, BMP Sizing

Principles of Erosion and Sedimentation, continued

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



Sedimentation can impair aquatic habitat in downstream receiving waters.

BMPs to Address Erosion and Sediment

4.3

The *GESC Manual* describes a number of Standard BMPs acceptable to Arapahoe County for use in reducing erosion and sediment from construction activities. These BMPs are shown in Table 4-1.

4.3.1 Standard Detail Number and Identifier. The number indicated in the first column of Table 4-1 corresponds to the number of the standard construction detail shown in Arapahoe County's standard drawings, entitled GESC Plan Standard Notes and Details, included in Appendix B. To take less space on the drawing, BMPs are called out on a GESC Drawing using the two, three, or four letter identifier and symbol shown in the BMP Legend.

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

- Construction control. These BMPs are related to construction access and staging.

Section 4. Grading Criteria, Ten Elements of an Effective GESC Plan, BMP Sizing

***BMPs to Address
Erosion and
Sediment,
continued***

Table 4-1. Erosion and Sediment Control BMPs

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

Section 4. Grading Criteria, Ten Elements of an Effective GESC Plan, BMP Sizing

BMPs to Address Erosion and Sediment, continued



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

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

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



Seeding (SE) and Mulching (MU) reduces erosion and is considered an erosion control.

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

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

4.3.4 GESC Drawings are to Use the Standard BMPs. When preparing GESC Drawings, the Design Engineer shall use the standard BMPs shown in Table 4-1. These BMPs have shown to be effective under actual construction site conditions within Arapahoe County and therefore are accepted for use by Arapahoe County. A complete set of details for the accepted BMPs in Table 4-1 have been prepared and can be found in Appendix B, Arapahoe County GESC Plan Standard Notes and Details.

The GESC Drawings submitted to the County for final signatures and subsequently provided to the Contractor as construction drawings shall include a set of the GESC Plan Standard Notes and Details.

Other details shall not be used.

The complete set of BMP details is discussed further in Section 4.3.6.

If Arapahoe County approves additional BMPs in the future (see Section 4.3.5), documentation of the additional BMPs will be made available to

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

Section 4. Grading Criteria, Ten Elements of an Effective GESC Plan, BMP Sizing

BMPs to Address Erosion and Sediment, continued

The use of alternative or innovative erosion or sediment control BMPs other than those already accepted for use by Arapahoe County (shown in Table 4-1) may be allowed under the terms of the Pilot Program described in this section.

holders of the *GESC Manual*.

4.3.5 Use of Alternative or Innovative BMPs. The Public Works and Development Department recognizes that there will be new advances in the development of erosion and sediment control BMPs that may prove effective, or even out-perform controls currently accepted. Arapahoe County may allow, under strictly-controlled circumstances, the installation of erosion and sediment control BMPs other than the standard BMPs shown in Table 4-1. These shall be considered pilot programs.

A pilot program will be considered upon demonstration by the Design Engineer of adequate evidence that shows the proposed control measure will effectively control erosion and sediment. Complete plans and details for the proper installation and maintenance of the proposed BMP shall also be submitted. The pilot program, if allowed, shall be undertaken to determine the effectiveness of the proposed control measure. The duration of the testing period will be determined by the County. If Arapahoe County finds the BMP to be effective at the end of the testing period, a revision to the *GESC Manual* may be considered (revisions will be made available to all holders of the *GESC Manual*).

Arapahoe County reserves the right to reject any BMP proposed for the pilot program, either during the review period or during the field trial, if the pilot BMP does not perform with sufficient effectiveness. In the case of an unsuccessful field trial, one or more of the Arapahoe County standard BMPs listed in Table 4-1 shall replace the failed pilot BMP at the Owner's expense.

4.3.6 GESC Plan Standard Notes and Details. As discussed in Section 4.3.4, the Arapahoe County GESC Plan Standard Notes and Details, consisting of 14 sheets, has been prepared to depict the BMPs shown in Table 4-1. Construction details and notes provide direction to the Permittee(s) regarding installation and maintenance requirements for each BMP. The Arapahoe County Standard Notes and Details shall be submitted with **all** GESC Drawings. A copy of these standard drawings is included in Appendix B.

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

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

BMPs to Address Erosion and Sediment, continued

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



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

Ten Elements of an Effective GESC Plan

4.3.7 Selecting BMPs for the GESC Drawings. Section 4.4 introduces a ten-step approach for developing a GESC Plan. Guidance is provided for selecting standard BMPs for specific portions of a construction site. It is important to consider effectiveness and maintenance requirements when selecting BMPs. Some BMPs, such as silt fence, are relatively inexpensive to install the first time, but may be tougher to maintain or not as effective as other BMPs.

4.4

This section describes a systematic approach to control erosion and sediment on a construction site. Ten-elements of an effective GESC Plan are summarized; Arapahoe County requires that each of these elements be addressed in a GESC Plan.

Ten Elements of an Effective GESC Plan:

- 1. Preserve and Stabilize Drainageways.*
 - 2. Avoid the Clearing and Grading of Environmentally Sensitive Resource 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.*
-

Ten Elements of an Effective GESC Plan, continued

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 GESC 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 GESC Drawings. Figure 4-1 relates the Ten Elements to the example GESC Drawings.

Information

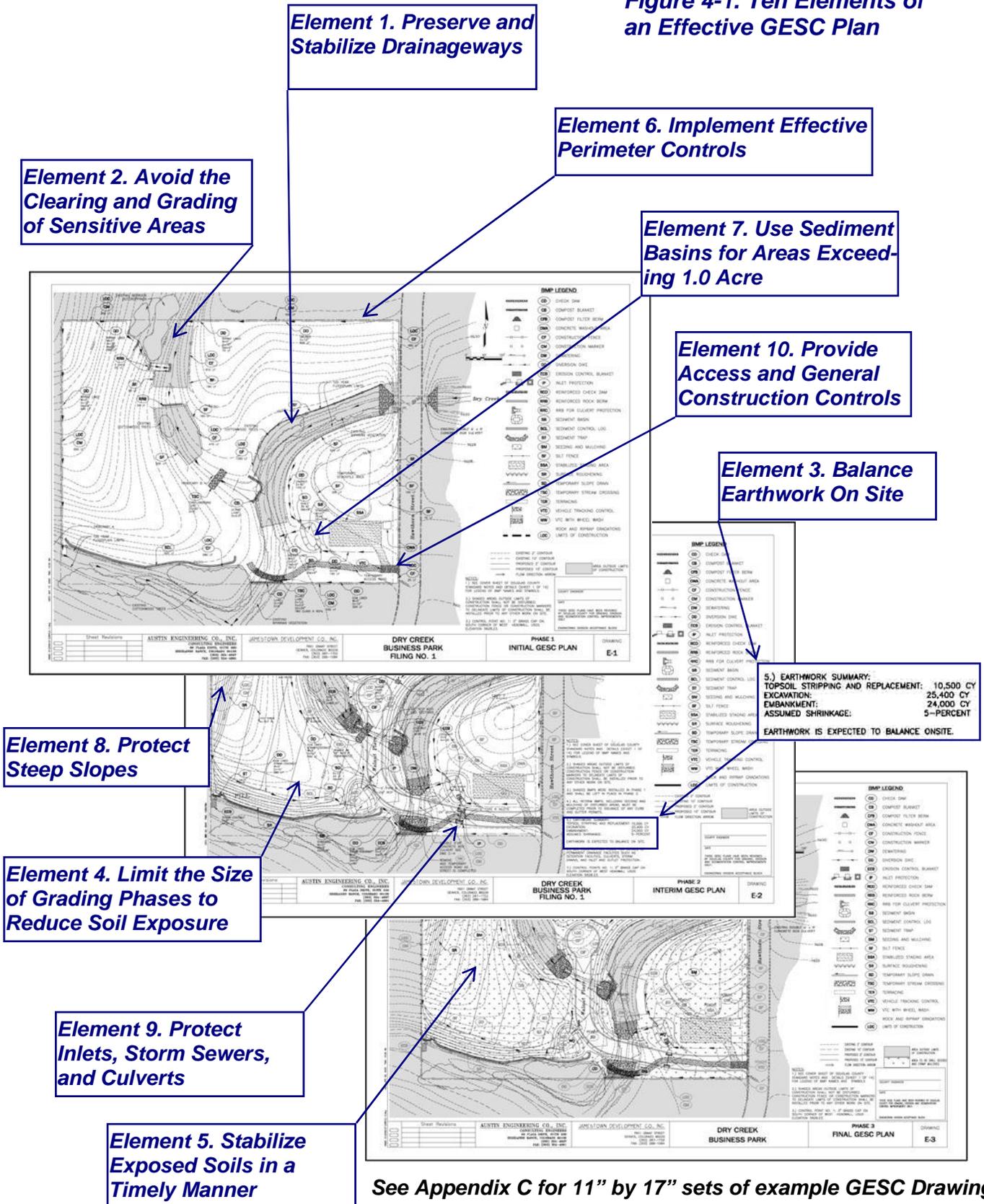
The example GESC Drawings shown in Appendix C are provided as a guide but, since each site is different, are not to be considered all-inclusive.

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

- *Sections 4.5 through 4.14 describe the Ten Elements of an Effective GESC Plan that shall be addressed when preparing a GESC Plan.*
- *Section 4.15 addresses design and sizing information for each of the County's Standard BMPs and describes the dimensions and parameters that shall be specified on the GESC Drawings.*
- *Sections 3.1 and 3.2 describe information that shall be provided in the GESC Drawings and Report.*
- *Appendix B contains a copy of the Arapahoe County GESC Plan Standard Notes and Details that shall be attached to all construction drawings.*
- *Appendix C provides example GESC Drawings for each type of GESC Plan.*
- *Appendix E provides a detailed checklist that shall be followed when developing a GESC Plan and Report.*

Section 4. Grading Criteria, Ten Elements of an Effective GESC Plan, BMP Sizing

Figure 4-1. Ten Elements of an Effective GESC Plan



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

**Element 1.
Preserve and
Stabilize
Drainageways**

4.5

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



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

construction activities be designed to reduce any adverse impacts to drainageways and that County, State, and Federal permitting processes be complied with (see Sections 1.5 and 1.6).

4.5.1 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 Arapahoe County. If riparian vegetation, desirable habitat, or other stream resources exist beyond the limits of the 100-year floodplain, consideration shall be given to avoiding impacts to those areas as well. Existing drainageways shall not be regraded or realigned without the approval of the County. Physical barriers, such as fencing, shall be required to limit access into stream corridors. Perimeter sediment controls, discussed in Section 4.10, 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 Arapahoe County. Existing drainageways shall not be regraded or realigned without the approval of the County.

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

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

4.5.2 Freeboard Above the 100-year Floodplain Shall be Provided.

Floodplain elevations can rise over time due to the following:



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

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

All of these conditions are generally healthy and positive, since they slow flow velocities, improve stream

stability, and enhance water quality through sediment trapping. For these conditions to occur over time without jeopardizing properties during floods, freeboard above the 100-year floodplain 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 *Stormwater Manual*, as amended .

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

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

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



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

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

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

4.5.4 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. The GESC Plan shall indicate how and where the existing drainageway will be diverted during construction. 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 practical area possible. **Construction Fence (CF) or Construction Markers (CM)** shall be indicated on the GESC 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

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



Section 4. Grading Criteria, Ten Elements of an Effective GESC Plan, BMP Sizing

Element 1. Preserve and Stabilize Drainageways, continued

Important!

*What about
straw bales?*

*Straw bales are
not an
accepted
sediment
control BMP*

*for GESC Permitted
projects in the
County; the track
record for effective
long-term
performance of straw
bales in the County
has not been strong.*



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.

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

*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.*



downstream end of the construction may be appropriate (in general, BMPs shall be configured to control erosion and trap sediment outside of the limits of drainageways to enable check dams to be used infrequently). Sizing criteria for check dams is provided in Section 4.15. 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 County.

*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 placed with topsoil, seeded and mulched, and, unless otherwise approved, protected with **Erosion Control Blanket (ECB)** and/or **Flexible Growth Medium (FGM)**. Additional plantings, such as willows or other riparian species, shall be considered to enhance channel stability, habitat, and aesthetics. Erosion control blan-

***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.*

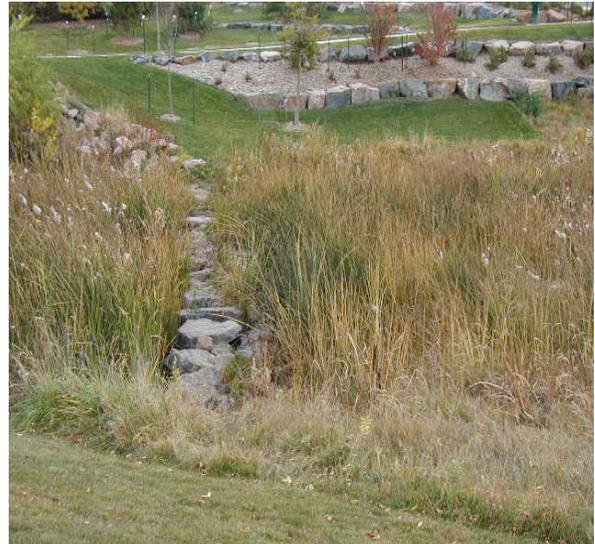


**Element 1.
Preserve and
Stabilize
Drainageways,
continued**

ket and/or Flexible Growth Medium shall be required for the disturbed channel bed and banks and all slopes steeper than 4:1. The Design Engineer shall indicate approximate limits of erosion control blanket and/or Flexible Growth Medium on the GESC Drawing. These limits shall extend to the top of the banks. Additional design information for erosion control blanket and Flexible Growth Medium is provided in Section 4.15.

Flexible Growth Medium (FGM) is a flexible growth medium composed of strand, thermally processed wood fibers with performance enhancing additives. The flexible growth medium (FGM) allows for erosion control, rapid germination and accelerated plant growth.

4.5.5 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.



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

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

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

Temporary diversion ditches may be necessary at upslope and downslope perimeters, at the top of steep slopes, and downstream of slope drains. Diversion ditches shall be sized and stabilized according to the criteria shown herein for a **Diversion Ditch (DD)**. Sections 4.10 and 4.15 provide specific guidance for locating diversion ditches.

Element 2.
Avoid the Clearing
and Grading of
Sensitive Areas

A **Diversiion 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.



4.6

In addition to drainageways, other environmentally sensitive resource areas 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 4.5, shall be shown on the Initial GESC Drawing.

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

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

Element 3.
Balance Earthwork
On Site

4.7

A common design task for almost all construction projects is the development of a proposed grading plan. Proposed contours shall be shown to provide for new roadways, building sites, and drainage features on the Interim and Final GESC Drawings. To reduce impacts on County roadways and potential for sediment to leave the site, the County encourages development projects balance earthwork quantities on site. This takes effort on the part of the Design Engineer to develop a grading plan, check earthwork quantities, and raise or lower portions of the site as necessary to achieve a balance between cut and fill material. This process will generally require several iterations, each time refining critical site slopes and design grades but will reduce overall costs of the applicant for mobilization and hauling of material offsite.

In the event that a site cannot balance earthwork quantities, the following information shall be submitted:

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

GESC Drawings shall be prepared for the import or export site in accordance with the *GESC Manual* and additional collateral shall be required.

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

4.8

For sites where the total disturbed area will exceed 40 acres, grading operations shall not take place all at one time unless otherwise approved by the County, see Section 3.4. Instead, the site shall be divided into separate grading phases each disturbing 40 acres or less. If overexcavation, stockpiling, and replacement of soils are necessary for mitigating expansive soils or addressing similar issues, each phase may disturb up to a maximum of 70 acres, as approved by Arapahoe County.

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.
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 GESC Drawings for each phase.
10. Ensure that the GESC Plan for later upstream phases address potential impacts to already completed downstream phases of the construction site.

**Element 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 GESC Plans. Adequate "footprints" for topsoil stockpiles shall be shown within the limits of construction, assuming stockpile slopes are no steeper than 3 to 1 and limited to 10 feet in height.*

4.9

All areas disturbed by construction and soil stockpiles shall be stabilized as soon as possible to reduce the duration of soil exposure and the potential amount of erosion. All disturbed areas which are either final graded, or will remain inactive for a period of more than 30 days shall be required to be stabilized within 14 days of the completion of the grading activities. Reworking the disturbed area within the 30 days for the sole purpose of avoiding the requirement to stabilize the exposed area shall not be considered an acceptable practice. Acceptable stabilization techniques are described below.

For temporary stabilization (i.e. areas that will be reworked), the County requires one of the following:

- Surface roughening **and** Mulching
- Seeding and Mulching (acceptable if area will remain dormant for more than 6 months; temporary seed mix acceptable)
- Erosion Control Blanket or Compost Blanket



Erosion control blanket protecting a slope.

Temporary stabilization measures must be installed and maintained in accordance with the requirements for the measure as described in Section 6.

For permanent stabilization (i.e. final grading is completed), the County requires that the disturbed area be permanently seeded and mulched. If the time of year does not allow for seeding operations to be effective, the Permittee may be granted an extension on the seeding requirement, however, mulching of the area will be required. The Permittee will be required to seed and mulch the disturbed area by the date that is provided by the inspector on the inspection report.

Seeding (SE) and Mulching (MU) consists of loosening soil, applying topsoil if permanent seeding, and 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. Refer to Section 4.15.13.



The BMPs applicable to stabilizing exposed soils consist of **Surface Roughening (SR)**, **Seeding and Mulching (SM)**, **Erosion Control Blanket (ECB)**, **Flexible Growth Medium (FGM)** and **Compost Blanket (CB)**. Descriptions and

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. Refer to Section 4.15.17.



photographs for surface roughening, seeding and mulching, and compost blanket are shown below; erosion

Section 4. Grading Criteria, Ten Elements of an Effective GESC Plan, BMP Sizing

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

control blanket and Flexible Growth Medium is shown in Section 4.5.4. Design information for erosion control blanket and Flexible Growth Medium is provided in Section 4.15.7 and 4.15.9, respectively. Compost blanket has performed favorably in field trials in Arapahoe County. This County-accepted BMP can be considered as an alternative to erosion control blanket and crimp mulch for stabilizing exposed soils (see Section 4.15.2).

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. Refer to Section 4.15.2.



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

4.10

4.10.1 Upslope Perimeters. If the upstream off-site area is developed, runoff may enter the site at one or more discrete outfalls. Taking into consideration potential drainage flows from off-site areas entering the construction site, drainage facilities shall be sized and stabilized to convey off-site runoff through the site (see Section 4.5 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 4.5 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 4.5). 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 4.5.5 for a description and photograph of a diversion ditch). Diversion ditches that have mild slopes may be unlined, whereas steeper ditches and rundowns must be lined with erosion control blanket (for moderate slopes), plastic (temporary installations only), or riprap.

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

A Temporary Slope Drain (TSD) is a small culvert or plastic liner to convey runoff down a slope or channel bank to reduce the occurrence of rill and gully erosion. Refer to Section 4.15.15.



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

4.10.2 Downslope Perimeters. Downslope perimeter BMPs 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, taking into consideration drainage flows and grade.

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 4.11 for sediment basin criteria).

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

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. Refer to Section 4.15.10.



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. Refer to Section 4.15.12.



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. Refer to Section 4.15.15.



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. Refer to Section 4.15.6. See **Volume 3** Figure C6-7, “Temporary Diversion Facility Sizing Nomograph based on 2-Year Peak Flows” for sizing temporary diversion ditches on construction sites.



Of these four BMPs, a reinforced rock berm, sediment control log, and silt fence function best when installed level, on a contour. However,

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

these BMPs may slope up to 5 percent from horizontal in accordance with the design information provided in Section 4.15. In the County's experience, silt fence is the least durable and has the highest maintenance cost of the four alternatives; therefore, consideration should be given to all of the alternatives before simply specifying silt fence. Additional information on installation and maintenance of BMPs is provided in Section 6.2.

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 4.14 for construction site access controls.

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

4.11

Runoff from all disturbed drainage areas exceeding 1.0 acre shall be treated in a Sediment Basin (SB). Supporting documentation for determining sediment basin size, including disturbed area and calculations, shall be provided to the County as described in 4.15.11.

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

*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. Refer to Section 4.15.10.*



*A **Sediment Trap (ST)** consists of a riprap berm with a small upstream basin that acts to trap coarse sediment particles. Refer to Section 4.15.12.*



Runoff from disturbed areas less than 1.0 acre may be treated in a sediment basin, a Sediment Trap (ST), or one of the downslope perimeter BMPs described in Section 4.10. Design guidance for sediment basins is provided in Section 4.15.10

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

Linear projects, such as transportation corridor and utilities projects, may consider other BMPs, such as vegetative buffer strips, grass swales or longer linear sediment basins that are retrofit into grass swales and vegetative buffers to provide sediment control during construction disturbance

Mining pits when used for the extraction of sand and gravel, permitted through the Colorado Division of Reclamation Mining and Safety (DRMS) and/or the Colorado Department of Public Health and Environment, may be considered on a case-by-case basis when disturbance is limited to the immediate pit area.

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

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

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

Permanent detention facilities shall be constructed as early in the development process as possible. If site planning has identified easements for permanent detention facilities, the Design Engineer 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**



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

4.12

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) and higher than five feet vertically.

4.12.1 Proposed Slopes Shall be No Steeper than 3 to 1. No permanent earth slopes greater than 3 to 1 shall be allowed. 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

**Element 8.
Protect Steep
Slopes,
continued**

shall be required to control grades on all sites that cannot be graded at a 3 to 1 slope. Retaining walls may be necessary to control grades on a site. Slopes steeper than 4 to 1 shall be protected with **Erosion Control Blanket (ECB)** or **Flexible Growth Medium (FGM)**.

4.12.2 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 County.

4.12.3 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 4.15.19.

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



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

4.13

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

All storm sewer inlets on a site shall be provided with **Inlet Protection (IP)**. The GESC Drawing shall specify whether area, sump, or continuous grade inlet protection is to be used in a particular location balancing erosion and sediment control with safety issues, including standing water in roadways. 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



Continuous-grade Inlet



Sump 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.



Area Inlet

protection is also designed to maintain inlet capacity after runoff flows over the wire-enclosed rock. The only inlet protection that blocks an inlet

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

opening is temporary inlet protection, discussed in Section 6.2.8, which is only used to keep soil out of an inlet prior to paving operations. All culvert inlets on a site shall be provided with a **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. See Section 4.15.9.



Storm sewer outfalls and culvert outlets shall be permanently protected against erosion with a riprap apron or other approved means in **accordance with the Stormwater Manual**, 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)** and/or **Flexible Growth Medium (FGM)** 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**

4.14

4.14.1 Limits of Construction (LOC).

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



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

4.14.2 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.

**Element 10.
Provide Access
And General
Construction
Controls,
continued**

4.14.3 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. A VTC may require a County ROW Use Permit if any portion is installed within the public ROW.

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.



4.14.4 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. Refer to Section 4.15.16.



4.14.5 Concrete Washout Area (CWA). A concrete washout area or pre-fabricated ecologically/environmentally friendly concrete washout bins such as Eco-Pan 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. Refer to Section 4.15.3.



4.14.6 Stockpile Areas. All stockpile areas shall be shown on the GESG Drawing. As discussed in Section 4.9, topsoil stripping, stockpiling, and re-spreading in areas to be vegetated shall be a mandatory practice called for in all GESG 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 and not to exceed 10 feet in height. Stockpiles shall not be shown outside the limits of construction.

4.14.7 Temporary Access Roads. All temporary access roads shall be shown on the GESG Drawing.

Design and Sizing Criteria for BMPs

4.15

All of the design parameters outlined on the Arapahoe County accepted details shall be specified for each BMP selected, as indicated on the Arapahoe County GESC Plan Standard Notes and Details drawings in Appendix B and discussed in detail in Section 6. The parameters may include specific dimensions, such as lengths and widths, or type if more than one configuration of a BMP exists. Design guidance is provided in the following paragraphs for each of the Arapahoe County-accepted BMPs.

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

- Type of check dam (check dam or reinforced check dam).
- Length (L) dimension.
- Crest length (CL) dimension.
- Depth (D) dimension.

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 20 acres.

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

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

Design parameters to be specified on the plan-view GESC Drawings include the following items :

- Location and aerial extent of compost blanket and any compost filter berms.
- Area (A) in square yards of compost blanket.
- Length (L) in linear feet of any compost filter berm.

Compost blanket and filter berms shall not be used in drainageways, swales, or any area of concentrated flow, but may be used as an alternative for erosion control blanket on slopes outside of drainageways, or as an alternative to crimp mulching.

4.15.3 Concrete Washout Area (CWA). Concrete Washout Area (CWA).

One or more locations for a concrete washout area or pre-fabricated ecologically/environmentally friendly concrete washout bin, near all areas of concrete work, shall be specified on the plan-view GESC Drawings. The use of vehicle tracking control in conjunction with a concrete washout area is mandatory. Pre-fabricated ecologi-

Design and Sizing Criteria for BMPs, continued

cally/environmentally friendly concrete washout bins are encouraged as it controls alkaline wash water from potentially entering the storm drain system or leaching into groundwater .

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

Design parameters to be specified on the plan-view GESC Drawings include the following items:

- Location of construction fence or line of markers.
- Length (L) in lineal feet of construction fence or line of markers.
- Coordinates or other location information.

Construction fence 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 4.6. 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.

4.15.5 Dewatering (DW). Design parameters to be specified on the plan-view GESC 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.

As mentioned in Section 1.5, a State Permit for Discharges Associated with Construction Activities is generally required for dewatering operations.

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

- Lining of diversion ditch (earth, ECB, riprap, or plastic).
- Length of each type of ditch.
- Depth (D) and width (W) dimensions.
- In addition, if the ditch lining is ECB or riprap, the type of erosion control blanket and size of riprap (D50) needs to be specified.

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

Section 4. Grading Criteria, Ten Elements of an Effective GESC Plan, BMP Sizing

Design and Sizing Criteria for BMPs, continued

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

require an independent design by a Professional Engineer (P.E.).

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

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

Type of blanket shall be based on the shear stress associated with the design flow, as discussed below. Dimensions shall be specified to ensure that the blanket provides protection to the top of the disturbed channel. All erosion control blankets shall have double sided netting. All erosion control blankets and netting should be made of 100% natural and biodegradable material and shall have a minimum product life of 2-years for channel applications and 12 month product life for slope applications.

Erosion control blanket shall be specified based on the judgment of the Design Engineer, but at a minimum, blanket in drainageways shall be sized for the shear stress from a 2-year return period event for development conditions expected during the operation of the matting. Table 4-2 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 steeper than 4:1, outside of drainageways. Concave slope areas that may concentrate sheet flows as well as all other drainage channels (up to the top of the banks) shall require a double-net 70% straw / 30% coconut, double-net 100% coconut, or double-net 100% excelsior blanket based on the shear stress and velocity of the new or disturbed

Table 4-2 Erosion Control Blanket Type

TYPE	COCONUT CONTENT	STRAW CONTENT	MI N. WE IG HT (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

Section 4. Grading Criteria, Ten Elements of an Effective GESC Plan, BMP Sizing

Design and Sizing Criteria for BMPs, continued

channel. The shear stresses and velocities shown in Table 4-2 shall be considered the maximum allowable values. Channels where velocities and stresses exceed those shown in Table 4-2 shall be designed in accordance with the *Stormwater Manual*, as amended.

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

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

- Shear stress (lbs/sf) = 62.4 * D * S, where:

D (ft) = maximum flow depth for the design (2-yr) storm event

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 4-2 for the type of blanket specified. Figure 4-2 shows the information in Table 4-2 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

Figure 4-2. 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										

**Design and
Sizing Criteria
for BMPs,
continued**

temporary erosion control only until vegetation can be established. 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 *Stormwater Manual*, as amended. The blanket is to provide erosion protection until the vegetation is established, and it is therefore an important component of an effective GESC Drawing. Under no circumstance does the use of temporary erosion control blanket relieve the Design Engineer of the requirement to satisfy channel design criteria in the *Stormwater Manual*. Permanent channel and roadside ditch stabilization measures must be addressed in the Phase III Drainage Report for the project and be specified and detailed on the project construction drawings.

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

Determining the length of the reinforced rock berm, curb socks, or proprietary inlet sediment control devices to fit the inlet is the responsibility of the Permittee(s), as is providing temporary inlet protection in accordance with the GESC Drawing Standard Notes and Details.

4.15.9 Flexible Growth Medium (FGM). The Flexible Growth Medium (FGM) shall be a hydraulically-applied, flexible erosion control blanket/mulch/covering composed of long strand, thermally processed wood fibers, crimped, interlocking fibers and performance enhancing additives. The FGM shall require no curing period and upon application forms an intimate bond with the soil surface to create a continuous, porous, absorbent and erosion resistant blanket that allows for rapid germination and accelerated plant growth.

The flexible growth medium is engineered to provide a dense blanket of interlocking fibers that hold the slurry together while bonding to the soil surface. These products can be designed to bond mechanically or hydraulically depending on seasonal application parameters. Flexible growth medium will reduce water runoff and channeling while maximizing seed germination and plant growth.

Flexible growth medium is applied in a heavy slurry, usually 1 to 2 times the thickness of hydro-mulching. Applications can be applied using all types of mechanically agitated hydraulic seeding equipment over uneven terrain and slopes between 4:1 and 3:1. Application rates may vary dependant on slope, soil and rainfall conditions and should be in accordance with manufacturer's recommendations. The slurry components consist of hydro-mulch fiber, crimped poly strands, hydraulic cross-linking agents, fertilizer, and tackifiers. Thin repeat applications are most effective to build-up a dense matrix.

Design and Sizing Criteria for BMPs, continued

The flexible growth medium should not be applied in channels, swales or other areas where concentrated flows are anticipated, unless installed in conjunction with a temporary erosion control blanket.

Table 4-3 summarizes designed specifications for the Flexible growth medium .

Table 4-3. Flexible Growth Medium Design Specifications	
<i>Water Holding Capacity</i>	<i>1500%</i>
<i>Cure Time</i>	<i>< 2 hour</i>
<i>Endurance</i>	<i>> 17 months</i>
<i>Shear Stress</i>	<i>1 lb/ft²</i>
<i>Application Rate</i>	<i>3,000 lb/acre</i>

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

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

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

When used as a downhill perimeter control, the design criteria described for **Silt Fence (SF)** in Section 4.15.4 shall apply, except that the reinforced rock berm may be used as a check dam across swales and small drainageways (up to 20 acres of upstream drainage area).

4.15.11 Sediment Basin (SB). Design parameters shall be specified on the plan-view GESG 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 GESG Drawing Standard notes and Details provided in Appendix B shall be used for any disturbed drain-

Design and Sizing Criteria for BMPs, continued

age area greater than 1.0 acre. (Note: Linear projects such as roadway and utilities projects can utilize other controls such as vegetative buffer areas as described in 4.11.) The standard sediment basin is appropriate for use for disturbed drainage areas up to 15 acres. For drainage areas greater than 15 acres, a *Volume 3* design must be prepared and shown in the construction drawings.

Sizing information for the sediment basin design (based on providing a minimum initial storage volume equal to 1800 cubic feet per upstream acre, shall be determined from Table 4-4. 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 4-4 will drain the upper 1.5 feet of the sediment basin in about 40 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 de-

Table 4-4. Sizing Information for Standard Sediment Basin

<i>Upstream Drainage Area (rounded to nearest acre), (ac)</i>	<i>Basin Bottom Width (W), (ft)</i>	<i>Spillway Crest Length (CL), (ft)</i>	<i>Hole Diameter (HD), (in)</i>
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

tion 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 40-hours may be used as the sediment basin outlet as long as at least half of the sediment basin volume is provided below the lowest orifice of the permanent outlet works.

4.15.12 Sediment Control Log (SCL). Sediment Control Logs (SCL) shall consist of 8” to 12” diameter cylinders of biodegradable plant material such as straw, coir, compost, or wood shavings encased within biodegradable or photodegradable netting. Encasing material shall be clean, evenly woven, and free of encrusted concrete or other contaminating materials such as preservatives. Encasing material shall be free from cuts, tears, or weak places and shall have a lifespan greater than 6 months.

Design and Sizing Criteria for BMPs, continued

Design parameters to be specified on the plan-view GESC Drawings shall include the following items: :

- Location of the sediment control log.
- Length (L) of the sediment control log.

When used as a downslope perimeter control, the design criteria described for **Silt Fence (SF)** in Section 4.15.15 shall apply.

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

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

Sediment trap may be used for upstream disturbed areas less than 1.0 acre. Sediment trap dimensions shall be specified to provide a storage volume equal to 1800 cubic feet per upstream acre.

4.15.14 Seeding (SE) and Mulching (MU). Design parameters to be specified on the plan-view GESC Drawings include the following items:

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

It is recommended that all projects include a seed mix recommendation provided by a Landscape Architect with sufficient knowledge of the project. If a Landscape Architect does not provide a seed mix, then the County 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 Arapahoe County GESC 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 Arapahoe County. All disturbed areas are to be ripped prior to placing topsoil. Topsoil shall be thoroughly loosened prior to seeding to a depth of at least six inches.
- ◆ A topsoil certification will be required with the Initial Close-Out Acceptance. A copy of the topsoil certification form is provided in Appendix P.
- ◆ 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 GESC Drawing Standard Notes and Details. In small areas that are impossible to drill seed, the Permittee(s), with the County's prior approval, may hand broadcast seed at twice the

Design and Sizing Criteria for BMPs, continued

drilled rate, lightly rake to cover the seed, and crimp mulch. Information on seed types in the Arapahoe County standard seed mixes is provided in Appendix T.

Important! *What about Hydraulic Seeding / Hydraulic Mulching?*

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



- ◆ Straw mulch shall be applied at 2 tons per acre and mechanically crimped into the soil. Revegetation is considered complete when the site is covered by an average of 3 plants per square foot of the variety and species found in the Arapahoe County-approved mix (for blue-grass or equivalent turf areas, the required coverage shall be at least 80-percent cover of the species planted). There shall be no bare areas larger than 4 square feet (2 feet by 2 feet or equivalent). The site shall be free of eroded areas and shall be free from infestation of noxious weeds in accordance with Section 7.3.

Inspections (monthly) and reseeding operations are required twice per year until a satisfactory stand of grass as denoted above is achieved.

- ◆ A seeding and mulching certification will be required with the Initial Close-Out Acceptance. A copy of the seeding and mulching certification form is provided in Appendix P.
- ◆ Mining projects permitted through the Colorado Division of Mining, Safety and Reclamation shall follow the reclamation requirements for seeding, mulching and revegetation.

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

- Location of silt fence.
- Length (L) in linear feet of silt fence.

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

Section 4. Grading Criteria, Ten Elements of an Effective GESC Plan, BMP Sizing

Design and Sizing Criteria for BMPs, continued

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 4-5 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 4-5. The end of a downslope section of silt fence shall extend a minimum of 15 feet into the drainage “shadow” of the adjacent upslope section to ensure capture of all approaching sheet flow.
5. In all cases, the ends of individual sections of silt fence shall be 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

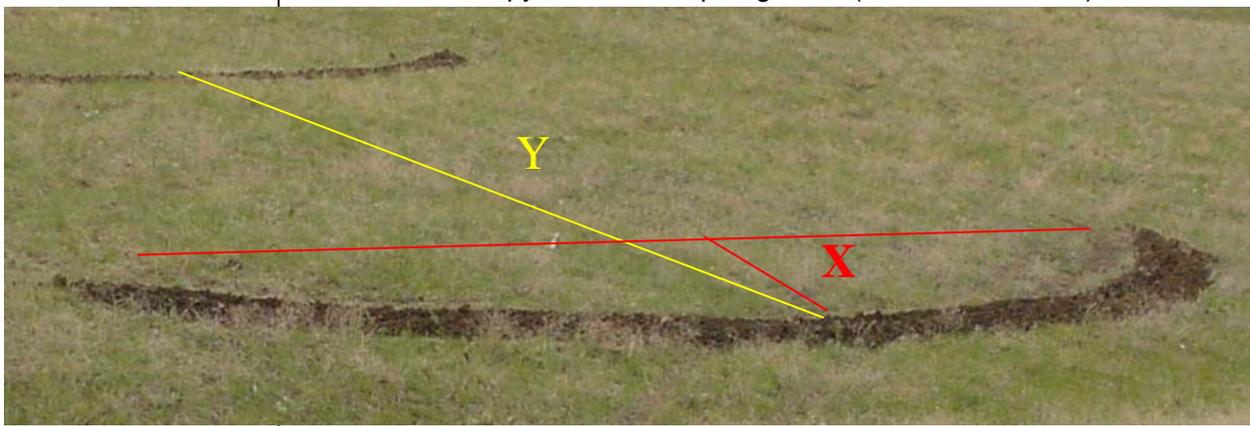


Table 4-5. Silt Fence on Slope

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

Design and Sizing Criteria for BMPs, continued

limits of construction can extend relatively close to the perimeter.

If the perimeter slopes are more than five percent, silt fence (or sediment control log or reinforced rock berm) must be staggered according to the information in Table 4-5, with individual sections oriented generally on the contour (or on less than a five percent slope) and “overlapping” by at least 15 feet. In this case, the sections of silt fence will occupy a relatively wide strip of ground (perhaps 20 to 50 feet); therefore, either the silt fence needs to be placed downslope of the perimeter (requiring the approval of Arapahoe County and, if it affects adjacent property, the owner of the adjacent property) or the limits of construction cannot extend very close to the perimeter. For this reason, it may be advantageous for the Design Engineer to use a lined **Diversion Ditch (DD)** along downslope perimeters steeper than 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 4-5. The slope percentage or slope ratio dictates the spacing of adjacent rows of silt fence. If construction takes place in the winter, silt fence should be placed far enough off the roadway to avoid damage from snow-plowing operations.



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

4.15.16 Temporary Slope Drain (TSD). Design parameters to be specified on the plan-view GESB 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 2-year return period event for development conditions expected during the operation of the slope drain.

4.15.17 Stabilized Staging Area (SSA). Design parameters to be specified on the plan-view GESB 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.

Design and Sizing Criteria for BMPs, continued

4.15.18 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 GESC Drawing.

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

- Location of stream crossing.
- Type of stream crossing (ford or culvert).
- For ford crossing, length (L), crest length (CL), and depth (D) dimensions.
- For culvert crossing, length (L), height (Y), overtopping depth (H), diameter (D) and number of culverts.

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

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

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

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

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

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

- Location of all vehicle tracking controls.

Design and Sizing Criteria for BMPs, continued

A location shall be selected that avoids disturbance of trees, desirable vegetation, and low, wet areas. Slopes greater than 8% shall be avoided. All access points to or from a construction site require a Street Cut and Right-of-Way Use Permit as outlined in the *Infrastructure Design and Construction Standards*, as amended. No ramps of dirt, gravel, asphalt, wood, or other materials are allowed in the curb section. A stop sign is required for all exiting traffic from the site. Pre-fabricated tracking mats are acceptable.

4.15.22 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 County Inspector, typically, only if vehicle tracking onto public streets becomes a major problem.

Section 5. Field Process and Enforcement

Overview of Section 5

5.0

Section 5 addresses the following steps in the GESC Permit Process:

Select a GESC Manager; review the GESC Field Manual and ensure that the Permittees and their representatives, including field personnel, understand the GESC Permit requirements.

Section 5.1, **The GESC Manager**, discusses the role of the Permittee(s)' GESC Manager, who serves as the on-site contact person with County inspectors and is responsible for ongoing compliance with the GESC Permit.

Section 5.2, **Understanding the Requirements of the GESC Plan**, describes the requirements of the Permittee(s) prior to the Preconstruction Meeting, including selecting the GESC Manager, thoroughly reviewing the GESC Field Manual, GESC Plan, GESC Plan Standard Notes and Details, and related plans and permits for the project as well as the benefits of the Permittee(s)' diligence in implementing the GESC Plan throughout construction.

Section Highlight – Implementing the GESC Plan is a Dynamic Process

Implementing the GESC Plan is a dynamic, not static, process. The Permittee(s) are responsible for adapting the original GESC Plan so as to effectively reduce erosion and sediment and comply with any modifications to the Plan as required by Arapahoe County.

Install the Initial BMPs as shown on the accepted GESC Drawings and schedule a Preconstruction Meeting with the County.

Section 5.3, **Preparation for the Preconstruction Meeting**, summarizes the activities to occur prior to the meeting which includes the installation of Initial BMPs. Other than the installation of the Initial BMPs, no other construction shall start prior to the Preconstruction Meeting.

Attend the on site Preconstruction Meeting, designate the GESC Manager, confirm an understanding of the GESC Permit requirements, review the Initial BMPs, and make any corrections required.

Section 5.4, **Preconstruction Meeting**, describes who shall attend the Preconstruction Meeting and summarizes the general meeting agenda.

Pick up the executed GESC Permit.

Section 5.5, **The Executed GESC Permit**, provides guidance for picking up the GESC Permit from the County.

Ensure that the Interim and Final BMPs are installed at the appropriate times in accordance with the accepted GESC Drawings and GESC Manual.

Section 5.6, **Installation of Interim and Final BMPs**, discusses the general schedule for installing Interim and Final BMPs.

Section 5. Field Process and Enforcement

Overview of Section 5 , continued

Ensure that the mandatory inspections by the County are scheduled by Permittee(s) and completed and that corrections requested by the County during these or any inspections are made.

Section 5.7, **Permittee GESC Inspections**, discusses the required inspections which must be completed by the Permittee.

Section 5.8, **County GESC Inspection Process**, discusses Inspections related to the County GESC Permitting Program and identifies steps in the construction process that require mandatory inspections and acceptance before work may proceed.

Section 5.9, **Violations and Enforcement**, provides a description of the two levels of violations and the associated Stop Work Order.

Section Highlight – Stop Work Order

Permittee(s) committing any Level I Violations listed in Section 5.9.3 may receive a Stop Work Order and have the GESC Permit revoked. A Stop Work Order requires that the Permittee(s) do the following before resuming work on the site:

- ◆ Correct the deficient practices that precipitated the Stop Work Order.
- ◆ Apply for a reinstatement of the GESC Permit and pay the GESC Permit reinstatement fee at the County.
- ◆ Schedule a site inspection with the County.
- ◆ Obtain a Release of Stop Work Form after approval of the corrected work from a County Inspector.



Use of the Collateral when there is a Default by the Permittee(s).

Section 5.10, **Revocation of Collateral for Default by Permittee(s)**, procedures are described where the County revokes the developer's Collateral and uses the funds to complete the GESC requirements.

The GESC Manager

5.1

5.1.1 Responsibilities of the GESC Manager. As the Permittee(s)' focus shifts from preparing the GESC Plans and applying for the GESC Permit to constructing the project, the first task is to select a GESC Manager. The GESC Manager is the Permittee(s)' contact person 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 Permit; however, the Permittee(s) shall remain the legally responsible party. The GESC Manager shall respond to requests made by Arapahoe County staff and have any deficiencies in the work corrected.

The GESC Manager and Alternate GESC Manager shall be named at the on site Preconstruction Meeting discussed in Section 5.4.

5.1.2 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 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 in on the status of the GESC Plan implementation, and ensure that the Alternate GESC Manager assumes the GESC Manager's responsibilities during any absence.

5.1.3 Availability of the GESC Manager. The GESC Manager shall be on site as necessary to ensure the GESC requirements are being implemented, and (along with the Alternate GESC Manager) shall provide the County with a 24-hour emergency contact number. In the event the GESC Manager (or Alternate GESC Manager) cannot be reached within 24 hours, a violation may be issued.

5.1.4 Changing the GESC Manager or Alternate. Notification in writing shall be provided to the County if the GESC Manager or Alternate leaves

the company or the Permittee(s) intend to change personnel. A field meeting with the County Inspector and new GESC Manager or Alternate shall be scheduled within 7 days of the change to discuss site conditions and responsibilities of the GESC Manager.



The GESC Manager shall always be available on site or by phone for communications with the County Inspector.

***Understanding
the Requirements
of the GESC Plan***

5.2

5.2.1 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).

5.2.2 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, and rework, and avoids reinspection fees and delays associated with Stop Work Orders (see Section 5.9).

As an example, the presence of gully erosion on a construction site (described in Section 4.2) 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 deal with rill erosion as it develops, will likely prevent gully erosion from occurring. This saves time and money in the long run.

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 GESC Permit fee or reinspection fee.*

5.2.3 Review of the GESC Field Manual, GESC Plan, and Related Plans and Permits. Prior to the Preconstruction Meeting, the GESC Manager shall thoroughly review the GESC Field 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 4 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 other field personnel are aware of the GESC requirements.

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

Understanding the Requirements of the GESC Plan, continued

Preparation for the Preconstruction Meeting



Preconstruction Meeting

5.2.4 Documents that Shall Remain On Site. A copy of the GESC Field Manual, Stamped and Approved 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 remain on site at all times as well.

5.3

5.3.1 Installation of Initial BMPs. The Initial BMPs shown on the GESC Drawings shall be installed 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) and 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 the GESC Field Manual (discussed in Section 2.13). However, all of the requirements of the GESC Field Manual and GESC Plan, including the Standard Notes and Details, shall be complied with. See Section 6 for a description of proper installation and maintenance of BMPs.

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 Arapahoe County Engineering (see contact information in Appendix A) to obtain acceptance of the proposed modifications prior to installing the BMPs.

5.3.2 Construction Shall Not Start. Other than the installation of the Initial BMPs shown on the GESC Plan, no stripping operations, haul road grading, or other construction shall occur.

Important!

If the Permittee(s) begin work on the site (other than installing the Initial BMPs) prior to obtaining an approved GESC Permit, the County will issue a Stop Work Order and assess a fee in accordance with the current County Penalty Fee Schedule.

5.3.3 Scheduling the Preconstruction Meeting. The Permittee(s) shall contact the County to schedule the on site Preconstruction Meeting. Three days notice (business days, not including Saturdays and Sundays) shall be provided to schedule the meeting.

5.4

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

1. **Owner or Owner's Representative** (the Contractor may **NOT** be the owner's representative).
2. **General Contractor.**

Preconstruction Meeting, continued

3. **GESC Manager and Alternate GESC Manager** (one or both may be the same as the Owner or General Contractor Representative).
4. **Grading Sub-Contractor**, if different than the General Contractor.
5. **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).

5.4.2 General Meeting Agenda. The following agenda items are addressed at the Preconstruction meeting.

1. **Introductions.** Introductions of all attendees, including the GESC Manager and Alternate GESC Manager, will take place.
2. **Contact Information.** Attendees will exchange contact information.
3. **Review of GESC Field Manual.** The County Inspector will confirm the Permittee(s)' understanding of the GESC Field Manual.
4. **Field Review of GESC Drawings.** The GESC Drawings for all stages and phases will be reviewed to confirm the attendees' understanding of the GESC Plan and to discuss any modifications to the plan. If modifications to the GESC Plan are thought to be advantageous, input will be sought from the Design Engineer and final acceptance of changes will be as determined by the Review Engineer. Limits of construction and topsoil stripping limits shall be confirmed.
5. **Inspection of Initial BMPs.** A visual inspection of all of the Initial BMPs that have been installed will take place. The County Inspector will confirm if any corrections are required.
6. **Acceptance of Initial BMPs.** If the Initial BMPs are accepted by the County Inspector, as is or with minor corrections, the County Inspector will inform the Permittee(s), sign the GESC Permit Application, and submit the GESC Permit Application to the Engineering Department for processing. **Construction shall not start until an executed GESC Permit is obtained from the County as described in Section 5.5.**

5.4.3 Corrections to the BMPs. If the County Inspector determines that significant modifications or corrections to the BMPs are necessary, the County Inspector will inform the Permittees that such corrections shall be

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 GESC Inspector, the meeting shall be rescheduled and the applicant will be assessed a \$50.00 reinspection fee. The fee shall be paid at the Arapahoe County Engineering Permits and Inspection office prior to scheduling another Preconstruction Meeting.*

Section 5. Field Process and Enforcement

Preconstruction Meeting, continued

made, that a follow-up inspection shall be scheduled with the County, and that acceptance of the corrected BMPs by the County Inspector shall take place prior to the signing of the GESC Permit or prior to any additional inspections. Modifications to the GESC Plan will, in most cases, require acceptance of the Design Engineer who signed and stamped the GESC Drawings.

The Executed GESC Permit

5.5

5.5.1 Pick Up the Executed GESC Permit. Arapahoe 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.

Installation of Interim and Final BMP's

5.6

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 after the construction of site infrastructure).

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 County Inspector to make the final determination of Interim and Final BMP installation time frames.

Permittee GESC Inspections

5.7

During the construction phase, erosion and sediment controls must be inspected regularly by the GESC Manager to ensure that the BMPs are adequately maintained and functioning as intended. The frequency of GESC inspections shall be consistent with the "Key Installation and Maintenance Requirements" for each of the BMPs provided in Section 6.

In order for the County to ensure that the inspections are completed as required, the Permittee will be required to provide a Certification of GESC Inspections with the Initial Close-Out Acceptance. A copy of the certification form is provided at the end of this Section.

County GESC Inspection Process

5.8

5.8.1 County GESC Inspections. During the construction phase, erosion and sediment controls will be inspected regularly by a County Inspector. County Inspectors 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. County Inspectors will coordinate with the GESC Manager, whose responsibility it is to ensure that the site remains in compliance with all GESC requirements.

Section 5. Field Process and Enforcement

County GESC Inspection Process, continued

The Owner's signature on the GESC Permit application form or Letter of GESC Permit Compliance constitutes written authorization for Arapahoe County and its agents to enter the project site and conduct regular inspections to ensure compliance with County regulations.

5.8.2 Mandatory County Inspections. The Permittee(s) shall call the Public Works and Development Department (contact information is shown in Appendix A) to schedule the following mandatory inspections:

1. Preconstruction Meeting/Inspection of Initial BMPs.
2. Any time during construction when a new GESC Manager or Alternate GESC Manager is chosen.
3. Initial Close-out Inspection at end of construction.
4. Vegetation Acceptance Inspection two years after Initial Close-out Inspection, or when grass has reached required vegetative cover in accordance with Section 7.3, prior to removal of on-site BMPs.
5. Final Close-out Inspection (after vegetation has been accepted and sediment controls have been removed).
6. For Staged and Phased GESC Plans where more than 40 acres needs to be 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 Violation.
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 County Inspector finds the BMPs to be installed and maintained in accordance with the approved GESC Plan and GESC Manual, the County Inspector will sign the GESC Phasing Acceptance Sheet.
5. Once the County 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 surface roughened, drill seeded and crimp mulched or otherwise stabilized in accordance with the accepted GESC Plan within 5 calendar days from the County Inspector's sign-off for commencement of the next phase (the County Inspector may grant a seeding "extension" if at a time of year not conducive to seeding, refer to Section 4.9). 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 EXTENSIONS SHALL BE GRANTED.**
7. This process shall be repeated for each additional phase until all earthwork is complete.



Violation and Enforcement

Important! *Violations to the Clean Water Act shall be subject to civil penalties of up to \$25,000 per day.*

5.9

5.9.1 Penalties and Enforcement. Failure to comply with any term, condition, limit, deadline or other provision of the GESC Permit or failure to obtain a GESC Permit, constitutes a violation of the Arapahoe County Land Development Code, as amended and may constitute a violation of the Federal Clean Water Act and the Colorado Water Quality Control Act, Section 25-8-101, *et seq.*, C.R.S. (“Act”).

Pursuant to Section 25-8-608, C.R.S., any person who violates the Act or any permit issued under the Act shall be subject to a civil penalty of not more than \$10,000 per day for each day during which such violation occurs. Pursuant to Section 25-8-609 C.R.S., any person who recklessly, knowingly, intentionally, or with criminal negligence discharges any pollutant into any state waters commits criminal pollution if such discharge is made in violation of any permit issued under the Act. If the violation is committed with negligence or recklessness, the maximum fine shall be \$12,500 per day. If the violation is committed knowingly or intentionally, the maximum fine shall be \$25,000 per day.

In addition to any other legal or equitable remedies that the County may have for GESC Permit violations, the County may withhold issuance of building permits, refuse to perform any inspections or to approve any inspections, or to issue any other necessary approvals until such violation has been corrected and the Permittee(s) has taken the necessary action to ensure compliance with the GESC permit and GESC Manual requirements.

5.9.2 Violations. Arapahoe County classifies violations in one of two categories, depending on the severity of the violation and has different enforcement actions for each category.

5.9.3 Level I Violations. Level I Violations are viewed by the County to pose an immediate serious risk to the health, safety or welfare of people and/or the environment.

Level I Violations include, but shall not be limited to the following:

- *Clearing, grubbing, grading or filling without an Arapahoe County GESC permit.*
- *Disturbing land or filling within a floodplain or sensitive area without proper approvals.*
- *For phased grading, failure to provide required stabilization on a phase within 5 days of the GESC Phased Acceptance.*
- *Failure to correct Level II Violations per the directives of the County Inspector within the specified amount of time.*
- *Failure to pay reinspection fees.*



Level I Violations may result in the immediate issuance of a Stop Work Order or a Notice of Violation (NOV), depending upon the impact and severity of the violation. If a Stop Work Order is issued, all work on site must

Violation and Enforcement, continued

stop until the GESC permit is reinstated.

5.9.4 Level II Violations. Level II Violations are viewed by the County to pose a moderate risk to health, safety or welfare of people and/or the environment; however if not immediately corrected, will pose a serious risk.

Level II Violations include, but shall not be limited to the following:

- *Tracking of material onto roadways and adjacent properties.*
- *Failure to make required plan revisions.*
- *Failure to perform BMP maintenance as directed by the County Inspector.*
- *Failure to provide routine maintenance for erosion and sediment controls*
- *Installation of non-County approved BMPs.*
- *Failure to provide inlet protection.*
- *Failure to provide protection of drainageways.*
- *Failure to provide sediment pond maintenance.*
- *Staging of equipment outside of stabilized staging area.*
- *Failure to have approved GESC permit, GESC drawings and Field Manual on site.*
- *Failure to address inspection concerns within allotted time frame.*

Remediation for Level II Violations shall commence after the Permittee is notified of the violation. Notification can either be verbal instruction from the County Inspector to the GESC Manager, or included on an inspection report as a deficiency. A re-inspection will be completed by the County to ensure remedies are implemented. If corrections have not been completed satisfactorily and additional inspections are needed, reinspection fees will be applied for subsequent inspections. Corrections not made in full after additional inspections and subsequent inspections fees will result in the issuance of a Notice of Violation (NOV) and possible Stop Work Order.



5.9.5 Re-Inspection Fee. To offset the cost of additional inspections on non-compliant sites, the County will require re-inspection fees. Inspection fees will not be charged for the first re-inspection of a site where deficiencies have been identified. Re-inspection fees shall be applied if the site continues to be in non-compliance after the first re-inspection. The re-inspection fees must be paid in person at the Engineering Division of



This site was issued a reinspection fee when the GESC Manager scheduled an inspection prior to reaching the required vegetative cover as well as not maintaining the required sediment controls.

Violation and Enforcement, continued

Public Works & Development office. The County may refuse to provide other required County inspections (Building Permit, Public Improvements, GESC, or other) until re-inspection fees are paid. Failure to pay re-inspection fees may also result in the Issuance of a Notice of Violation and/or a Stop Work Order.

5.9.6 Notice of Violation. Failure to meet the GESC requirements may result in the issuance of a Notice of Violation. If the Violation is not remedied a Stop Work Order may be issued and prosecution commenced, as discussed in Section 5.9.7.

5.9.7 Stop Work Orders. The 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 revoked.** 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 County Inspector of such activities.



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. Apply for a reinstatement of the GESC Permit and pay the reinstatement fee at the County.
3. Call the County to schedule a site inspection.
4. Obtain a release of Stop Work Form after approval of the corrected work from a County Inspector.

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

5.9.8 Arapahoe County Land Development Code. Failure to comply with a Stop Work Order and provide the necessary remedies to meet the GESC requirements is a violation of the Arapahoe County Land Development Code.

5.10

Important! *If a Permittee works without a GESC Permit, a fee in accordance with the current County Penalty Fee Schedule will be assessed. 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, GESC Manual, GESC Plan and Stop Work Order through any available means.*

Section 5. Field Process and Enforcement

Violation and Enforcement, continued

Revocation of Collateral for Default by Permittee(s)

5.10.1 Default by Permittee(s). In the event there is a default by the Permittee(s) of any of the requirements of the GESC Permit, GESC Plan and/or *GESC Manual*, remedies will be in accordance with the remedies identified in this *GESC Manual*, statutory remedies provided for enforcement against Zoning Violations, remedies listed in the Subdivision Improvements Agreement for the filing, and any other remedies provided by law.

A Default by Permittee(s) shall be based on conditions including, but not limited to, the following:

5.10.2 Notice of Default. If the Director, or representative of the Director, gives notice that a Default by Permittee(s) exists, and if the Permittee(s) fails to cure such default within the time specified by the Director, the County shall be entitled to: (a) make a draw on the letter of credit for the amount reasonably determined by the County to be necessary to cure the default in a manner consistent with the approved GESC Plan up to the face amount of the letter of credit; and (b) sue the Permittee(s) for recov-

- *Permittee(s) fails to construct the improvements in substantial compliance with the GESC Plan and the other requirements of the GESC permit;*
- *Permittee(s) fails to complete construction of the GESC improvements by the completion date provided in the GESC Plan or Permit as the same may be extended;*
- *Permittee(s) fails to cure any noncompliance specified in any written notice of noncompliance within the timeframe specified in the notice of noncompliance;*
- *Permittee(s) otherwise breaches or fails to comply with any obligation of the GESC Permit;*
- *Permittee(s) becomes insolvent, files a voluntary petition of bankruptcy, is adjudicated as bankrupt pursuant to an involuntary petition in bankruptcy, or a receiver is appointed for the Permittee;*
- *Permittee(s) fails to maintain in full force and effect a letter of credit in the amounts specified above or in the GESC Permit. Notice of default as to any phase of the GESC improvements must be given prior to expiration of the warranty period for such phase of the Subdivision Improvements as hereinafter provided.*

ery of any amount necessary to cure the default over and above the amount available under the letter of credit.

5.10.3 County Right to Complete Subdivision Improvements. The County shall have the right to complete the GESC Improvements, in substantial accordance with the GESC Plan, the Engineer's Cost Estimate, and other requirements of this *GESC Manual*, either itself or by contract with a third party or by assignment of its rights to a successor

Section 5. Field Process and Enforcement

Revocation of Collateral for Default by Permittee(s), continued

Permittee(s) who has acquired the subdivision/project by purchase, foreclosure, or otherwise. The County, any Contractor under contract with the County, or any such successor Permittee(s), their agents, subcontractors and employees shall have the non-exclusive right to enter upon the subject property for the purpose of completing the GESC Improvements.

5.10.4 Use of Funds by County. Any funds obtained by the County under a letter of credit, or recovered by the County from the Permittee(s) by suit or otherwise, will be used by the County to pay the costs of completion of the GESC Improvements substantially in accordance with the GESC Plan and the other requirements of this *GESC Manual* and to pay the reasonable costs and expenses of the County in connection with the Default by Permittee(s), including reasonable attorneys' fees, with the surplus, if any, to be returned to the Permittee(s).

Section 6. General Construction, BMP Installation, Maintenance

Overview of Section 6

6.0

Section 6 addresses the following topics in the GESC Permit Process:

*Section 6.1, **General Construction Practices**, indicates that Permittee(s) working in the County have the responsibility to review, understand, and comply with the general GESC Notes shown on Sheet 1 of the Arapahoe County GESC Plan Standard Notes and Details, included in Appendix B. This section highlights several of the County's requirements pertaining to general construction practices. Photographs show proper construction practices and practices to avoid.*

*Section 6.2, **Correct Installation and Maintenance of BMPs**, provides installation and maintenance information and shows photographs of field installations of each of the County's Standard Erosion and Sediment Control BMPs. Both correct installations and maintenance and practices to avoid are shown.*

General Construction Practices

6.1

Sheet 1 of the GESc Plan Standard Notes and Details (see Appendix B) 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.

6.1.1 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. Whenever possible, the source of construction water shall also be within

the limits of construction. If water is not available within the construction limits, then water shall be transported through a pipe from the nearest source available. Water trucks are discouraged in order to prevent tracking of mud onto public streets. The Permittee(s) shall obtain written approval for use of any adjacent property for stockpiling, etc. from the legal owner and Arapahoe County and shall provide erosion and sediment control BMPs for the adjacent area.



Lack of construction fence to define limits of construction can lead to unnecessary disturbance in drainageways.



Construction fence helps a GESc Manager restrict operations to the defined limits of construction.

6.1.2 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 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. The County may invoice contractors or withhold collateral for inadequate street cleaning.



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



Streets shall be kept clean at all times. Washing mud off streets with water is prohibited.



General Construction Practices, continued

6.1.3 Dust Control. The GESC Manager shall be responsible for dust control on the site and on haul roads. 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 emissions. Haul roads shall be watered or sprayed with tackifier to reduce sediment mobility.



6.1.4 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 height of 10 feet and side slopes of 3 (horizontal) to 1 (vertical). Stockpiled soils that are undisturbed for more than 30-days shall be seeded and mulched within 14-days of stockpile construction.

Haul roads and other disturbed areas shall be kept watered or otherwise stabilized to preclude visible dust emissions.

6.1.5 Import and Export of Soil. As described in Section 4.7, the County encourages earthwork balance as a way to reduce sediment from leaving the site and to reduce mobility costs of the applicant for hauling material off site.

6.1.6 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-

Excavation and fill shall take place under controlled conditions in accordance with recommendations contained in a Geotechnical report.

**General
Construction
Practices,
continued**

Way shall be placed in accordance with recommendations contained within a Geotechnical Report.

Unless County acceptance has been granted, fill shall not be placed in streams and drainage channels. Broken-up concrete or asphalt shall not be used as a means of bank stabilization. Any fill material that contains concrete, asphalt, or other non-earthen material may not be used.

6.1.7 Control of Water During Construction - Temporary Stream Diversions. When constructing a drop structure, pond, culvert, or other feature within a stream channel, it is necessary to provide temporary measures to address the baseflow and storm runoff through the construction site. This can be achieved by providing temporary stream diversions, diking, berming, pumping, etc. It is essential that any of these operations be undertaken in a manner that minimizes disturbance to the stream channel and reduces erosion in the diversion system itself. Care shall be taken to avoid areas of desirable channel vegetation that could otherwise be left undisturbed. Any berms constructed across the channel to direct water to a pumped or piped diversion shall be protected against overtopping damage. Open ditches shall be lined or otherwise protected against erosion

A plan for the control of water during construction is required to be submitted to the County. All plans shall be reviewed and accepted by the County before any diversion work is undertaken. Plans shall be in accordance with the *Stormwater Manual* and *Volume III* as amended.

6.1.8 Utility Construction. As Arapahoe 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 Arapahoe County Right of Way shall be required to obtain an Arapahoe County Street Cut Right of Way Use and Construction Permit in accordance with the *Infrastructure Design and Construction Standards*.
- Provide adequate erosion and sediment controls (see Section 4)
- At the end of a work day, no trench shall be left open. The trench shall be either backfilled to grade, or a steel plate shall be placed over the open portion of the trench. Steel plates shall be positioned and anchored in accordance with all applicable safety criteria and such that stormwater will not enter the trench. For safety purposes, steel plates shall not be located in County ROW travel lanes.

Section 6. General Construction, BMP Installation, Maintenance

General Construction Practices, continued

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

6.1.9 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.¹ 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.

General Construction Practices, continued

6.1.10 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.

Application rates shall conform to registered label directions. Disposal of excess pesticides and pesticide-related wastes shall conform to registered label directions for the proper disposal and storage of pesticides and pesticide containers set forth in applicable Federal, State, and local regulations that govern their usage, handling, storage, and disposal. Pesticides and herbicides shall be used only in conjunction with Integrated Pest Management Plans. Pesticides should be the tool of last resort; methods that are the least disruptive to the environment and human health should be used first.

Pesticides shall be disposed of through either a licensed waste management firm or a permitted treatment, storage, and disposal (TSD) facility. Containers should be triple-rinsed before disposal, and rinse waters should be reused as product.

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.

6.1.11 Properly Store, Handle, Use, and Dispose of Petroleum Products.

When storing petroleum products, follow these guidelines:

- Create a shelter around the area with cover and wind protection;
- Line the storage area 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. Used oil for recycling shall not be mixed with degreasers, solvents, antifreeze, or brake fluid.

Fueling and vehicle maintenance operations shall take place in the stabilized staging areas (SSA).



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.

General Construction Practices, continued

6.1.12 Sanitary Facilities. Sanitary facilities shall be provided for construction workers. 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 inlets.

6.1.13 Other Construction Site Pollutants. Store, cover, and isolate 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.

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

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

6.1.14 Spills Response. All chemical or hazardous material spills which may 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 as required by Section 25-8-601, C.R.S., and to Arapahoe 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. Contact information for CDHPE, Arapahoe County and the National Response Center can be found in Appendix A. 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.



1. Washington State Department of Ecology, 1991. This section was adapted from the United States Environmental Protection Agency's 'Polluted Runoff Nonpoint Source Pollution', 2003.

**Correct Installation
and Maintenance
of BMPs**

6.2

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 14 sheet set of drawings that identifies correct installation and maintenance procedures for all of the County-accepted BMPs. These drawings are provided in Appendix B. They are to be included in all GESC Plans and govern all GESC-Permitted construction work in the County. The Standard Notes and Details allow Design Engineers and Permittee(s) to become familiar with one set of BMPs and consistent installation and maintenance requirements. Following are brief descriptions of the standard erosion and sediment control BMPs accepted for use in Arapahoe County and some of the important installation and maintenance requirements found in the GESC Plan Standard Notes and Details. Example photographs illustrating correctly installed BMPs and practices to avoid are included.



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.

Correct Installation and Maintenance of BMPs, continued

6.2.1 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.
- Sediment accumulated upstream of check dams shall be removed when the sediment depth upstream of the check dam is within 1/2 of the height of the crest.



DO Properly installed check dam.



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



DO NOT This disturbed drainage way was not protected by a check dam at the downstream site perimeter, allowing sediment to be conveyed off site.



Correct Installation and Maintenance of BMPs, continued

6.2.2 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. This County-accepted BMP can be considered as an alternative to erosion control blanket or crimp mulch for stabilizing exposed soils, although it cannot be used in drainageways or concentrated flow areas. Compost filter berms are used on slopes in conjunction with compost blanket to reduce flow length and control rill and gully erosion.

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 a Class 1 Compost as defined by specific physical, chemical and biological parameters, including the following particle distribution:

3" (75 mm)	95% to 100% passing
1" (25mm)	95% to 100% passing
3/4" (19 mm)	85% to 90% passing
3/8" (9.5 mm)	50% to 60% passing
#4 sieve	20% to 35% passing
- 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.
- Compost Blanket and Filter Berms shall be inspected 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.*

Correct Installation and Maintenance of BMPs, continued

6.2.3 Concrete Washout Area (CWA). A concrete washout area is a pre-fabricated ecologically/environmentally friendly concrete washout bin or a shallow excavation with a small perimeter berm to isolate concrete truck washout operations.

Key Installation and Maintenance Requirements:

- Pre-fabricated ecologically/environmentally friendly concrete washout bins are encouraged.
- Vehicle Tracking Control (Section 6.2.22) 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 for the concrete washout area.
- Inspect 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.
- 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

Correct Installation and Maintenance of BMPs, continued

6.2.4 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.



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



This construction fence is in need of repair. Inspections shall be made daily and downed sections repaired immediately.

Correct Installation and Maintenance of BMPs, continued

6.2.5 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. See Section 1.5.2, "Construction Dewatering Permits", for information regarding state permitting requirements.

Key Installation and Maintenance Requirements:

- The GESC Manager shall obtain a construction discharge (dewatering) permit from the Colorado Department of Public Health and Environment prior to any dewatering operations. All dewatering shall be in accordance with the requirements of the discharge permit and shall be coordinated with the County Inspector.
- Dewatering operations shall use one or more of the dewatering sumps shown in the GESC Plan Standard Notes and Details or other means approved by the County to reduce the pumping of sediment, and shall provide a temporary basin for settling pumped discharges prior to release off site.
- A 4' square riprap pad shall be placed at the discharge point.
- The discharge end of the line shall be staked in places to prevent the movement of the line off the riprap pad.
- The GESC Manager shall inspect dewatering systems and perform any necessary repairs or maintenance on an hourly basis.



DO Sump pumps or suction lines can be contained within perforated 5-gallon buckets and surrounded with gravel to reduce the pumping of mud during



DON'T This suction line is not contained in gravel and is pumping excessive



DON'T These discharge lines require a riprap pad and a settling trap.



Correct Installation and Maintenance of BMPs, continued

6.2.6 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 GESM 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.*

Correct Installation and Maintenance of BMPs, continued

6.2.7 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 GESC Plan Standard Notes and Details, Seeding and Mulching. 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) 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. Blanket shall be 100% natural and biodegradable.

Correct Installation and Maintenance of BMPs, continued

6.2.8 Inlet Protection (IP). Inlet protection consists of a curb sock, rock filter, or 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.
- Curb Socks (CS) can be used as an alternate to Reinforced Rock Berm (RRB) inlet protection to reduce sediments from entering the storm sewer.
- For projects of shorter duration, such as utility line projects, curb socks or proprietary inlet sediment control devices or curb filters may be an appropriate application for inlet protection.
- Inlet protection shall not extend above curb or allow water to overlap the curb.
- Reinforced Rock Berm (RRB) shall be comprised of fractured faced (all sides) crushed rock and shall comply with gradation shown on the GESC Plan Standard Notes and Details (1-1/2" minus). Recycled concrete meeting this gradation may be used.
 - Wire mesh shall be fabricated of 10-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 the joint detail in the GESC Plan Standard Notes and Details.
 - The top of reinforced rock berm shall be 1/2 - 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 fence.
- 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.

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



• 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.



Properly installed area inlet protection.

Section 6. General Construction, BMP Installation, Maintenance



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



DON'T 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.



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



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



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



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



DON'T



***Correct Installation
and Maintenance
of BMPs,
continued***

6.2.9 Flexible Growth Medium (FGM). Flexible Growth Medium (FGM) is a hydraulically-applied, flexible erosion control blanket/mulch/covering composed of long strand, thermally processed wood fibers, crimped, interlocking fibers and performance enhancing additives. The FGM requires no curing period and upon application forms an intimate bond with the soil surface to create a continuous, porous, absorbent and erosion resistant blanket that allows for rapid germination and accelerated plant growth.

Key Installation and Maintenance Requirements:

- In areas where the flexible growth medium 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 GESC Plan Standard Notes and Details, Seeding and Mulching. Apply the flexible growth medium to geotechnically stable slopes that have been designed and constructed to divert runoff away from the face of the slope. Do not proceed with installation until satisfactory conditions are established.
- Strictly comply with Manufacturer's installation instructions and recommendations. Use approved hydro-spraying machines with a fan type nozzle (50-degree tip) whenever possible to achieve best soil coverage. Apply the product from opposing directions to assure 100% soil surface coverage. Slope interruption devices or water diversion techniques are recommended when slope lengths exceed 75 ft. Mix and apply FGM material at a rate of approximately 50 lb per 125 gallons of water over freshly seeded surfaces. Confirm loading rates with equipment manufacturer. Do not leave seeded surfaces unprotected, especially if precipitation is imminent.
- A mechanically agitated hydraulic application machine is recommended for mixing product, filling tank to the middle of the agitator shaft or tank about 1/3 full of water. Turn on pump to wet or purge lines and begin agitating. Water should be added slowly while adding the FGM product at a steady rate.
- Consult application and loading charts to determine number of bags to be added and mixing rate. Contact Equipment manufacturer to confirm optimum mixing rates.
- All material should be loaded when the tank is approximately 3/4 full.
- Fertilizer should be added once the tank is nearly full.
- In order to fully activate bonding additives and attain proper viscosity, mix the slurry for at least 10 minutes after adding the last amount of material.
- Turn off recirculation valve to minimize potential for air entrainment within the slurry.
- Clean spills promptly. Advise owner of methods for protection of treated areas. Do not allow treated areas to be trafficked or subjected to grazing.
- The GESC Manager shall inspect flexible growth mediums weekly and during and after any storm event and make repairs as necessary.

**Correct Installation
and Maintenance
of BMPs,
continued**

6.2.10 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 or Flexible Growth Medium 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 D₅₀ 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.

Correct Installation and Maintenance of BMPs, continued

6.2.11 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 in the GESC Plan Standard Notes and Details. Recycled concrete meeting these gradation may be used.
- Wire mesh shall be fabricated of 10-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 or 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.*



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

Correct Installation and Maintenance of BMPs, continued

6.2.12 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 in the GESC Plan Standard Notes and Details. Recycled concrete meeting this gradation may be used.
- Wire mesh shall be fabricated of 10-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 or 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 properly installed reinforced rock berm for culvert protection.



DON'T Although some sediment trapping would occur with this alternate arrangement, the standard detail shall be utilized.



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

Correct Installation and Maintenance of BMPs, continued

6.2.13 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 GESC Plan Standard Notes and Details.
- A gravel pack of 1-1/2-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-foot in depth or 20% of the pond's water quality capture volume, whichever is less.

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

- A 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 and gravel pack.



DON'T The sediment basin above is improperly installed due to:

- Lack of an armored spillway.
- Pipe perforations set above the spillway crest elevation.

Correct Installation and Maintenance of BMPs, continued

6.2.14 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 and promotes sediment deposition on its upstream side and a reduction in 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.



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.



DO Sediment control logs shall be placed along a contour.

***Correct Installation
and Maintenance
of BMPs,
continued***

6.2.15 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.



A properly installed sediment trap.

DO

Correct Installation and Maintenance of BMPs, continued

6.2.16 Seeding (SE) and Mulching (MU). Seeding and mulching consists of drill seeding disturbed areas with the approved Arapahoe 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.
- Areas that are being temporarily seeded and stockpiles do not require topsoil prior to seeding and mulching.
- 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-percent 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 4000-pounds of straw per acre.
- *Copies of seed tickets shall be provided to the County Inspector upon request.*
- Seeded and mulched areas shall be inspected 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 Section 7.3 of the *GESC Manual* for a definition of required vegetation coverage.
- Seeding and mulching operations must be undertaken when a GESC Permit expires and no renewal is granted.



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



A drill seeder shall be used to plant seed in Arapahoe 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

Correct Installation and Maintenance of BMPs, continued

6.2.15 Seeding (SE) and Mulching (MU) continued.



DONT *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 typically not allowed as a seeding method.* **DO**



DONT *With the exception of MBFM, Hydraulic seeding/mulching is not allowed.*



DONT *This mulch was not crimped into soil and is susceptible to displacement, leaving seed bed unprotected.*

Correct Installation and Maintenance of BMPs, continued

6.2.17 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.



DO Silt fence is to be securely tied into adjacent BMPs such as the sediment control log shown here, or reinforced rock berms or sediment basin embankments.



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

Correct Installation and Maintenance of BMPs, continued

6.2.18 Stabilized Staging Area (SSA). A stabilized staging area consists of stripping topsoil and spreading a layer of 1-1/2-inch gravel or recycled concrete 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.



Properly installed stabilized staging area.



Parking, staging, and storage are spread out all over this site, increasing disturbance and erosion.

Correct Installation and Maintenance of BMPs, continued

6.2.19 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.

Correct Installation and Maintenance of BMPs, continued

6.2.20 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.

Correct Installation and Maintenance of BMPs, continued

6.2.21 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 1.6 and 2.9).
- 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.



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

***Correct Installation
and Maintenance
of BMPs,
continued***

6.2.22 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.



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

Correct Installation and Maintenance of BMPs, continued

6.2.23 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. Other acceptable vehicle tracking control devices include proprietary pre-fabricated VTC. A Street Cut and Right-of-Way Use Permit is required and access to the site may only be taken at a permitted access point (see Section 2.9.7).

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.



DO Properly installed vehicle tracking control.



DON'T Use of low density rock such as Rhyolite is not permitted since it does not stay in place and can get tracked onto paved streets.



DON'T No vehicle tracking control means mud on streets.



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



**Correct Installation
and Maintenance
of BMPs,
continued**

6.2.24 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 wash water/sediment trap. If Arapahoe 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.*

Correct Installation and Maintenance of BMPs, continued

6.2.25 Pond Maintenance and Sediment Removal (PM). Pond Maintenance consists of trash and debris cleanup, vegetation maintenance, and sediment removal. It is the responsibility of the Permittee(s) to maintain all detention and water quality ponds throughout the life of the GESC Permit.

Key Installation and Maintenance Requirements:

- Debris shall be removed from the pond to prevent clogging at the outlet and improve aesthetics.
- Sediment shall be removed from the pond once it reaches 1-foot in depth or 20% of the pond's water quality capture volume, whichever is less.
- Vegetation shall be mowed as necessary to maintain adequate volume in the pond and as required by Arapahoe County Land Development Code. The County Inspector may request additional mowing when necessary.
- The GESC Manager shall inspect all detention ponds on a weekly basis. The GESC Manager shall inspect all detention ponds after a storm event and cleanup debris and sediment as necessary.



DON'T Trash and debris should not be allowed to build-up at the outlet works of a detention pond preventing proper draining of the pond.



DO Sediment must be removed from a pond once it reaches 1-foot in depth or 20% of the pond's water quality capture volume, whichever is less.

Correct Installation and Maintenance of BMPs, continued

6.2.26 Street Maintenance (SM). Street Maintenance consists of cleaning mud and other debris which is tracked onto the roadway at a construction site. Removing all tracked mud from the streets reduces or eliminates sediment transport to downstream structures.

Key Installation and Maintenance Requirements:

- Streets shall be free of mud and debris throughout the life of the project.
- Any mud tracked onto the street shall be cleaned using a vacuum-type street sweeper, a brush-type street sweeper with dust control, or manually using shovels and brooms.
- Streets shall not be washed with water at any time.
- The GESC Manager shall inspect streets on a daily basis. The GESC Manager shall complete inspections hourly after a storm event and cleanup sediment as necessary.



Streets shall remain clean of mud at all times.



A vacuum or brush-type street sweeper should be used to clean up any mud tracked onto streets. Washing streets with water is prohibited.



Section 7. Project Close-Out

Overview of Section 7

7.0

Section 7 addresses the following steps in the GESC Permit Process:

Prepare the site for the Initial Close-out Inspection and schedule the inspection at least two weeks prior to an anticipated request for an Initial Close-out Acceptance.

Section 7.1, **Preparation for the Initial Close-Out Inspection**, describes the tasks the Permittee(s) must complete prior to the Close-Out Inspection.

Attend Initial Close-Out Inspection, make any corrections requested by the County, and obtain Initial Close-Out Acceptance.

Section 7.2, **Initial Close-Out Acceptance**, discusses the requirements for the Initial Close-Out Inspection and Acceptance.

Inspect the site monthly during the revegetation process. Make necessary corrections to the on site BMPs and control weeds as necessary. Make corrective actions as required by Arapahoe County.

Section 7.3, **Interim Between Initial Close-Out and Final Close-Out**, describes procedures for accepting the establishment of permanent vegetation; it also provides a definition of the required vegetation coverage, free of noxious weeds.

Schedule the Vegetation Acceptance Inspection when vegetative growth has reached the required coverage. After receiving written acceptance of vegetation establishment from the County, remove the on site BMPs and schedule the Final Close-Out Inspection.

Section 7.4, **Final Close-Out**, requires that once vegetation has reached the required coverage as defined in Section 7.3.2, a Vegetation Acceptance Inspection should be scheduled. Once the vegetation coverage has been accepted by the County, a Final Close-Out Acceptance Form shall be completed and a Final Close-Out Inspection scheduled with the County.

After receiving written notice from the County that all GESC requirements have been addressed, submit a signed Collateral Release Form to the County. After the Collateral is released by the County, the project is complete.

Section 7.5, **Release of Collateral**, discusses the Procedures for releasing the project's Collateral.

**Preparation for
Initial Close-out
Inspection**

7.1

7.1.1 Initial Close-Out. Initial Close-Out may be requested when all disturbed areas are final landscaped, drill seeded, crimp mulched, or otherwise stabilized in accordance with Arapahoe County criteria. Initial Close-Out Acceptance will not be granted until Probationary Acceptance of the SIA improvements is granted.

At the Initial Close-Out, the Final BMP GESC plan should be implemented. Any significant changes necessary to the Final BMP GESC plan, either at the direction of the County or the request of the permittee should be shown on a revised plan and re-approved by the County. If necessary, a revised cost estimate should be submitted.

7.1.2 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 ARAPAHOE 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 County Inspector) and install/maintain erosion and sediment control BMPs per the Arapahoe County-approved Final GESC Plan.*
3. *Ensure all disturbed areas are drill seeded and crimp mulched, or otherwise stabilized, per Arapahoe County criteria.*

7.1.3 Certifications. The following certifications and forms must be submitted to Arapahoe County prior to the Initial Close-Out. Copies of the certification forms can be found in Appendix P.

1. Seeding and Mulching Certification. Provide a seeding and mulching certification in accordance with Section 4.15.13.
2. Topsoil Certification. Provide a topsoil certification in accordance with Section 4.15.13.
3. Initial Close-Out GESC Inspection Certification. Provide an Initial Close-Out GESC Inspection Certification in accordance with Section 5.7.
4. Detention/Water Quality Pond Statement. A Surveyor's statement verifying the required pond volume shall be provided to ensure that adequate volume is provided for water quality capture volume and detention. If this statement has been provided previously, and the County Inspector determines that the pond has been adequately maintained, with no evidence of sediment accumulation, this requirement may be waived.
5. Copy of County's letter of Probationary Acceptance of Public Im-

Preparation for Initial Close-Out Inspection, continued

provements. A copy of the County's letter of Probationary Acceptance of Public Improvements is required to ensure that the Permittee's public improvements are completed prior to issuance of Initial Close-Out Acceptance.

6. Revised Final BMP GESC Plan and Cost Estimate. Unforeseen conditions may occur throughout the Initial and Interim GESC period. It may be necessary to revise the Final GESC drawing and cost estimate to better reflect the project at the Final stage. If warranted, a revised GESC Plan and cost estimate may be required to be submitted prior to Initial Close-Out.

7.1.4 Initial Close-Out

Acceptance Form. The initial close-out acceptance form must be completed by the GESC Manager and submitted to the County to initiate the Initial Close-Out Process. A copy of this form can be found in Appendix P. All certifications as described in Section 7.1.3 must be attached to the form including a revised Cost Estimate, if applicable. The GESC Manager must also complete the collateral history and request.

Important! *It is imperative that the above listed items are completed per this GESC Manual 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.*

7.1.5 Scheduling the Inspection. Once all items are completed, the GESC Manager shall call the County and schedule an Initial GESC Acceptance Inspection.

Initial Close-Out Acceptance

7.2

7.2.1 Attendees. Representatives of the Permittee(s), including the GESC Manager, shall attend the Initial Close-out Inspection.

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

- **Inspection of Final BMPs.** Installation of all Final BMPs are inspected, including topsoil spreading, soil preparation, and drill seeding and crimp mulching.
- **Inspection of Site Cleanup.** Cleanup of the site and adjoining streets is checked.
- **Discussion of Vegetation Requirements.** The required vegetation inspections and coverage will be discussed.

7.2.3 Detached Single-Family Residential Projects. If the filing is divided into separate grading phases, as discussed in Sections 2.8.3, 4.8, and 5.8, 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

***Initial Close-Out
Acceptance,
continued***

***Interim Between
Initial Close-Out
and Final
Close-Out***

Phased residential projects is provided in Section 5.8.

7.2.4 Corrections to Site. The Permittee(s) shall make any corrections to the site as requested by the County Inspector. When completed, a re-inspection shall be scheduled with the County.

7.2.5 Granting Initial Close-Out Acceptance. Once the appropriate certifications have been provided, and the acceptance inspection is approved, the County shall grant Initial Close-Out Acceptance by approval of the Initial Close-Out Acceptance Form. A copy of the approved form will be sent to the GESC Manager and Permittee(s).

7.2.6 Reduction of Financial Collateral. Upon approval of the Initial Close-Out Acceptance Form, the Permittee is eligible to have the original GESC collateral reduced. The reduction shall be to the amount stated in the Engineer's original Cost Estimate for the Final GESC BMP & Maintenance Value or to the amount approved in the revised cost estimate form.

7.3

7.3.1 Required Inspections and Maintenance. 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 two years following initial seeding. Repairs and reseeded and mulching shall be undertaken at least twice per year or as requested by the County Inspector for any areas failing to meet the required coverage.*
- 2. Rill and gully erosion shall be filled with topsoil prior to reseeded. Reseeded method shall be approved by the County.*
- 3. Noxious weeds shall be controlled in a manner approved by the Arapahoe County Inspector.*
- 4. The GESC Manger will be required to certify at Final Close-Out that all seeded areas were inspected and repaired as required in the above section. A copy of the Final Close-Out GESC Inspection Certification Form is provided in Appendix P.*

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

Interim Between Initial Close-Out and Final Close-Out, continued

7.3.2 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 Arapahoe County-approved mix (Appendix T).*
- 2. No bare areas larger than 4 square feet, 2 feet x 2 feet or equivalent.*
- 3. Free of eroded areas.*
- 4. Free from infestation of noxious weeds in accordance with Appendix V.*

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 feet x 2 feet or equivalent.*
- 3. Free of eroded areas.*
- 4. Free from infestation of noxious weeds in accordance with Appendix V.*



Full vegetation coverage is required prior to release of collateral.

Final Close-Out

7.4

7.4.1 Vegetation Acceptance Inspection. Once vegetation has reached the required coverage as defined in Section 7.3.2, the Permittee(s) shall call the County to schedule a Vegetation Acceptance Inspection.

7.4.2 Written Acceptance. The County 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 County 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.

7.4.3 Removal of On-site BMPs. After obtaining written acceptance of the vegetation coverage, the remaining on-site BMPs including silt fence, 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. On-site BMPs not removed will delay final closeout acceptance and release of collateral.

7.4.4 Certifications. The following certifications must be submitted to the County prior to Final Close-Out. Copies of these certification forms can be found in Appendix Q.

1. Final Close-Out Acceptance Form (Section 7.4.5).
2. Final Close-Out GESC Inspections Certification (Section 7.3.1).
3. Vegetation Acceptance (Section 7.4.2).
4. Copy of Final Acceptance of Public Improvements. A copy of the County's letter of Final Acceptance of the Public Improvements is required to ensure that the Permittee's public improvements are completed prior to issuance of the Final Close-Out Acceptance.
5. Detention/Water Quality Pond Statement. A Surveyor's statement verifying the required pond volume shall be provided to ensure that adequate volume is provided for water quality capture volume and detention. If this statement has been provided previously, and the County Inspector determines that the pond has been adequately maintained, with no evidence of sediment accumulation, this requirement may be waived.

7.4.5 Final Close-Out Acceptance Form. The Final Close-Out Acceptance form shall be completed by the GESC Manager. All certifications as described in Section 7.4.4 must be attached to the form. The Final Close-out Inspection shall then be scheduled with the County.

7.4.6 Final Close-out Inspection. The County 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 County Inspector may require that a follow-up inspection be scheduled with the County.

***Final Close-Out,
continued***

The Final Close-Out Inspection can be concurrent with the Final Acceptance of SIA improvements if vegetation is established.

7.4.7 Reduction of Collateral Prior to Final Close-Out. It is recognized by the County, that during the interim period between Initial Close-Out and Final Close-Out, conditions of the site may change, and warrant alterations to the required Final BMPs. If the Final BMP requirements are reduced, the Permittee may request a reduction in collateral consistent with the reduced BMP requirements. A copy of the Request for Reduction of Collateral for the GESC permit is provided in Appendix Q.

***Release of
Collateral***

7.5

Once Final Close-out Acceptance has been granted, the Final Close-Out Acceptance form will be approved by the County and collateral for the project will be released.

Section 8. Low Impact GESC Permit

Overview of Section 8

8.0

The streamlined process provided in this section applies to a Low Impact GESC Permit.

Confirm that a Low Impact GESC Permit is required (see Section 8.1).

Prepare a Low Impact Permit Application and Drawing (see Section 8.2).

Submit the Low Impact Permit Application and Drawing to the County for review and acceptance and revise documents as necessary to address County comments (see Section 8.3).

After County acceptance, pay fee, submit Collateral if required, and pick up Low Impact Permit, Accepted Low Impact GESC Drawing, and GESC Field Manual (see Section 8.4).

Review GESC Field Manual and ensure that Permittee(s) understand Low Impact Permit requirements (see Section 8.5).

Install Initial BMPs on the project site (see Section 8.6).

Start construction, implementing erosion and sediment control in accordance with the Low Impact Permit Drawing. The Low Impact GESC Permit, Drawing, and GESC Field Manual are to be kept on site at all times during construction (see Section 8.7).

Address issues raised during any County GESC Inspections (see Section 8.8).

Drill seed and crimp mulch all disturbed areas in accordance with the GESC Field Manual (see Section 8.9).

Schedule Vegetation Acceptance Inspection when vegetative growth has reached the required coverage. After receiving written acceptance of vegetation establishment from the County, remove the on site BMPs, then project is complete (see Section 8.10).

Section 8. Low Impact GESC Permit

Projects that Require a Low Impact GESC Permit

This section describes the GESC Permit Process for Low Impact GESC Permits. This process is more streamlined than the Standard GESC Permits.

8.1

The first step in the process is to examine the information in Section 2.1.2 to confirm that a Low Impact GESC Permit is required for the project. This Low Impact GESC Permit applies to projects with a disturbed area less than one acre where there is a potential for negative impact to adjacent properties or drainageways.

The Public Works and Development Department can be contacted to clarify GESC Permit requirements and interpret which GESC Permit, if any, applies to a particular project. Contact information is provided in Appendix A.

A simplified permitting process is associated with a Low Impact GESC Permit. A Low Impact GESC Permit does not require GESC Drawings to be prepared or stamped by a Professional Engineer because typically the work does not involve engineering design.

i *Even though the Low Impact GESC Permit offers streamlined application and inspection procedures, the erosion and sediment control practices discussed herein shall be adhered to and penalties for non-compliance will apply.*

Even with streamlined application and inspection procedures, the erosion and sediment control practices discussed herein shall be followed. If the County finds a Low Impact Permittee to be non-compliant, the violations as described in Section 5.9 will apply, the Permit may be revoked and a Stop Work Order issued in accordance with Section 5.9.7.



Low Impact GESC Permits have a streamlined permitting and inspection process.

Low Impact GESC Permit Application and Drawings

8.2

8.2.1 Low Impact Permit Application Requirements. For Low Impact Permits, GESC Drawings shall be accompanied by a completed Low Impact GESC Permit Application (a copy of the application form is included in Appendix K). No GESC Report is required for the Low Impact Permit, but the application form requires descriptive information regarding the proposed project. Review fees in accordance with the current Arapahoe County Engineering Fee Schedule are required to be submitted with the Low Impact GESC drawing.

Low Impact GESC Permit Application and Drawings, continued

8.2.2 Low Impact Drawing Requirements. Although a detailed GESC Plan need not be prepared for sites where a GESC Low Impact Permit is sought, the following drawings shall be prepared and submitted to the County to provide enough information to determine if a Low Impact Permit is acceptable for the proposed work:

1. General location map – at a scale of 1-inch to 1000-feet to 1-inch to 8000-feet, indicating the general vicinity of the site location, including all roadways and north arrow.
2. Detailed plan showing:
 - North arrow.
 - Approximate scale of drawing.
 - Limits of work area.
 - Proximity of work area to property lines.
 - All surface water hydrologic features within 100-feet of proposed work area.
 - Directional flow arrows indicating stormwater runoff.
 - Erosion and sediment control BMPs in accordance with these criteria.

The principles described in Section 3.1 for preparing a GESC Plan also apply to a Low Impact GESC Drawing. Specifically, Section 4.2 discusses principles of erosion and sedimentation, Section 4.4 describes ten elements of an effective GESC Plan, and Section 4.15 provides design and sizing criteria for BMPs. An example GESC Drawing for a Low Impact GESC Permit is shown in Appendix C.

Section 4.2, especially Section 4.4, Ten Elements of an Effective GESC Plan, and Section 4.15, Design and Sizing Criteria for BMPs, provides guidance for preparing a Low Impact GESC Drawing.

An example GESC Drawing for a Low Impact GESC Permit is shown in Appendix C.

Submit Low Impact Application and Drawing; Address County Comments

8.3

After the GESC Drawing has been prepared and a Low Impact Permit Application form has been filled out and signed, the items shall be submitted to the Public Works and Development Department.

The GESC Plan will be reviewed with an eye toward the effectiveness of the overall Plan. After review, written comments will be provided to the applicant.

Section 8. Low Impact GESC Permit

Pay Permit Fee and Submit Collateral

8.4

Once the GESC Drawing and Permit have been accepted by Arapahoe County, the Applicant shall pick up the Drawing, Permit, and a copy of the GESC Field Manual. At the same time, the Applicant shall pay permit fees to the County, and, if the County requires, submit collateral for the work. Permit fees shall be paid in accordance with the current County Fee.

Review GESC Field Manual

8.5

The Permittee(s) shall thoroughly review the GESC Field Manual, the GESC Drawing, and the GESC Plan Standard Notes and Details for any BMPs that will be installed to understand all of the requirements of the GESC Permit Process. Any subcontractors and field personnel also need to be made aware of the GESC requirements.

Install Initial BMPs

8.6

Once a copy of the GESC Field Manual has been picked up and reviewed, the Initial BMPs shown on the approved GESC Low Impact Drawing shall be installed.

Section 6, in particular Section 6.2, provides guidance on the correct installation and maintenance of BMPs.

Begin Construction

8.7

After installation of the Initial BMPs, construction may begin. The approved GESC Permit, the accepted construction drawings and the GESC Field Manual are to be kept on site in the Permittee(s)' possession at all times.

During construction, all GESC criteria, including seeding and mulching requirements, shall be adhered to. If Arapahoe County finds a Low Impact Permit holder to be non-compliant with the GESC Permit or any other GESC criteria, violations in accordance with Section 5.9 will apply. In addition, the Permit may be revoked. The County may then require the Permittee(s) to obtain a Standard GESC Permit per Section 2.2.1.

Address any GESC or Engineering Inspection Comments

8.8

Under a Low Impact GESC Permit, only a final Vegetation Acceptance Inspection by County staff is required (and this only for certain cases); however, County Inspectors shall visit a Low Impact site regularly. Permittee(s) shall address any comments or corrections required by the County Inspector.

Section 5.9 provides information on violations and enforcement, including the Stop Work Order.

Section 8. Low Impact GESC Permit

Drill Seed and Crimp Mulch All Disturbed Areas

8.9

All disturbed areas shall be drill seeded and crimp mulched in accordance with Section 4.9 and the GESC Plan Standard Notes and Details (see Appendix B). All disturbed areas which are either final graded, or will remain inactive for a period of more than 30 days shall be required to be stabilized within 14 days of the completion of the grading activities. See Section 4.9 for more information.

Schedule Vegetation Acceptance Inspection

8.10

When required by the County, a Vegetation Acceptance Inspection shall be required. Section 7.3 describes requirements for vegetative coverage and control of noxious weeds.

After receiving written acceptance of the vegetative coverage, the on-site BMPs may be removed and the project is complete.

Section 9. Single Family Residential Lot GESC Criteria

Overview of Section 9

9.0

This section describes the GESC requirements for the control of erosion and sediment during the building permit process.

Section 9.1, **Scope**, summarizes the type of projects in which the Single Family Residential Lot GESC Criteria apply.

Section 9.2, **Enforcement**, describes the regulations and codes that enforce the Single Family Residential Lot Criteria.

Section 9.3, **Violations**, describes the regulations and codes that violations of the Single Family Residential Lot Criteria are enforced through.

Section 9.4, **New Owners Become Party to Project GESC Permit**, describes the permit requirements when portions of single-family residential projects are sold to new owners.

Section 9.5, **Drawing Requirements**, summarizes the drawing requirements for standard lot plans when individual or groups of lots are sold to a new owner (or Builder).

Section 9.6, **Grading and Drainage Requirements for Finished Grade**, describes the grading and drainage pattern requirements for individual lots. A drainage certificate must be provided and certified by a PE or PLS.

Section 9.7, **Erosion and Sediment Control Requirements**, describes the County's requirements and responsibilities of the Permittee to control the transport of sediment from individual lots during construction.

Section 9.8, **County Inspections**, summarizes the County's inspection process for Single Family Residential Sites.

Section 9.9, **Notification of Violation**, provides a description of the two levels of violations in the County.

Section 9.10, **Single Family Residential Drainage, Erosion, and Sedimentation Control Certification**, summarizes the requirements for a Certification.

Section 9.11, **Homeowner Responsibility**, discusses the requirements of the homeowner once the property is purchased.

Scope

9.1

The requirements of this Section apply to all entities performing work on Single-family Residential projects as permitted under an Arapahoe County Building Permit. It is a requirement of the Building Permit that the GESC requirements in this Section be implemented throughout the building process. A separate GESC permit is not required with the Building Permit, however most individual lots will typically already be included within an existing GESC permit issued for the subdivision, via the Letter of GESC Permit Compliance (refer to Section 2.19.2).

The following requirements apply to all single-family residential development projects, including:

- New single-family residential construction.
- New construction (i.e. additions, etc.) on existing single family home sites.
- Idle single family lots both permitted and non-permitted (lots owned by the builder or land developer not yet under construction).
- Grading, excavating and stockpiling of earth and landscape materials (not specifically limited to new construction) which results in the transport of any of these materials off site by any means including, but not limited to, wind or water erosion and vehicular tracking.

All builders and land developers must comply with the grading, sediment and erosion control requirements of this chapter.

Enforcement

9.2

The requirements of this Section are enforced through the requirements of the Arapahoe County Land Development Code and the Arapahoe County Building Code, as adopted and amended by the Arapahoe County Board of County Commissioners, including IBC Section 105.3.1.1 and IRC Section 105.3.2, in which building permit applicants must comply with all applicable County regulations. Acceptance of a permit constitutes the agreement by the property owner and the applicant to continue to comply with the Code, the County's Floodplain Regulations, the conditions set forth on the plat and the development plan for the property, the County's grading, erosion and sediment control requirements, the subdivision, and stormwater management regulations, and all applicable zoning regulations.

Violations

9.3

Violations of these requirements shall be enforced through the Building Official in accordance with the County adopted amended requirements of IBC Section 105.3.1.1 and IRC Section 105.3.2, which states that the Building Official shall have the power to suspend, revoke or cancel any permit if at any time the Building Official or his/her designee observes or is informed by other County personnel of violations of any of the above regulations (or other applicable regulations, resolutions or laws) on the property or caused by the applicant or owner on or near the property. The Building official may refuse inspections, may refuse to issue certificates of occupancy and may revoke certificates of occupancy.

Section 9. Single Family Residential Lot GESC Criteria

New Owners Become Party to Project GESC Permit

9.4

When portions of a single-family residential project are sold (typically to Builders), the new property owners must comply with the requirements of the project GESC permit for the development and become a party to the GESC permit for the site. New owners are not required to obtain a new individual GESC permit unless the entire site is sold as a whole to a new owner.

When the property transfers ownership, the new owner shall be required to complete a Letter of GESC Permit Compliance. The Letter of GESC Permit Compliance requires all property owners to comply with the terms and conditions of the GESC Permit. Failure to submit a Letter of GESC Permit Compliance may result in the issuance of a Stop Work Order in accordance with Section 5.9. A copy of the Letter of GESC Permit Compliance is provided in Appendix O. Additional collateral will not be required, as the original GESC permit and collateral shall remain in effect for the project. The original GESC permit may be transferred to the new property owner, with new collateral, only if the transfer occurs for the entire development project, including all common areas. Refer to Section 2.19.2.

Requirements of Individual Homeowners

Individual homeowners, which have purchased homes from builders are not required to submit a Letter of GESC Permit Compliance, but shall comply with Section 9.11.

Drawing Requirements

9.5

Standard Lot Plans, with typical drainage patterns are provided at the end of this Section. If the lot conforms to the general layout and drainage patterns of one of these plans, a separate plan shall not be required. If the lot does not conform to one of the standard types provided at the end of this section, a new plan will be required. If a builder chooses to “lump” several lots into a group and provide perimeter stabilization for the group of lots, a plan shall be provided to show the designated lots, and the GESC controls. The plan must demonstrate adequate controls for all of the lots throughout the build out of the group. Submitted drawings shall be consistent with the format and content of the Standard Lot Plans at the end of this chapter.

Grading and Drainage Requirements for Finished Grade

9.6

9.6.1 Lot Grading and Drainage. Grading and drainage for individual lots shall be consistent with the requirements of the approved Phase III Drainage Report, the Final Development Plan (FDP) for the project, and in accordance with the County’s Building Code. On small projects, such as additions or expansions, where a drainage report is not available, the Builder will be required to verify that the improvements on the site are consistent with the historic drainage patterns of the property, and do not adversely impact other properties.

9.6.2 Drainage Certificate. To ensure proper site drainage, adequate drainage away from the foundation and off the lot shall be certified by a PE or Professional Land Surveyor (PLS) prior to issuance of the Certificate of Occupancy (CO). A copy of the Drainage Certificate is provided in Appendix S.

Erosion and Sediment Control Requirements

9.7

9.7.1 Stabilization of Individual Lots. Lot specific structural and/or nonstructural BMPs shall be provided on all active lots to reduce erosion and sediment transport on construction sites. Active lots include any lot that is not permanently stabilized with landscaping or established vegetation.

9.7.2 Single Family Lot Erosion Control Plan. The Standard Lot Plans provided at the end of this Section are the minimum requirements by the County to control sediment transport from individual lots during construction. The standard plan is provided to establish the County's minimum requirements, and to avoid the need for a plan review and approval process on each individual lot. If alternate methods are going to be used on a site, a new plan depicting the BMPs for the lot may be submitted and reviewed on a case by case basis.

The following list summarizes the responsibilities and requirements of the Builder in order to achieve adequate erosion and sediment controls on single family lots:

- ◆ It is the builder's responsibility to ensure that adequate controls are provided on their site to eliminate sediment transport. It may be necessary to provide additional BMPs above and beyond what is shown on the provided single family lot erosion control plan. If drainage, erosion or sediment problems become apparent during construction, such as when off-site sedimentation occurs, the BMPs shall be re-evaluated and re-implemented in an effective manner.



The Builder is responsible for ensuring that adequate sediment control measures are in place to prevent sediment transport.

- ◆ BMPs are required throughout the life of the project, including prior to the excavation of the foundation, through building, landscaping, issuance of a C.O., and until the lot specific BMPs designed to last 90 days are installed.
- ◆ The builder is responsible for the on-going maintenance of all lot specific erosion and sediment control devices.
- ◆ Builders are required to provide periodic inspections. Periodic inspections shall be whatever is deemed necessary to ensure that erosion control measures are functioning as designed. As a minimum, erosion control measures should be inspected every two weeks, and after each significant precipitation event that causes surface erosion.

Section 9. Single Family Residential Lot GESC Criteria

Erosion and Sediment Control Requirements, continued



The Builder is responsible for the maintenance of all sediment control measures to prevent sediment from entering the storm sewer system.

- ◆ Once construction has commenced, the Builder is responsible for the maintenance of erosion and sediment control measures protecting area inlets on their lots, as well as curb inlets along the street frontage. It is critical that sediment not be allowed to invade the storm sewer system.

- ◆ Vehicle access and parking should be limited to paved surfaces as much as possible. A temporary construction entrance may be needed to provide a place for parking vehicles and a spot where material can be off-loaded.

- ◆ During the construction process, the Builder is responsible to ensure that mud, dirt, rocks, and other debris are not allowed to erode or be tracked onto streets and sidewalks by construction vehicles. The Builder is responsible for removal of any mud, or debris on adjacent streets and sidewalks, and shall be required to clean it up immediately.

- ◆ When cleaning streets, they shall be scraped and swept. Street sweeping shall be conducted in a manner that prevents the formation of dust. Street washing with water is NOT allowed.

- ◆ Earth materials and landscape materials, such as sod, rock, and mulch shall not be stockpiled, placed or stored on streets, sidewalks or stormwater flowlines (refer to Section 432-5-310, C.R.S.).

- ◆ Construction supplies (trusses and lumber), roll-off containers, dumpsters, portable toilets, trailers, etc. shall not be stored on streets or sidewalks. These items shall be stored on the construction site or staging area(s). (Refer to Section 43-5-301, C.R.S.),

- ◆ During the construction process the Builder is responsible to ensure that all erosion control measures are maintained on the site, regardless of the entity creating the land disturbance. If utilities are installed after the BMPs are installed, including seed and mulching, silt fence, erosion control blankets, etc., it shall be the Builder's responsibility to ensure that the BMPs are re-installed appropriately.



Sediment fence shall be properly maintained throughout the life of the project.

- ◆ The Builder is responsible for the maintenance of silt fence, including but not limited to:
 1. Inspect sediment fences at least once a week and after any pre-

Erosion and Sediment Control Requirements, continued

County Inspections

Notification of Violation

precipitation snowmelt or runoff event that causes surface erosion, sediment transport, or tracking.

2. Should the fabric of the sediment fence collapse, tear, decompose or become ineffective, replace immediately.
3. Remove the sediment deposits as necessary to provide adequate storage volume for the next rain event and to reduce pressure on the fence. Take care to avoid damaging or undermining the fence during cleanup.

9.8

The County will not conduct routine formal inspections for the GESC requirements, but shall monitor the sites for compliance in conjunction with other inspections being performed on the site. If problems are noted, the Builder will be contacted. If problems persist on the site, a more formalized inspection program may be required.

9.9

Failure to meet the GESC requirements described herein shall result in the issuance of a Notice of Violation. The County classifies violations in one of two categories, depending upon the severity of the violation. Each violation category has different enforcement actions.

9.9.1 Level I Violations. Level I Violations are viewed by the County to pose an immediate serious risk to the health, safety or welfare of people and/or the environment.

Level I Violations include, but shall not be limited to the following:

- ***Disturbing land or filling within a floodplain or sensitive area without proper approvals.***
- ***Failure to correct Level II Violations per the directives of the County Inspector within the specified amount of time.***
- ***Failure to pay reinspection fees.***



Level I Violations may result in the immediate issuance of a Stop Work Order or a Notice of Violation (NOV), depending upon the impact and severity of the violation. If a Stop Work Order is issued, all work on site must stop until the violations are remedied and approved by the County.

9.9.2 Level II Violations. Level II Violations are viewed by the County to pose a moderate risk to health, safety or welfare or people and/or the environment; however if not immediately corrected, will pose a serious risk.

Section 9. Single Family Residential Lot GESC Criteria

Notification of Violation, continued

Level II Violations include, but shall not be limited to the following:

- *Tracking of material onto roadways and adjacent properties.*
- *Failure to make required plan revisions.*
- *Failure to perform BMP maintenance as directed by the County Inspector.*
- *Failure to provide routine maintenance for erosion and sediment controls*
- *Installation of non-County approved BMPs.*
- *Failure to provide inlet protection.*
- *Failure to provide protection of drainageways.*
- *Failure to provide sediment pond maintenance.*
- *Staging of equipment outside of stabilized staging area.*
- *Failure to address inspection concerns within allotted time frame.*

Remediation for Level II Violations shall commence immediately after the Builder is notified of the violation. Notification can either be verbal instruction from the County Inspector to the Builder, or included on an inspection report as a deficiency. Level II Violations shall be corrected within 48 hours of notification, unless otherwise specified in writing by the County Inspector. A re-inspection will be completed by the County following the allotted 48 hour time frame. If corrections have not been completed satisfactorily within the 48 hour time frame, and additional inspections are needed, reinspection fees will be applied for subsequent inspections. Corrections not made in full after additional inspections and subsequent inspections fees will result in the issuance of a Notice of Violation (NOV) and possible Stop Work Order.

Single Family Residential Drainage, Erosion, and Sedimentation Control Certification

9.10

Under an active building permit, the Builder shall be responsible for all grading, erosion and sediment control related to the permitted site. Prior to issuance of the Certificate of Occupancy (CO), the Builder shall be required to provide either permanent erosion control (landscaping, established vegetation), or adequate temporary erosion control designed to remain effective for 90 days, or until the homeowner installs permanent erosion control, whichever comes first. For lots that are grouped during construction, individual lot protection is required prior to issuance of the CO. The Builder retains responsibility for the erosion and sediment control until the property is sold to a homeowner. When the property is sold to a homeowner, the Builder must inform the purchaser of the need to maintain established drainage patterns as shown on the Drainage Certificate, and the need to provide permanent erosion controls or maintain temporary erosion and sedimentation controls on the property. Prior to issuance of the CO, the Builder must provide a Certification to the County regarding the above requirements. A copy of the Single-Family Lot Erosion Control Certificate is provided in Appendix S.

**Homeowner
Responsibility**

9.11

Once the property is sold to a homeowner, the homeowner shall be responsible for the erosion and sediment control of the property. The County requires through the Land Development Codes that homeowners prevent the erosion and transfer of sediment from their property. Homeowners are required to provide permanent stabilization of their lot, through such measures as sod, established seeded vegetation, rock, landscaping or other permanent measures of stabilization. Homeowners are required to maintain temporary erosion control measures on their property, until permanent measures can be implemented, up to a maximum of one year.



Homeowners are responsible for maintaining temporary erosion control measures on their property until permanent measures are implemented.

EROSION CONTROL FOR SINGLE FAMILY RESIDENTIAL CONSTRUCTION

Scope

The following requirements apply to all single-family residential projects, including:

- New single-family residential construction.
- New construction (i.e. additions, etc.) on existing single-family home sites.
- Idle single family lots both permitted and non-permitted (lots owned by the builder or land developer not yet under construction).
- Grading, excavating and stockpiling of earth and landscape materials (not specifically limited to new construction) which results in the transport of any of these materials off site by any means including, but not limited to, wind or water erosion and vehicular tracking.

Enforcement

The requirements herein are enforced through the requirements of the Arapahoe County Land Development Code and the Arapahoe County Building Code. Failure to comply may result in the refusal of inspections, refusal of Certificates of Occupancy, and the suspension, revocation, or cancellation of Building Permits. Refer to Section 9.2 of the GESC Manual.

Excavations for basements

When lots are ready for basement excavations and / or additional grading, the BMPs that are protecting the lot shall not be compromised during this operation. BMPs may be temporarily removed to allow for access and promptly reinstalled at the end of the basement excavation and / or grading operations, or at the end of the day- whichever is sooner. At no time shall the lot specific BMPs be removed over night or during precipitation events.

Basement excavations / grading shall not be performed on a lot(s) if excessive tracking of sediment onto streets will occur. This is often the case after recent precipitation events, which cause the lot to be "muddy."

Material from basement excavations shall be contained behind silt fence or other approved BMPs. The excavated material shall comply with all stockpile criteria outlined in the County GESC Manual.

If the excavated material is to be moved, and sediment is tracked onto streets, all sediment shall be removed immediately. The streets shall be scraped and swept periodically throughout the day and at no time shall the material be allowed to remain on the street overnight. All BMPs shall be reinstalled at the end of each day.

Downspouts / Sumps Protection

As soon as downspouts / sumps are installed, they must be protected. The downspout / sump shall not discharge directly onto unprotected soil. The downspouts / sump shall be extended to the sidewalk using a temporary pipe as shown in the details that follow. If the downspouts / sump can be conveyed to a common swale (so that the flow is contained within the swale) then the swale can be protected with an erosion control blanket and check dams to convey the flow to the sidewalk; see details. If the downspout / sump is located some distance from the common swale between the houses than the swale leading to the common swale shall be protected in a similar fashion to the common swale.

Common Drainage Swale (Between houses)

If the flow from a downspout is conveyed to a common drainage swale (between houses) then the swale shall be protected with erosion control blankets and check dams. The check dams shall be rock and/or sediment control logs depending on the flow that will be conveyed to the swale. At least two check dams shall be installed as shown on the detail.

Erosion Control Blanket

The Erosion Control Blanket shall meet the specifications, installation, and maintenance requirements stated in the GESC Manual.

Silt Fence

The Silt Fence shall meet the specifications, installation, and maintenance requirements stated in the GESC Manual.

Sediment Control Log

The Sediment Control Log shall meet the specifications, installation, and maintenance requirements stated in the GESC Manual.

Inlet Protection

Inlet Protection shall be installed & maintained per County GESC requirements at all times.

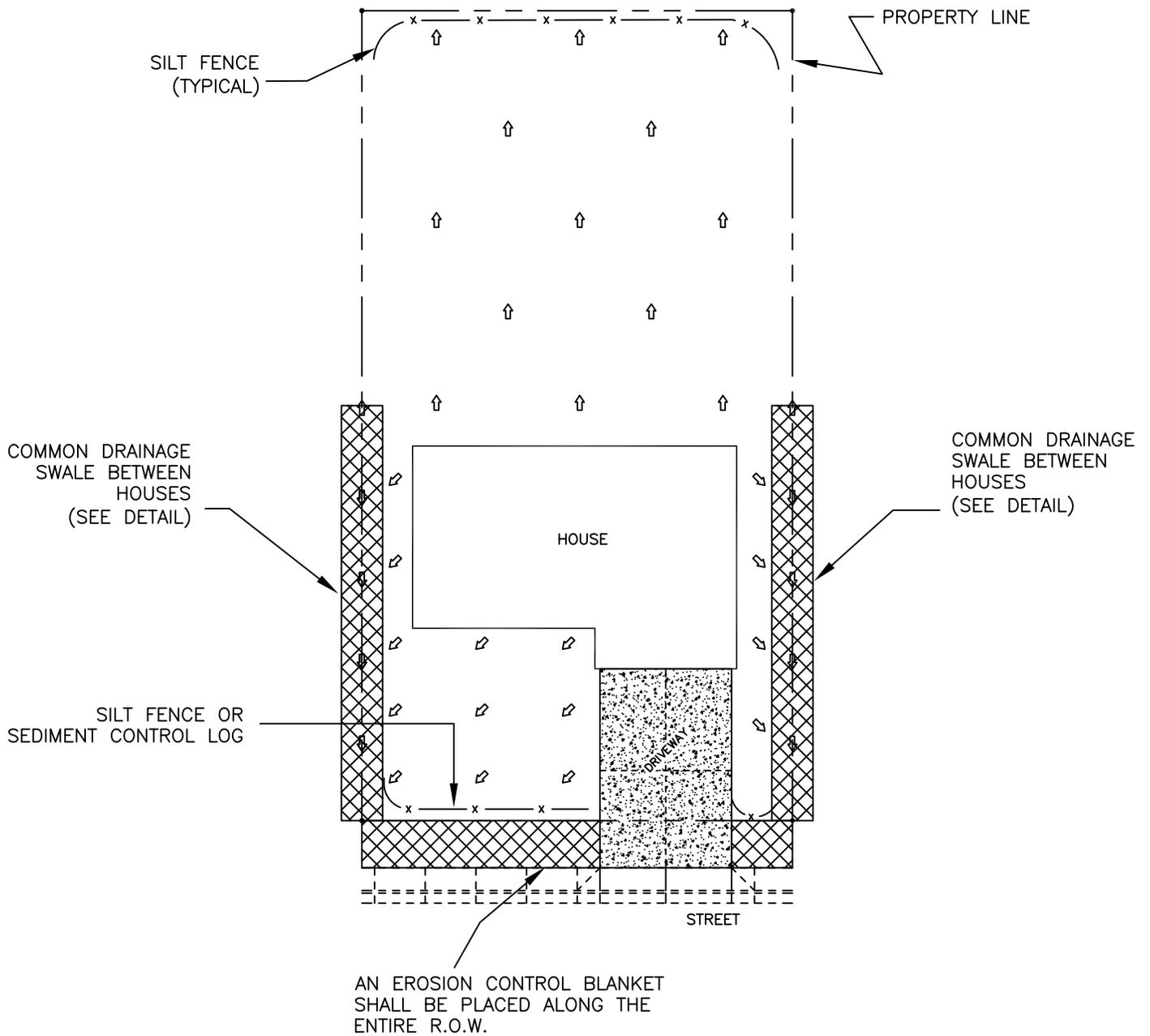
Street Sweeping

Street sweeping shall be performed on a regular basis. The frequency of sweeping will depend on construction activity, the amount of deliveries, the overall effectiveness / maintenance of the BMPs, as well as "good housekeeping" practices. The County may request additional sweeping if material is tracked onto streets. The street sweeping shall be completed within 24 hours of the request.

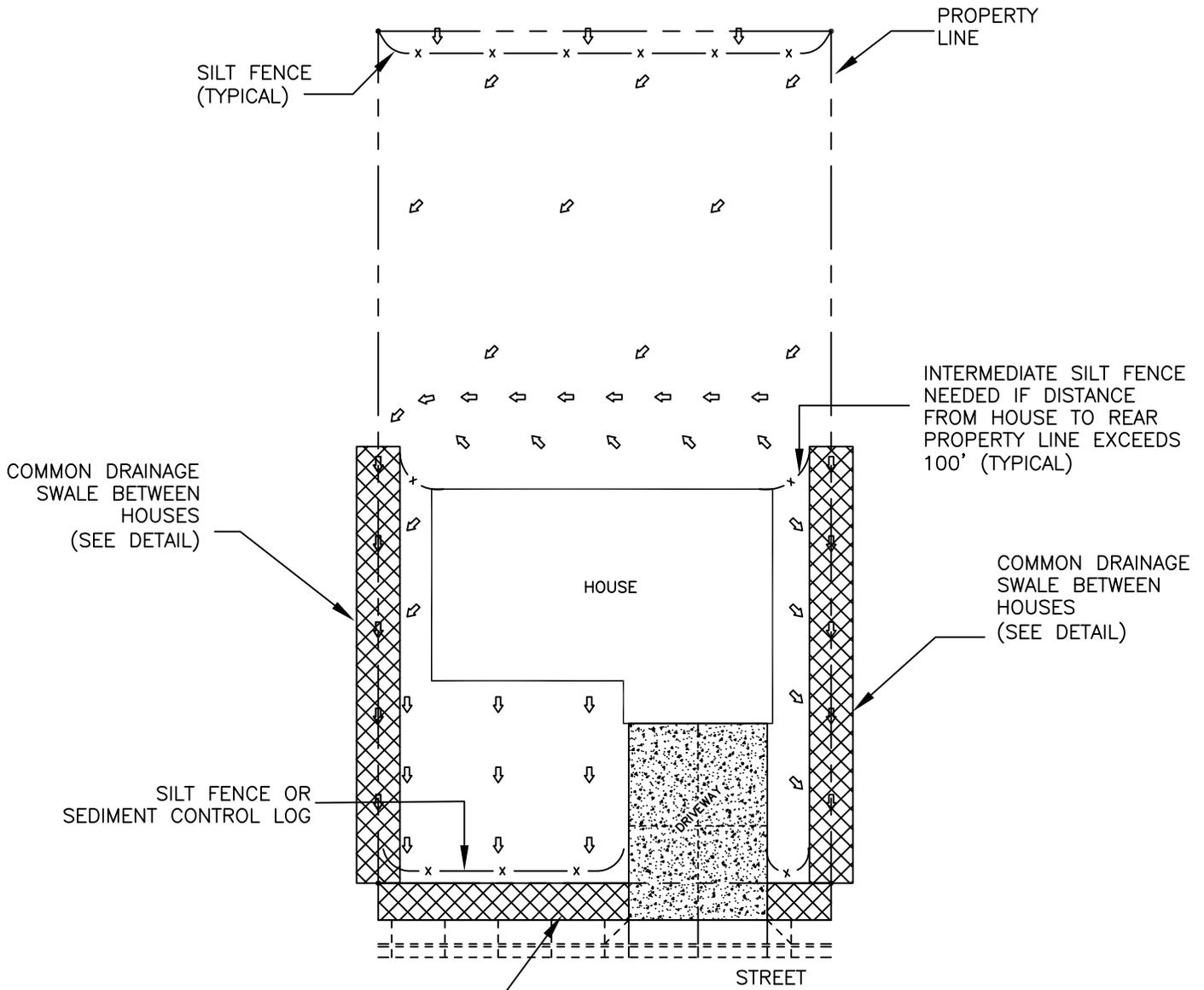
Maintenance of lot BMPs

Maintenance shall be performed on all lot BMPs on a routine basis and after all precipitation events that cause surface erosion. See the County GESC Manual (field section) for additional information.

*Lots that are in sensitive areas, or conditions are such that the lot(s) cannot be permanently stabilized for an extended period of time, may require the entire lot to be covered with erosion control blankets. This will be determined on an individual lot basis.



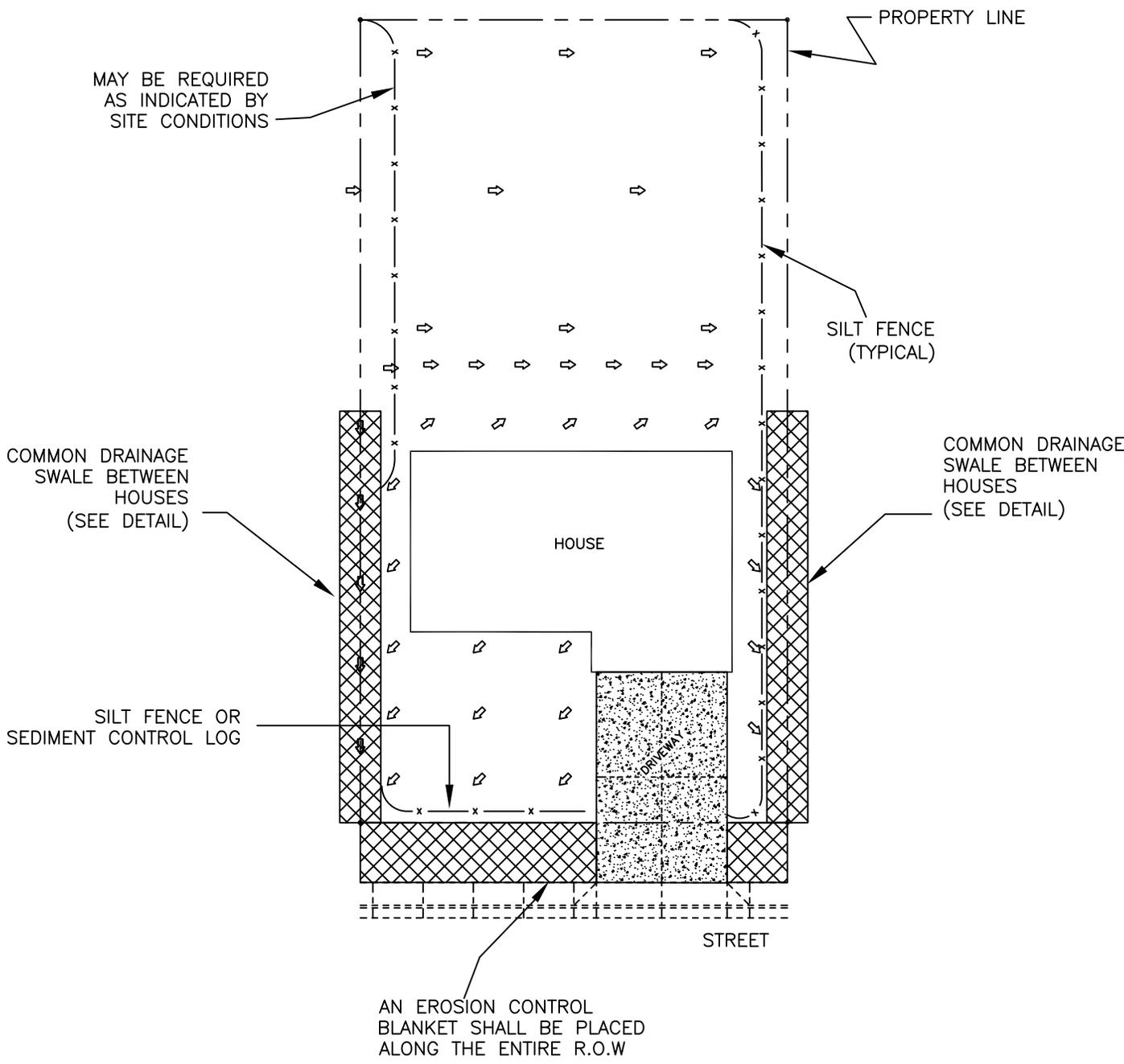
- x — SILT FENCE / SEDIMENT CONTROL LOG
- ← DIRECTION OF SURFACE WATER RUNOFF
- ▨ EROSION CONTROL BLANKET



INTERMEDIATE SILT FENCE
NEEDED IF DISTANCE
FROM HOUSE TO REAR
PROPERTY LINE EXCEEDS
100' (TYPICAL)

AN EROSION CONTROL
BLANKET SHALL BE PLACED
ALONG THE ENTIRE R.O.W

- x — SILT FENCE / SEDIMENT CONTROL LOG
- ← DIRECTION OF SURFACE WATER RUNOFF
- ▨ EROSION CONTROL BLANKET



SILT FENCE OR
SEDIMENT CONTROL LOG

COMMON DRAINAGE
SWALE BETWEEN
HOUSES
(SEE DETAIL)

SILT FENCE
(TYPICAL)

COMMON DRAINAGE
SWALE BETWEEN
HOUSES
(SEE DETAIL)

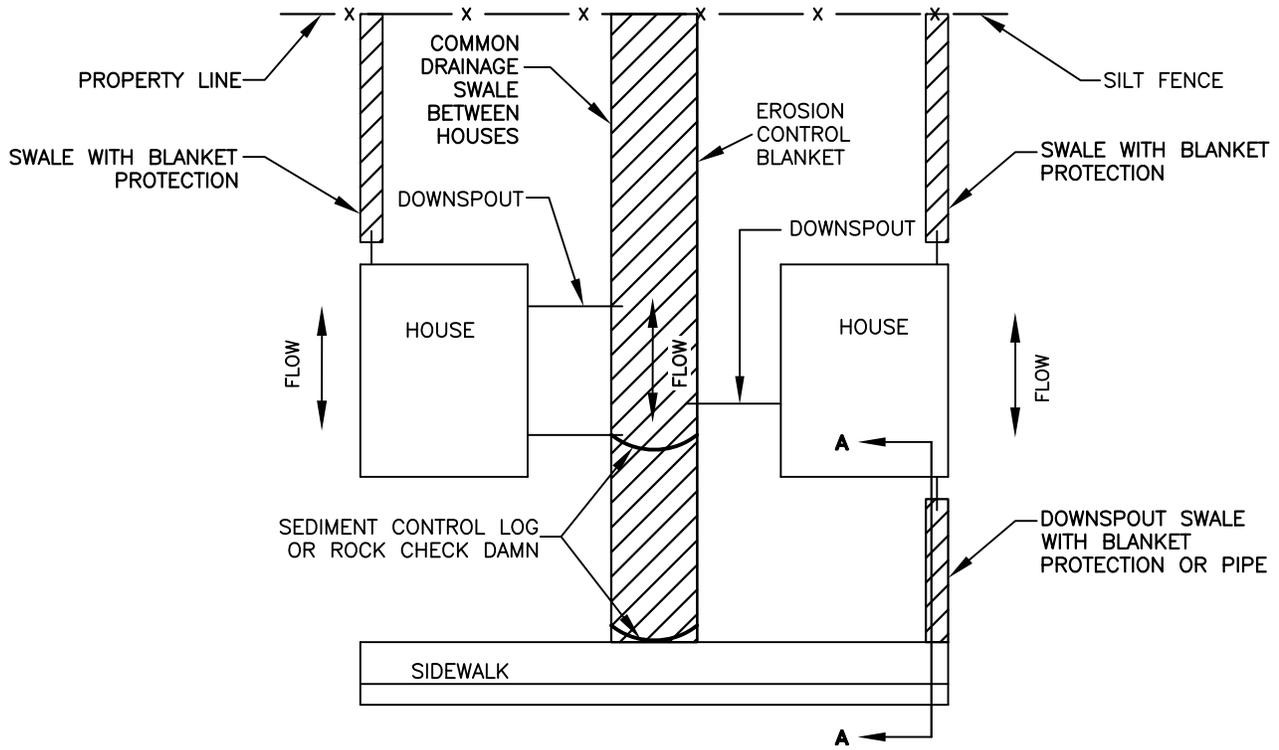
AN EROSION CONTROL
BLANKET SHALL BE PLACED
ALONG THE ENTIRE R.O.W

— x — SILT FENCE / SEDIMENT CONTROL LOG

← DIRECTION OF SURFACE
WATER RUNOFF

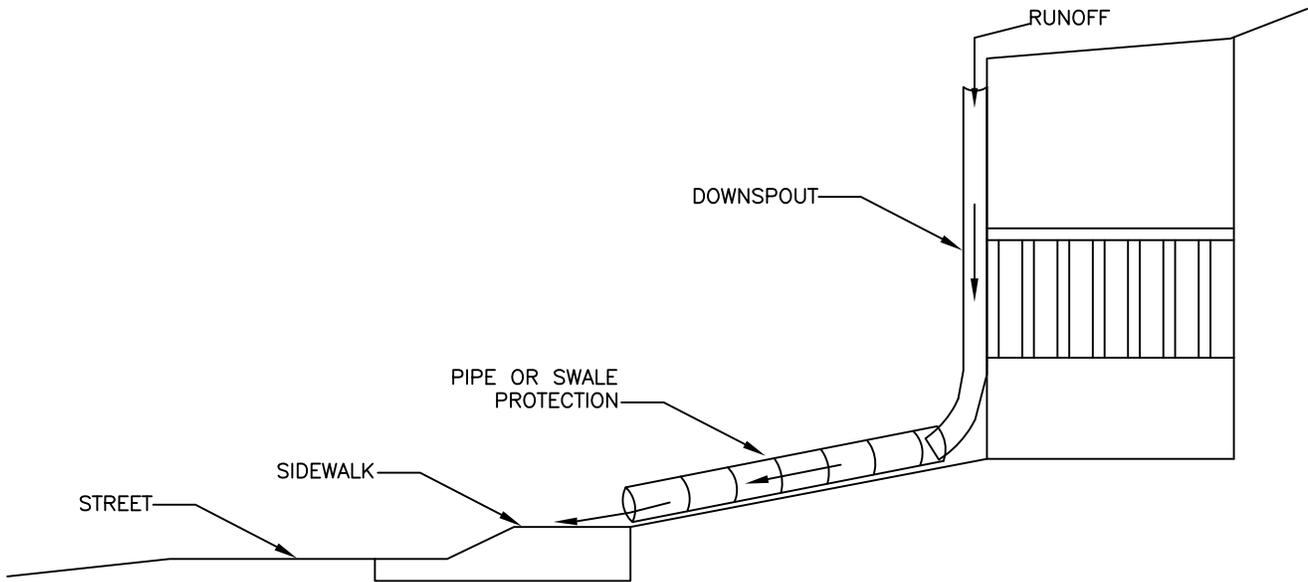
▨ EROSION CONTROL BLANKET

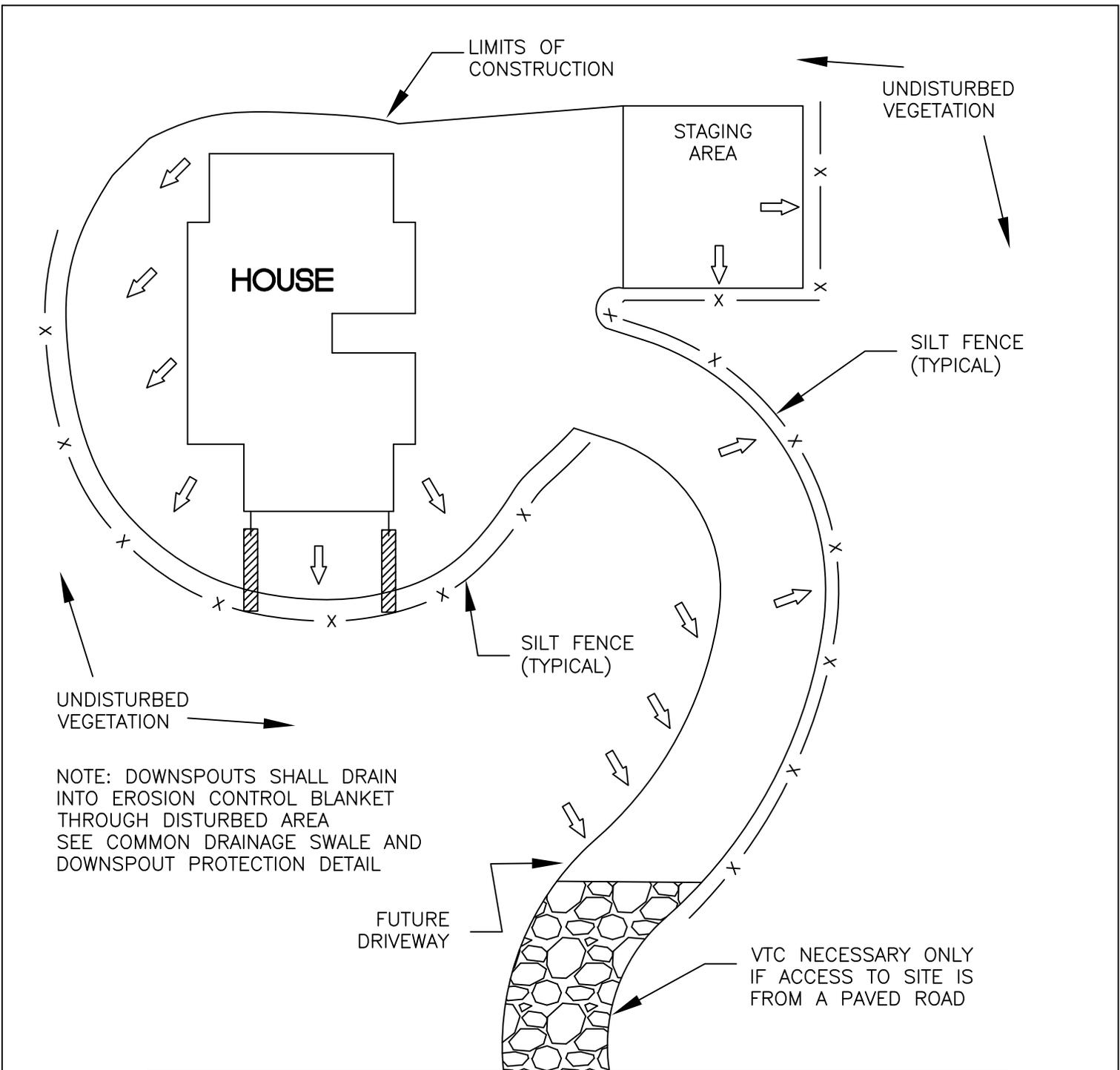
**COMMON DRAINAGE SWALE AND DOWNSPOUT PROTECTION DETAIL
(BETWEEN HOUSES)**



NOTE: DETAIL MUST BE IMPLEMENTED WHEN DOWNSPOUTS ARE INSTALLED ON HOUSE

SECTION A-A





NOTE: DOWNSPOUTS SHALL DRAIN INTO EROSION CONTROL BLANKET THROUGH DISTURBED AREA SEE COMMON DRAINAGE SWALE AND DOWNSPOUT PROTECTION DETAIL

PAVED ROAD

NOTE: THIS PLAN MAY BE USED WHEN ONLY A PART OF THE LOT IS DISTURBED.

- x — SILT FENCE / SEDIMENT CONTROL LOG
- ← DIRECTION OF SURFACE WATER RUNOFF

Section 10. Special Requirements for Utility Construction

Overview of Section 10

10.0

This section describes the GESC special requirements for utility construction.

*Section 10.1, **Utility Construction**, provides an overview of utility construction and the related GESC requirements.*

*Section 10.2, **Utility Construction Requiring a GESC Permit**, summarizes the requirements of any utility line construction which requires a GESC permit.*

*Section 10.3, **Utility Construction Covered Under a Street Cut and Right-of-Way Use Permit**, summarizes the requirements of any utility line construction which is covered under a Street Cut and Right-of-Way Use Permit.*

Section 10. Special Requirements for Utility Construction

Utility Construction

Utility Construction Requiring a GESC Permit

10.1

As Arapahoe County 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.

Section 2 of this Manual provides guidelines for determining whether a GESC permit is required for all types of construction activities. The installation or maintenance of utility lines in excess of 1000 linear feet requires a Standard GESC Permit. Installation and maintenance of utility lines less than 1000 linear feet within County right-of-way do not require a GESC permit, but must comply with the GESC requirements associated with a Street Cut and Right-of-Way Use Permit as issued by the County. Further discussion of these requirements follows later in this Section.

10.2

Utility line projects which require a GESC permit, as described in Section 2, must adhere to the permitting process and submittal requirements set forth in the previous sections of this Manual.

At a minimum, all utility line construction and maintenance which require a GESC permit shall comply with the following:

- ◆ All utility work within Arapahoe County right-of-way shall be required to obtain an Arapahoe County Street Cut and Right-of-Way Use Permit in accordance with the *Infrastructure Design and Construction Standards*, as amended.
- ◆ Provide adequate erosion and sediment controls.
- ◆ At the end of a work day, no trench shall be left open. The trench shall be either backfilled to grade, or a steel plate shall be placed over the open portion of the trench. The steel plate is not allowed in County ROW travel lanes. Steel plates that are utilized outside of ROW shall be positioned and anchored in accordance with all applicable safety criteria and such that stormwater will not enter the trench.
- ◆ 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.



No utility trench shall be left open at the end of the work day.

Section 10. Special Requirements for Utility Construction

Utility Construction Requiring a GESC Permit, continued

- ◆ 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 4.10.
- ◆ 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 4.9.

Utility Construction Covered Under a Street Cut and Right-of-Way Use Permit

10.3

Utility line projects which do not require a GESC permit, as described in Section 2, must adhere to the GESC requirements associated with a Street Cut and Right-of-Way Use Permit as issued by the County. The following summarizes the requirements for utility projects covered under a Street Cut and Right-of-Way Use Permit (does not require an individual GESC Permit).

10.3.1 Drawings. GESC drawings will not be required unless the work to be performed is out of the ordinary or is located in a sensitive area. The contractor must use approved Arapahoe County BMPs, and maintain them throughout the construction process.

10.3.2 Collateral. The County will generally not require additional collateral for GESC requirements covered under a Street Cut and Right-of-Way Use Permit, as long as the contractor actively maintains their BMPs. If the County determines that the contractor is not maintaining their BMPs, and the site may negatively affect water quality in the area then the County will require additional collateral.

10.3.3 Enforcement. If the County finds the Permittee to be non-compliant with the GESC requirements under the Street Cut Right-of-Way Use Permit, the Permit may be revoked and a stop work order may be issued. When the contractor corrects the deficiencies, the County shall be notified and the Permittee will be required to attain new permits and pay a fee in accordance with the current County Penalty Fee Schedule and additional collateral will be collected. The County may require the contractor to obtain a Standard GESC Permit and shall submit all applicable plans and reports associated with this permit.



10.3.4 General Construction Site Best Management Practices. The Permittee must adhere to the list of requirements provided under Section 10.2 as well as the following list of Best Management Practices (BMPs)

Utility Construction Covered Under a Street Cut and Right-of-Way Use Permit, continued

while GESC requirements are being completed under a Street Cut and Right-of-Way Use Permit.

Pre-Construction Best Management Practices:

- ◆ Develop and implement erosion and sediment control plans/practices for the specific project that you are constructing.
- ◆ Schedule excavation and grading work for dry weather.
- ◆ Identify all storm drains, drainage swales and creeks located near the construction site and make sure all subcontractors are aware of their locations to prevent pollutants from entering them.
- ◆ Delineate clearing limits, easements, and setbacks. Sensitive or critical areas, trees, drainage courses, and buffer zones to prevent excessive or unnecessary disturbances and exposure. Phase in the process of clearing and grubbing the site on an as necessary basis rather than clearing and grubbing the entire work zone at one time, thus creating a maintenance item until such time that the area is under active construction.
- ◆ Designate a “Wash-out Area” on the job site in a grassy or graveled area where pooled water can soak into the ground. Use for all application and mixing equipment. If no “Wash-out Area” is available, washout into container, dispose in a posted “Wash-out Area” at another site (with owner permission) or return to the batch plant for disposal.
- ◆ Designate one area for parking, equipment/vehicle refueling, and routine maintenance. The designated area should be well away from gutter, storm drains, and creeks.

Construction Best Management Practices:

- ◆ Keep materials out of the rain. Store them under cover, with temporary roofs or plastic sheets protected from rainfall, runoff, run-on, and wind. Store all material away from creeks and storm drains. Cover stockpiles (road base, excavated material, etc.) and other materials with plastic tarps to protect from rain. Use berms/ ‘rock socks’ around the entire stockpile to prevent run-on and run-off.
- ◆ Clean up leaks, drips, and other spills immediately.
- ◆ Sweep and remove materials from surfaces that drain to storm drain inlets, creeks, or channels, throughout the workday. When precipitation is in the forecast increase the frequency of the sweeping.
- ◆ Make sure portable toilets are in good working order. Check frequently for leaks and service regularly.
- ◆ Designate one area for parking, equipment/vehicle refueling, and routine maintenance. The designated area should be well away from gutter, storm drains, and creeks.



The Permittee must adhere to all Construction Site BMPs listed while GESC requirements are completed under a Street Cut and Right-of-Way Use Permit.

Section 10. Special Requirements for Utility Construction

Utility Construction Covered Under a Street Cut and Right-of-Way Use Permit, continued

- ◆ Maintain all vehicles and heavy equipment. Inspect frequently for leaks and repair as necessary.
- ◆ After breaking up old pavement and concrete, remove all chunks and pieces to avoid contact with rainfall and runoff.
- ◆ Catch drips from paving equipment with drip pans, absorbent material (cloth, rags, etc.) heavy cardboard or plywood place under the machine when not in use.
- ◆ When making saw-cuts in pavement (asphalt or concrete), use as little water as possible. Cover each storm drain inlet per the inlet protection detail during saw operation and contain the slurry. After the liquid drains or evaporates, shovel or vacuum the slurry residue from the pavement or gutter and remove it from the site.
- ◆ Completely sweep the streets immediately following milling operations. All areas that are not accessible to the street sweeper must be hand broomed.
- ◆ Filter the water from concrete flow line sections that have been removed, left open and have collected rain/irrigation and then discharge. The inlet(s) that will receive the filtered water shall have the approved inlet protection installed.
- ◆ Delivered materials or excavated material shall not be placed in the flow-line.
- ◆ Diesel fuel shall not be used to lubricate equipment parts.
- ◆ Major equipment / vehicle repairs and washings shall not occur on site.
- ◆ Never hose down dirty pavement or surfaces. Clean up all spills and leaks using “dry” methods (with absorbent materials and/or rags). If spills occur on dirt areas, dig up and remove contaminated soil and dispose of properly.
- ◆ Concrete curing compound or tack oil shall not be sprayed if rain is on the “horizon.”
- ◆ Do not discharge any concrete, slurry or rinse water into street, flow line, storm drains, or drainage channels from concrete activities and concrete pumping equipment.

Section 11. Temporary Batch Plant/GESC Permit

Overview of Section 11

11.0

This section summarizes the GESC Permit requirements for a Temporary Batch Plant.

*Section 11.1, **Special Requirements for Temporary Batch Plant/GESC Permit**, provides an overview of the requirements associated with a Temporary Batch Plant/GESC Permit.*

*Section 11.2, **Submittal Requirements for Temporary Batch Plant/GESC Drawings**, describes the required drawings and submittals for a Temporary Batch Plant GESC Permit.*

**Temporary
Batch Plant/
GESC
Permit**

The permit application for a Temporary Batch Plant is provided in Appendix U.

**Submittal
Requirements for
Temporary Batch
Plant/GESC
Drawings**

11.1

11.1.1 Special Requirements for Temporary Batch Plant/GESC Permit.

Because of their potential impact on land, vegetation, and receiving waters, temporary batch plants require a Temporary Batch Plant/GESC Permit (even if the plant is to be located inside the limits of construction of a GESC-permitted project). The process required for a Standard GESC permit applies to the Temporary Batch Plant GESC Permit.



A Temporary Batch Plant requires its own GESC Permit.

In addition to other submittal documents, the Temporary Batch Plant/ GESC Permit requires a copy of the Lease Agreement between the Property Owner and the Batch Plant Operator.

GESC 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/GESC Permit renewal application may be considered for a Temporary Batch Plant/GESC Permit extension. The request for renewal shall be made no later than 30 days prior to the expiration of the Temporary Batch Plant/GESC Permit. All extensions are contingent on the applicant reapplying for the Temporary Batch Plant/GESC Permit and completion of a satisfactory site inspection to ensure that the site is in compliance with the Temporary Batch Plant GESC Plan. The license agreement from the property owner shall be resubmitted with the request for a time extension.

When a temporary batch plant is required, an item shall be included in the Engineer's Cost Estimate Spreadsheet for Final BMP's (See Section 3) for temporary batch plant restoration. This BMP should be added in the "Other" line at the end of the spreadsheet and typical cost is \$5000 per acre.

11.2

11.2.1 Submittal Requirements for Temporary Batch Plant/GESC Drawings.

Temporary Batch Plant/ GESC Drawings shall be organized into two stages. Initial BMPs shall be shown on a Batch Plant Site Drawing and Final BMPs shall be shown on a Reclamation Plan. Submittal requirements for Temporary Batch Plant GESC Drawings are as follows:

- ◆ A GESC Drawing for the site in accordance with the requirements found in this *GESC Manual*. The Batch Plant GESC Drawing shall comprise two plan sheets, an Initial and Final GESC Drawing (example plans are shown in Appendix C). The Initial Plan shall

***Submittal
Requirements for
Temporary Batch
Plant/GESC
Drawings,
continued***

utilize at a minimum the following BMPs:

- Sediment Basin (Section 6.2.12) at the low point on the site;
- Diversion Ditch (Section 6.2.6) to route all stormwater runoff to the sediment basin;
- Vehicle Tracking Control pad (Section 6.2.22) at each entrance and exit;
- A Stabilized Staging Area/stabilized driving surface (Section 6.2.17) from Vehicle Tracking Control pads to the silo chute; and
- Limits of construction.

The Final GESC Drawing shall include site clean up, regrading and revegetation and any additional temporary erosion and/or sediment controls.

- ◆ A narrative report describing: purpose of plant, proposed schedule of operation, including days and times, duration of plant operations, anticipated daily trip generation, and maximum gross vehicle weight (GVW) of hauling units.
- ◆ A posting of collateral (see Section 2.16) for the installation and maintenance of the temporary erosion and sediment control and site reclamation.
- ◆ A lease agreement from the property owner (if applicable).
- ◆ A copy of all associated State and Federal permits.
- ◆ All access points to or from a construction site require a Temporary Construction Access Permit as outlined in the *Infrastructure Design and Construction Standards* as amended. No ramps of dirt, gravel, asphalt, wood, or other materials are allowed in the curb section.

Section 12. Revisions and Updates to Manual

In an effort to ensure the Arapahoe County Grading, Erosion, and Sediment Control (GESC) Manual provides clear guidance and regulations, Arapahoe County Staff has made revisions to Sections 1.5.3, 2.1.3, 2.16.3, 2.16.3.1, 3.1.1.9, 3.1.4.8, 3.1.5.10, 3.2.15, 3.3.1, 4.1.3, 4.1.5, 4.5.4, 4.7, 4.11, 4.15.3, 4.15.9, 4.15.22, 5.9.4, 6.1.2, 6.2.3, 6.2.8, 6.2.9, 10.2

Section 1.5.3 – At the end of Section, add the paragraph of “*Haul Roads, as defined by the Air Quality Control Commission, Regulation 1 (5 CCR 1001-3), are roads which are used for commercial, industrial or governmental hauling of materials and which the general public does not have a right to use. Any owner or operator of any new or existing haul road which has vehicle traffic exceeding 40 haul vehicles or 200 total vehicles per day (averaged over any consecutive 3-day period) from which fugitive particulate emissions will be emitted shall be required to use all available practical methods which are technologically feasible and economically reasonable in order to minimize such emissions in accordance with the requirements of Section III.D. of Regulation 1. Additional control measures or operating procedures, including but not limited to road watering, chemical stabilization, road carpeting, paving, suggested speed restrictions and other methods or techniques approved by the Air Quality Control Division, may be necessary to fully comply with these regulations at the construction site. The CDPHE should be contacted about APENs and other air quality requirements.*”

Section 2.1.3 – Replace the bulleted note no. 3 of “Maintenance of existing public and private roadways” to “Maintenance of pavement repair, including mill and overlay and signal projects, on existing public and private roadways.”

Section 2.16.3 - Add Irrevocable Letter of Credit from out-of-state financial institution in a form acceptable to the County.

Section 2.16.3.1 – Modify terms of collateral for governmental and quasi-governmental entities. Waiver governmental and quasi-governmental agencies from financial collateral upon providing agreement with conditions of approval.

Section 3.1.1.9 – Updated Design Engineer’s Certification Statement as follows:

“I hereby attest that the attached Grading, Erosion, and Sediment Control (GESC) Plan for (Name of Subdivision/Development) has been prepared by me or under my direct supervision, and to the best of my knowledge and ability has been prepared in accordance with the latest version of the Arapahoe County GESC Manual. The signature and stamp affixed hereon certifies that the GESC Plan was prepared in accordance with the required regulations and criteria; however, the stamp and signature does not certify or guarantee future performance of the execution of the plan by the Contractor. The Contractor is responsible for executing the construction work according to the information set forth in the plan and in accordance with all applicable requirements.”

Registered professional Engineer _____

State of Colorado No. _____

Affix Seal

Section 12. Revisions and Updates to Manual

Section 3.1.4.8 – Add additional notes on interim drawing:

- ALL INTERIM BMPS, INCLUDING SEEDING AND MULCHING OF DISTURBED AREAS, MUST BE COMPLETED WITHIN 14 DAYS IF THE AREAS WILL REMAIN UNDISTURBED FOR A PERIOD GREATER THAN 30 DAYS AND PRIOR TO ISSUANCE OF ANY CURB AND GUTTER PERMITS.
- ALL PROPOSED SLOPES ON THIS PLAN HAVE A MAXIMUM SLOPE OF 4:1. ANY SLOPES BETWEEN 3:1 AND 4:1 WILL REQUIRE THE USE OF EROSION CONTROL BLANKETS OR FLEXIBLE GROWTH MEDIUM.

Section 3.1.5.10 - Add additional note on final drawing:

- ALL INTERIM BMPS, INCLUDING SEEDING AND MULCHING OF DISTURBED AREAS, MUST BE COMPLETED WITHIN 14 DAYS IF THE AREAS WILL REMAIN UNDISTURBED FOR A PERIOD GREATER THAN 30 DAYS AND PRIOR TO ISSUANCE OF ANY CURB AND GUTTER PERMITS.
- ALL PROPOSED SLOPES ON THIS PLAN HAVE A MAXIMUM SLOPE OF 4:1. ANY SLOPES BETWEEN 3:1 AND 4:1 WILL REQUIRE THE USE OF EROSION CONTROL BLANKETS OR FLEXIBLE GROWTH MEDIUM.

Section 3.2.15 – update landowner/authorized agent certification acknowledging the review and acceptance of responsibility as follows:

“I hereby certify that the GESC measures for (*Name of Subdivision/Development/ address*) shall be constructed according to the design presented in this report. I understand that additional erosion control, sediment control and water quality enhancing measures may be required of the owner and his or her agents due to unforeseen pollutant discharges or if the submitted plan does not function as intended. The requirements of the plan shall be the obligation of the land owner and/or his successors or heirs; until such time as the plan is properly completed, modified or voided.”

Owner or Authorized Agent _____

Authorized Signature _____

Section 3.3.1 – The GESC cost estimate has been modified to be a separate submittal from the GESC report. The GESC cost shall be signed by the Applicant/Developer, Engineer for Application, and the County Case Engineer.

Section 4.1.3 – The text of “All stockpiles must drain to a sedimentation pond” has been modified to “A sedimentation pond, or other appropriate BMP shall be used to control sediment from leaving the site” for stockpiles.

Section 4.1.5 – Modify the text of “the County requires that earthwork cut and fill volumes balance onsite” to “the County encourages earthwork cut and fill volumes balance onsite”.
A variance is no longer needed for earthwork balance

Section 4.5.4 – Alternative BMP of Flexible Growth Medium has been added.

Section 4.7 – A variance is no longer needed for earthwork balance onsite.

Section 12. Revisions and Updates to Manual

Section 4.11 – Added two paragraphs as follows:

- Linear projects, such as transportation corridor and utilities projects, may consider other BMPs, such as vegetative buffer strips, grass swales or longer linear sediment basins that are retrofit into grass swales and vegetative buffers to provide sediment control during construction disturbance
- Mining pits when used for the extraction of sand and gravel, permitted through the Colorado Division of Reclamation Mining and Safety (DRMS) and/or the Colorado Department of Public Health and Environment, may be considered on a case-by-case basis when disturbance is limited to the immediate pit area.

Section 4.15.3 – Alternative BMP of pre-fabricated ecologically/environmentally friendly concrete washout bin has been added.

Section 4.15.9 – Flexible Growth Medium has been added in this section.

Section 4.15.21 – Alternative BMP of Pre-fabricated tracking mats has been added.

Section 5.6 – The last sentence of the first paragraph has been modified from “...shall be installed within 48 hours of the pouring of an inlet” to “...shall be installed after the construction of site infrastructure”.

Section 5.9.4 – Modify the section from “Remediation for Level II Violations shall commence immediately after the Permittee is notified of the violation. Notification can either be verbal instruction from the County Inspector to the GESC Manager, or included on an inspection report as a deficiency. Level II Violations shall be corrected within 48 hours of notification, unless otherwise specified in writing by the County Inspector. A re-inspection will be completed by the County following the allotted 48 hour time frame. If corrections have not been completed satisfactorily within the 48 hour time frame, and additional inspections are needed, reinspection fees will be applied for subsequent inspections. Corrections not made in full after additional inspections and subsequent inspections fees will result in the issuance of a Notice of Violation (NOV) and possible Stop Work Order” to “Remediation for Level II Violations shall commence after the Permittee is notified of the violation. Notification can either be verbal instruction from the County Inspector to the GESC Manager, or included on an inspection report as a deficiency. A re-inspection will be completed by the County to ensure remedies are implemented. If corrections have not been completed satisfactorily and additional inspections are needed, reinspection fees will be applied for subsequent inspections. Corrections not made in full after additional inspections and subsequent inspections fees will result in the issuance of a Notice of Violation (NOV) and possible Stop Work Order.”

Section 5.9.5 – Delete the text of “and the Permittee has been given 48 hours to correct”.

Section 5.9.6 – Delete the texts of “Violations must be remedied within 48 hours of the Notice of Violation” and “within 48 hours” in the paragraph.

Section 6.1.2 – Add the requirement at the end of paragraph: The County may invoice contractors or withhold collateral for inadequate street cleaning.

Section 6.2.3 – Add the alternative BMP: Pre-fabricated ecologically/environmentally friendly concrete washout bins are encouraged.

Section 12. Revisions and Updates to Manual

Section 6.2.8 – Add the alternative BMP: Curb Socks can be used as an alternate to Reinforced Rock Berm inlet protection to reduce sediment from entering the storm sewer.

Section 6.2.9 – Add the “Key Installation and Maintenance Requirements” for Flexible Growth Medium.

Flexible Growth medium (FGM) is a hydraulically-applied, flexible erosion control blanket/mulch/covering composed of long strand, thermally processed wood fibers, crimped, interlocking fibers and performance enhancing additives. The FGM requires no curing period and upon application forms an intimate bond with the soil surface to create a continuous, porous, absorbent and erosion resistant blanket that allows for rapid germination and accelerated plant growth.

Key Installation and Maintenance Requirements:

- In areas where the flexible growth medium 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 GESC Plan Standard Notes and Details, Seeding and Mulching. Apply the flexible growth medium to geotechnically stable slopes that have been designed and constructed to divert runoff away from the face of the slope. Do not proceed with installation until satisfactory conditions are established.
- Strictly comply with Manufacturer’s installation instructions and recommendations. Use approved hydro-spraying machines with a fan type nozzle (50-degree tip) whenever possible to achieve best soil coverage. Apply the product from opposing directions to assure 100% soil surface coverage. Slope interruption devices or water diversion techniques are recommended when slope lengths exceed 75 ft. Mix and apply FGM material at a rate of approximately 50 lb per 125 gallons of water over freshly seeded surfaces. Confirm loading rates with equipment manufacturer. Do not leave seeded surfaces unprotected, especially if precipitation is imminent.
- A mechanically agitated hydraulic application machine is recommended for mixing product, filling tank to the middle of the agitator shaft or tank about 1/3 full of water. Turn on pump to wet or purge lines and begin agitating. Water should be added slowly while adding the FGM product at a steady rate.
- Consult application and loading charts to determine number of bags to be added and mixing rate. Contact Equipment manufacturer to confirm optimum mixing rates.
- All material should be loaded when the tank is approximately 3/4 full.
- Fertilizer should be added once the tank is nearly full.
- In order to fully activate bonding additives and attain proper viscosity, mix the slurry for at least 10 minutes after adding the last amount of material.
- Turn off recirculation valve to minimize potential for air entrainment within the slurry.
- Clean spills promptly. Advise owner of methods for protection of treated areas. Do not allow treated areas to be trafficked or subjected to grazing.
- The GESC Manager shall inspect flexible growth mediums weekly and during and after any storm event and make repairs as necessary.

Section 10.2 – Add the language of “The steel plate is not allowed in County ROW travel lanes” under bullet point no. 3.

Appendixes B, D, E, F, G, I – changes were made to each of these appendices to reflect revisions as made to corresponding sections above.

Appendices

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Appendix R	Request for Reduction of Collateral Form
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Appendix V	Noxious Weeds

Appendix A

Contact Information

Appendix A

Contact Information (Information is subject to change)

Arapahoe County

Arapahoe County Department of Public Works and Development
Engineering Services Division
6924 South Lima Street
Centennial, Colorado 80112-3881
Phone: 720-874-6500 Fax: 720-874-6611

Other

Colorado Department of Public Health and Environment
4300 Cherry Creek Drive South
Denver, Colorado 80246-1530
Phone: 303-692-3500

Department of the Army
Corps of Engineers, Omaha District
Tri-Lakes Project Office 9307
State Highway 121 Littleton,
Colorado 80128-6901
Phone: 303-979-4120

United States Department of the Interior Fish and Wildlife Division
134 Union Blvd.
Lakewood, Colorado 80228
Phone: 303-326-7400

Federal Emergency Management Agency
Region VII
Building 710, Box 25267
Denver, Colorado 80225-0267
Phone: 303-235-4800 Fax: 303-235-4976

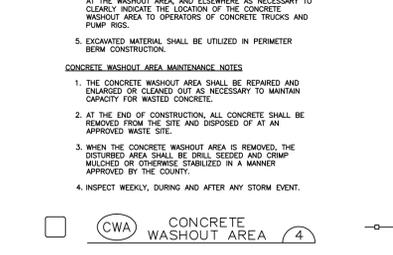
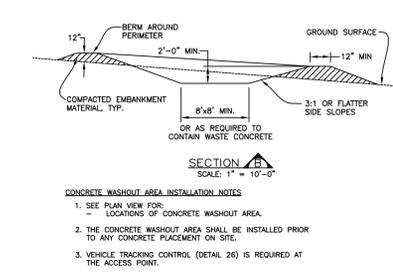
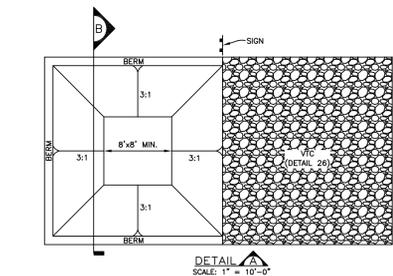
Southeast Metro Stormwater Authority
76 Inverness Drive East, Suite A
Englewood, CO 80112-5106
Phone: 303-858-8844

Appendix B

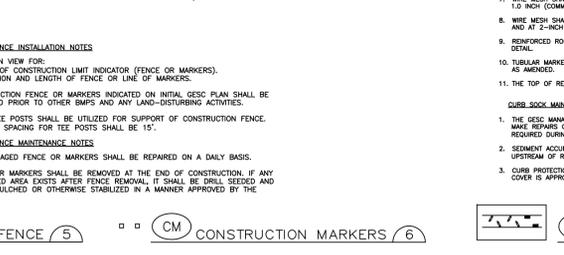
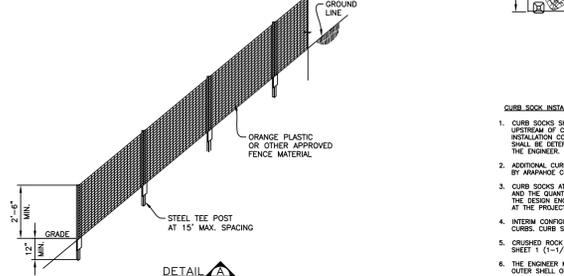
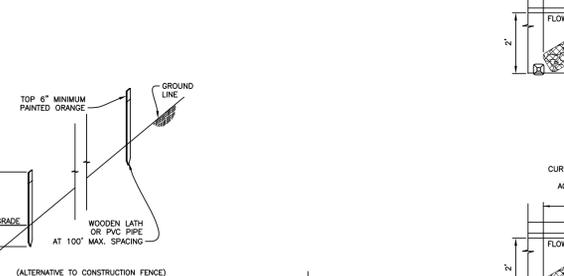
**GESC Plan
Standard Notes and Details**

GRADING, EROSION, AND SEDIMENT CONTROL (GESC) GENERAL NOTES

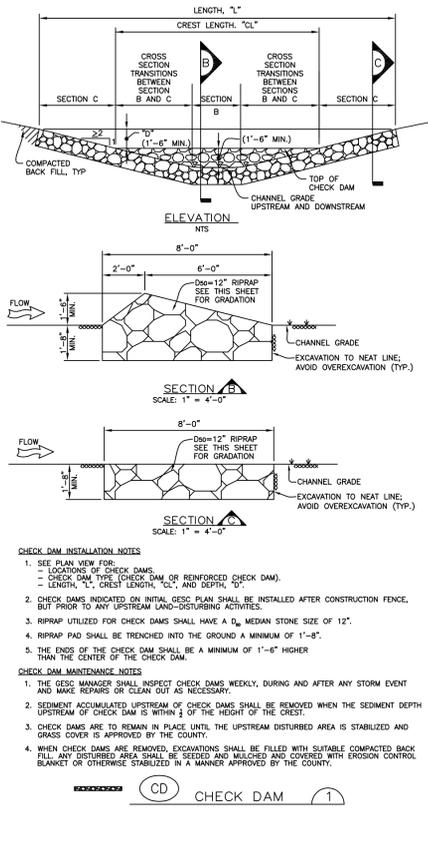
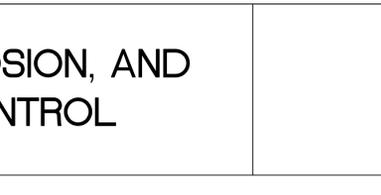
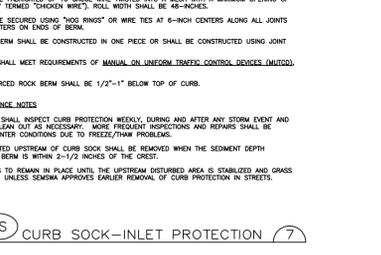
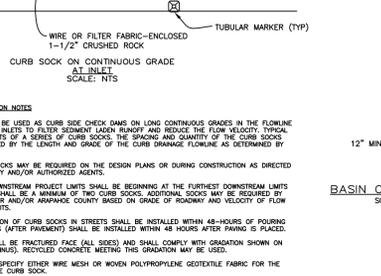
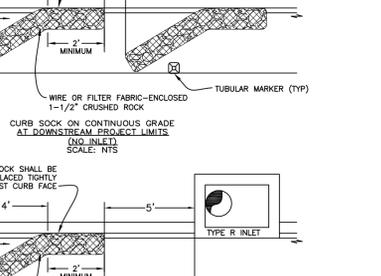
- THE ARAPAHOE COUNTY DIRECTOR OF PUBLIC WORKS AND DEVELOPMENT'S (DIRECTOR) SIGNATURE AFFIXED TO THIS DOCUMENT INDICATES THE ARAPAHOE COUNTY PUBLIC WORKS DEPARTMENT, ENGINEERING DIVISION, HAS REVIEWED THE DOCUMENT AND FOUND IT IN GENERAL COMPLIANCE WITH THE ARAPAHOE COUNTY LAND DEVELOPMENT CODE AND/OR THE GRADING, EROSION AND SEDIMENT CONTROL (GESC) CRITERIA MANUAL. THE DIRECTOR THROUGH ACCEPTANCE OF THIS DOCUMENT, ASSUMES NO RESPONSIBILITY (OTHER THAN AS STATED ABOVE) FOR THE COMPLETENESS AND/OR ACCURACY OF THESE DOCUMENTS.
- THE ADEQUACY OF THIS GESC PLAN LIES WITH THE ORIGINAL DESIGN ENGINEER.
- THE GESC PLAN SHALL BE CONSIDERED VALID FOR TWO (2) YEARS FROM THE DATE OF ACCEPTANCE BY ARAPAHOE COUNTY. AFTER WHICH TIME THE PLAN SHALL BE VOID AND WILL BE SUBJECT TO RE-REVIEW AND RE-ACCEPTANCE BY ARAPAHOE COUNTY. PLANS MUST CONFORM TO CURRENT REGULATIONS.
- ALL MATERIALS AND WORKMANSHIP SHALL BE SUBJECT TO INSPECTION BY THE ARAPAHOE COUNTY ENGINEERING DIVISION. ARAPAHOE COUNTY RESERVES THE RIGHT TO ACCEPT OR REJECT ANY SUCH MATERIALS AND WORKMANSHIP THAT DOES NOT CONFORM TO THE GESC MANUAL, GESC PLAN OR GESC PERMIT.
- THE PLACEMENT OF EROSION AND SEDIMENT CONTROL BEST MANAGEMENT PRACTICES (BMPs) SHALL BE IN ACCORDANCE WITH THE ARAPAHOE COUNTY - ACCEPTED GESC PLAN AND THE ARAPAHOE COUNTY GESC MANUAL.
- ANY VARIATION IN MATERIAL, TYPE OR LOCATION OF EROSION AND SEDIMENT CONTROL BMPs FROM THE ARAPAHOE COUNTY - ACCEPTED GESC PLAN WILL REQUIRE APPROVAL FROM AN ACCOUNTABLE REPRESENTATIVE OF THE ARAPAHOE COUNTY ENGINEERING DIVISION.
- AFTER THE GESC PLAN HAS BEEN ACCEPTED, THE GESC PERMIT APPLIED FOR THE GESC FIELD MANUAL OBTAINED AND REVIEWED, THE CONTRACTOR MAY INSTALL THE INITIAL-STAGE EROSION AND SEDIMENT CONTROL BMPs INDICATED ON THE ACCEPTED GESC PLAN.
- THE FIRST BMP TO BE INSTALLED ON THE SITE SHALL BE CONSTRUCTION FENCE, MARKERS, OR OTHER APPROVED MEANS OF DEFINING THE LIMITS OF CONSTRUCTION, INCLUDING CONSTRUCTION LIMITS ADJACENT TO STREAM CORRIDORS AND OTHER AREAS TO BE PRESERVED.
- AFTER INSTALLATION OF THE INITIAL-STAGE EROSION AND SEDIMENT CONTROL BMPs, THE PERMITTEE SHALL CALL THE ENGINEERING DEPARTMENT TO SCHEDULE A PRECONSTRUCTION MEETING AT THE PROJECT SITE. THE REQUEST SHALL BE MADE A MINIMUM OF THREE BUSINESS DAYS PRIOR TO THE REQUESTED MEETING TIME. NO CONSTRUCTION ACTIVITIES SHALL BE PLANNED WITHIN 24 HOURS AFTER THE PRECONSTRUCTION MEETING.
- THE OWNER OR OWNER'S REPRESENTATIVE, THE GESC MANAGER, THE GENERAL CONTRACTOR, AND THE GRADING SUBCONTRACTOR, IF DIFFERENT FROM THE GENERAL CONTRACTOR, MUST ATTEND THE PRECONSTRUCTION MEETING. IF ANY OF THE REQUIRED PARTICIPANTS FAIL TO ATTEND THE PRECONSTRUCTION MEETING, OR IF THE GESC FIELD MANUAL IS NOT ON SITE, OR IF THE INSTALLATION OF THE INITIAL BMPs ARE NOT APPROVED BY THE ARAPAHOE COUNTY GESC INSPECTOR, THE APPLICANT WILL HAVE TO PAY A RESUMPTION FEE, ADDRESS ANY PROBLEMS WITH BMP INSTALLATION, AND CALL TO RESCHEDULE THE MEETING, WITH A CORRESPONDING DELAY IN THE START OF CONSTRUCTION.
- CONSTRUCTION SHALL NOT BEGIN UNTIL THE ARAPAHOE COUNTY GESC INSPECTOR APPROVES THE INSTALLATION OF THE INITIAL BMPs AND THE APPROVED GESC PERMIT IS PICKED UP FROM THE COUNTY AND IS IN-HAND ON THE SITE. THE COMPLETED PERMIT WILL BE AVAILABLE WITHIN 24-HOURS AFTER THE INSTALLATION OF THE INITIAL BMPs ARE APPROVED.
- THE GESC MANAGER SHALL STRICTLY ADHERE TO THE ARAPAHOE COUNTY-APPROVED LIMITS OF CONSTRUCTION AT ALL TIMES. THE ARAPAHOE COUNTY ENGINEERING DIVISION MUST APPROVE ANY CHANGES TO THE LIMITS OF CONSTRUCTION AND, AT THE DISCRETION OF THE ENGINEERING DIVISION, ADDITIONAL EROSION/SEDIMENT CONTROLS MAY BE REQUIRED IN ANY ADDITIONAL AREAS OF CONSTRUCTION.
- THE MAXIMUM AREA OF CONSTRUCTION SHALL BE LIMITED TO 40 ACRES (70 ACRES IF APPROVED FOR SOIL MITIGATION OPERATIONS) TO REDUCE THE AMOUNT OF LAND DISTURBED AT ANY ONE TIME. LARGER SITES SHALL BE DIVIDED INTO PHASES THAT ARE EACH 40 (OR 70) ACRES OR LESS IN SIZE. THESE PROJECTS SHALL CONDUCT GRADING ACTIVITIES IN ACCORDANCE WITH THE ACCEPTED GESC PLAN, BMP INSTALLATION AND APPROVAL BY ARAPAHOE COUNTY AT THE START AND COMPLETION OF EACH PHASE SHALL BE CONDUCTED IN ACCORDANCE WITH THE PROCEDURES OUTLINED IN THE GESC MANUAL AND/OR GESC FIELD MANUAL.
- PRIOR TO ACTUAL CONSTRUCTION, THE PERMITTEE SHALL VERIFY THE LOCATION OF EXISTING UTILITIES. FOR INFORMATION, CONTACT THE DENVER INTER-UTILITY GROUP AT 1-800-922-1987 OR FAX AT (303)534-8700.
- NATURAL VEGETATION SHALL BE RETAINED AND PROTECTED WHEREVER POSSIBLE. EXPOSURE OF SOIL TO EROSION BY REMOVAL OR DISTURBANCE OF VEGETATION SHALL BE LIMITED TO THE AREA REQUIRED FOR IMMEDIATE CONSTRUCTION OPERATIONS.
- THE GESC PERMIT SHALL BE VALID FOR A PERIOD OF TWO (2) YEARS.
- A COPY OF THE GESC PERMIT, ACCEPTED GESC PLANS AND THE GESC FIELD MANUAL SHALL BE ON SITE AT ALL TIMES.
- THE GESC MANAGER SHALL BE RESPONSIBLE PARTY FOR ENSURING THAT THE SITE REMAINS IN COMPLIANCE WITH THE GESC PERMIT AND SHALL BE THE PERMITTEE'S CONTACT PERSON WITH THE COUNTY FOR ALL MATTERS PERTAINING TO THE GESC PERMIT. THE GESC MANAGER SHALL ON THE SITE AS NECESSARY TO ENSURE THE GESC REQUIREMENTS ARE BEING IMPLEMENTED, AND (ALONG WITH THE ALTERNATE GESC MANAGER) SHALL PROVIDE THE COUNTY WITH A 24-HOUR EMERGENCY CONTACT NUMBER. IN THE EVENT THAT THE CONTRACTOR'S GESC MANAGER IS NOT ON SITE AND CANNOT BE REACHED DURING A VIOLATION, THE ALTERNATE GESC MANAGER SHALL BE CONTACTED. IF NEITHER THE GESC MANAGER NOR ALTERNATE GESC MANAGER CAN BE CONTACTED DURING ANY VIOLATION, WITHIN 24 HOURS, VIOLATION MAY BE ISSUED TO THE PERMITTEE.
- ALL CONSTRUCTION TRAFFIC MUST ENTER/EXIT THE SITE THROUGH THE ARAPAHOE COUNTY-APPROVED ACCESS POINT. A VEHICLE TRACKING PAD IS REQUIRED AT ALL ACCESS POINTS ON THE SITE. ADDITIONAL STABILIZED CONSTRUCTION ENTRANCES MAY BE ADDED WITH AUTHORIZATION FROM THE ARAPAHOE COUNTY ENGINEERING SERVICES DIVISION.

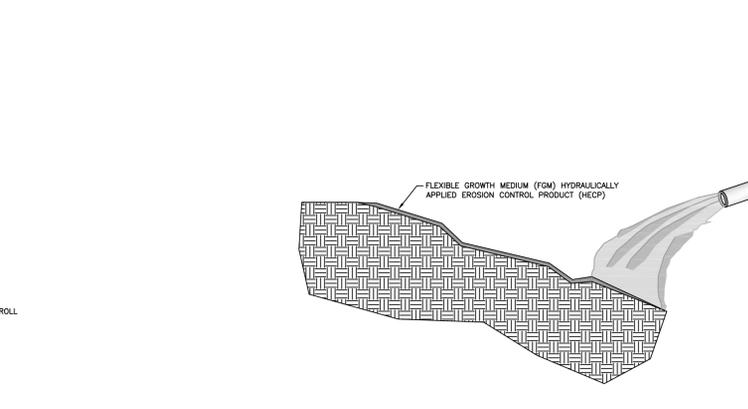
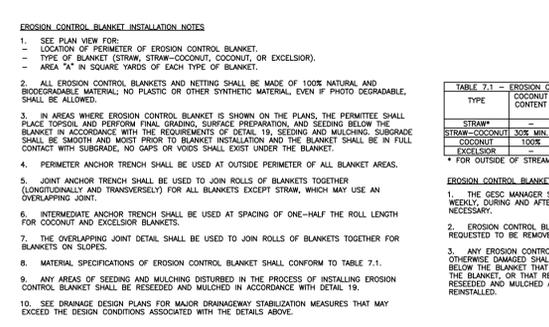
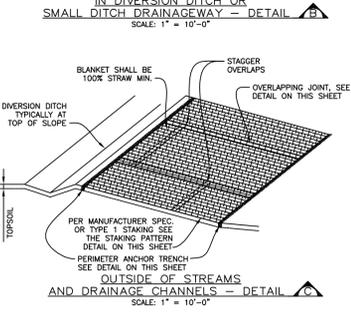
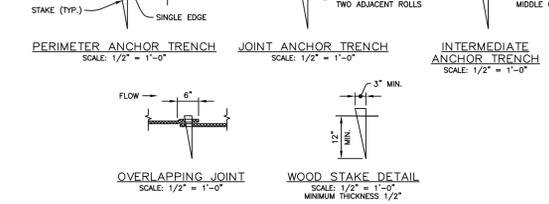
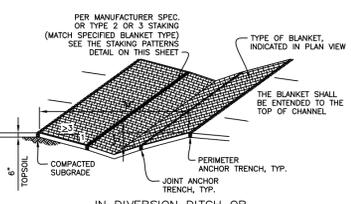
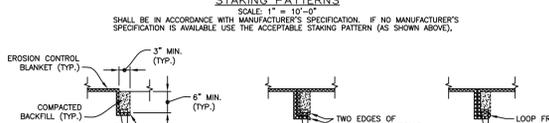
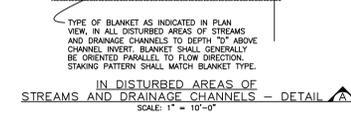
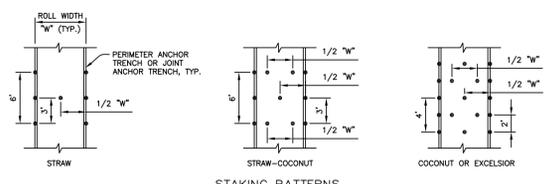
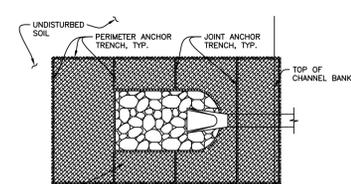


- THE GESC MANAGER IS RESPONSIBLE FOR CLEANUP OF SEDIMENT OR CONSTRUCTION DEBRIS TRACKED ONTO ADJACENT PAVED AREAS. PAVED AREAS INCLUDING STREETS ARE TO BE KEPT CLEAN THROUGHOUT BUILD-OUT AND SHALL BE CLEANED, WITH A STREET SWEEPER OR SIMILAR DEVICE, AT FIRST NOTICE OF ACCIDENTAL TRACKING OR AT THE DISCRETION OF THE ARAPAHOE COUNTY GESC INSPECTOR. STREET WASHING IS NOT ALLOWED. ARAPAHOE COUNTY RESERVES THE RIGHT TO REQUIRE ADDITIONAL MEASURES TO ENSURE AREA STREETS ARE KEPT FREE OF SEDIMENT AND/OR CONSTRUCTION DEBRIS.
- APPROVED EROSION AND SEDIMENT CONTROL BMPs SHALL BE MAINTAINED AND KEPT IN GOOD REPAIR FOR THE DURATION OF THIS PROJECT. AT A MINIMUM, THE GESC MANAGER SHALL INSPECT ALL BMPs IN ACCORDANCE WITH THE ACCEPTED GESC PLAN AND GESC MANUAL. ALL NECESSARY MAINTENANCE AND REPAIR ACTIVITIES SHALL BE COMPLETED WITHIN 48 HOURS. ACCUMULATED SEDIMENT AND CONSTRUCTION DEBRIS SHALL BE REMOVED AND PROPERLY DISPOSED.
- STRAW BALES ARE NOT AN ARAPAHOE COUNTY GESC-ACCEPTED SEDIMENT CONTROL BMP.
- TOPSOIL SHALL BE STRIPPED AND STOCKPILED IN THE LOCATION SHOWN ON THE ACCEPTED GESC PLAN. THE TOPSOIL STOCKPILES(S) SHALL FOLLOW ALL STOCKPILING CRITERIA DESCRIBED IN THE GESC MANUAL. IT SHALL BE NOTED THAT THERE IS TOPSOIL CERTIFICATION REQUIRED AT THE INITIAL CLOSE-OUT INSPECTION OF THE GESC PERMIT.
- THE ACCEPTED GESC PLAN MAY REQUIRE CHANGES OR ALTERATIONS AFTER APPROVAL TO MEET CHANGING SITE OR PROJECT CONDITIONS OR TO ADDRESS INEFFICIENCIES IN DESIGN OR INSTALLATION. THE GESC MANAGER SHALL OBTAIN PRIOR APPROVAL FROM THE DESIGN ENGINEER AND ARAPAHOE COUNTY ENGINEERING FOR ANY PROPOSED CHANGES.
- LINING OF TEMPORARY SWALES AND DITCHES SHALL BE IN ACCORDANCE WITH THE GESC CRITERIA MANUAL.
- NO PERMANENT EARTH SLOPES GREATER THAN 3:1 SHALL BE ALLOWED.
- ANY SETTLEMENT OR SOIL ACCUMULATIONS BEYOND THE LIMITS OF CONSTRUCTION DUE TO GRADING OR EROSION SHALL BE REPAIRED IMMEDIATELY BY THE GESC MANAGER. THE GESC MANAGER SHALL BE HELD RESPONSIBLE FOR OBTAINING ACCESS RIGHTS TO ADJACENT PROPERTY, IF NEEDED, AND REMEDIATING ANY ADVERSE IMPACTS TO ADJACENT WATERWAYS, WETLANDS, PROPERTIES, ETC. RESULTING FROM WORK DONE AS PART OF THIS PROJECT.
- A WATER SOURCE SHALL BE AVAILABLE ON SITE DURING EARLY WORKING OPERATIONS AND UTILIZED AS REQUIRED TO MINIMIZE DUST FROM EARTHWORK EQUIPMENT AND WIND.
- SOILS THAT WILL BE STOCKPILED FOR MORE THAN THIRTY (30) DAYS SHALL BE SEEDED AND MULCHED WITHIN FOURTEEN (14) DAYS OF STOCKPILE CONSTRUCTION. NO STOCKPILES SHALL BE PLACED WITHIN ONE HUNDRED (100) FEET OF A DRAINAGE WAY UNLESS APPROVED BY THE ARAPAHOE COUNTY ENGINEERING SERVICES DIVISION.
- ALL CHEMICAL OR HAZARDOUS MATERIAL SPILLS WHICH MAY 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 COPIE PER CRS 25-8-601, AND ARAPAHOE 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 COPIE. CONTACT INFORMATION FOR COPIE, ARAPAHOE COUNTY AND THE NATIONAL RESPONSE CENTER CAN BE FOUND IN APPENDIX A. 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. TO REPORT SPILLS TO ARAPAHOE COUNTY CALL ARAPAHOE COUNTY DEPARTMENT OF PUBLIC WORKS AND DEVELOPMENT-STORMWATER GROUP AT 720-874-6500.
- ALL WORK ON SITE SHALL STAY A MINIMUM OF ONE HUNDRED (100) FEET AWAY FROM ANY DRAINAGE WAY, WETLAND, ETC. UNLESS OTHERWISE NOTED ON AN ACCEPTED ARAPAHOE COUNTY GESC PLAN.
- THE USE OF REBAR, STEEL STAKES OR STEEL FENCE POSTS FOR STAKING OR SUPPORT OF ANY EROSION OR SEDIMENT CONTROL BMP IS PROHIBITED (EXCEPT STEEL TEE-POSTS FOR USE IN SUPPORTING CONSTRUCTION FENCE).
- THE CLEANING OF CONCRETE DELIVERY TRUCK CHUTES IS RESTRICTED TO APPROVED CONCRETE WASH OUT LOCATIONS ON THE JOB SITE. THE DISCHARGE OF WATER CONTAINING WASTE CONCRETE, TO THE STORM SEWER SYSTEM IS PROHIBITED. ALL CONCRETE WASTE SHALL BE PROPERLY CLEANED UP AND DISPOSED AT AN APPROPRIATE LOCATION.
- ALL DEWATERING ON SITE SHALL BE COORDINATED WITH A ARAPAHOE COUNTY GESC INSPECTOR AND BE FREE OF SEDIMENT IN ACCORDANCE WITH THE GESC CRITERIA MANUAL.
- ALL PERMANENT INSTALLATIONS OF PIPES FOR STORM SEWERS, SLOPE DRAINS, AND CULVERTS, TOGETHER WITH RIPRAP APRONS OR OTHER INLET AND OUTLET PROTECTION, REQUIRE INSPECTION BY ARAPAHOE COUNTY ENGINEERING (SEPARATE FROM GESC INSPECTIONS).
- ALL DISTURBED AREAS SHALL BE STABILIZED IN ACCORDANCE WITH THE GESC CRITERIA MANUAL WITHIN 14 DAYS OF SUBSTANTIAL COMPLETION OF GRADING, INCLUDING AREAS TO REMAIN DORMANT FOR LONGER THAN 30 DAYS, WHICHEVER IS LESS. THIS MAY REQUIRE MULTIPLE MOBILIZATIONS FOR SEEDING AND MULCHING.
- HYDRAULIC SEEDING AND HYDRAULIC MULCHING ARE NOT AN ACCEPTABLE METHOD OF SEEDING OR MULCHING IN ARAPAHOE COUNTY. MECHANICALLY APPLIED EROSION CONTROL PRODUCTS WILL BE ALLOWED FOR FLEXIBLE GROWTH MEDIUM, AS APPROVED.
- ALL INTERIM INLET PROTECTION SHALL BE INSTALLED PRIOR TO PAVING.
- ALL SINGLE FAMILY RESIDENTIAL PROJECTS SHALL COMPLY WITH THE GESC MANUAL, SECTION 9, THROUGHOUT THE BUILDING PERMIT PROCESS.

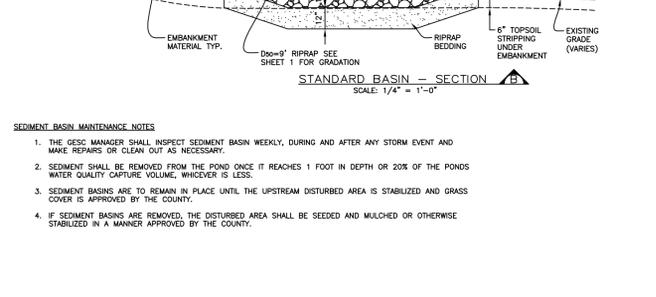
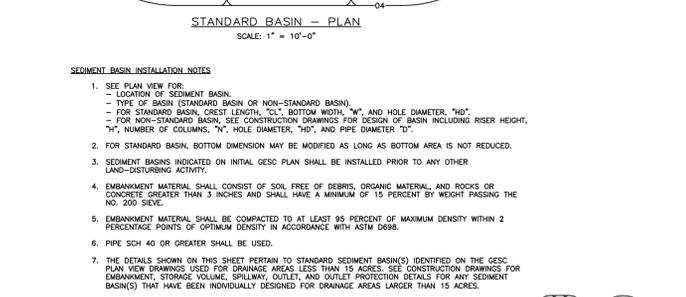
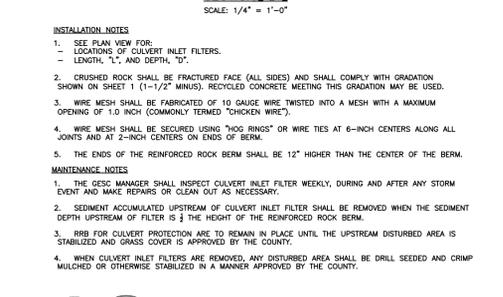
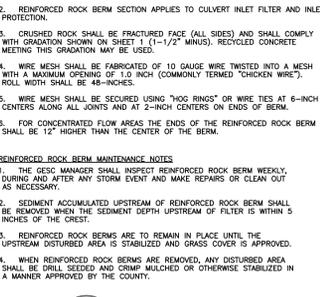
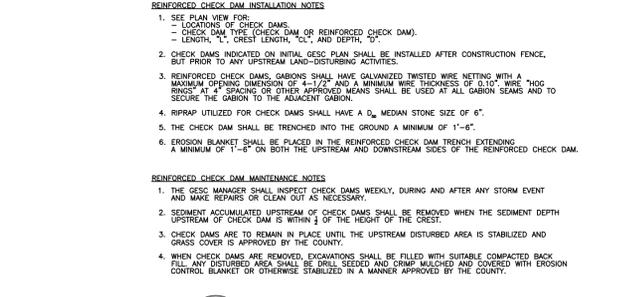
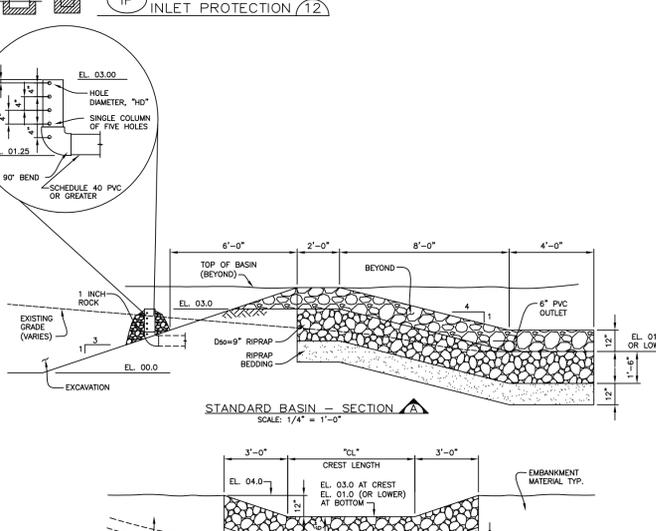
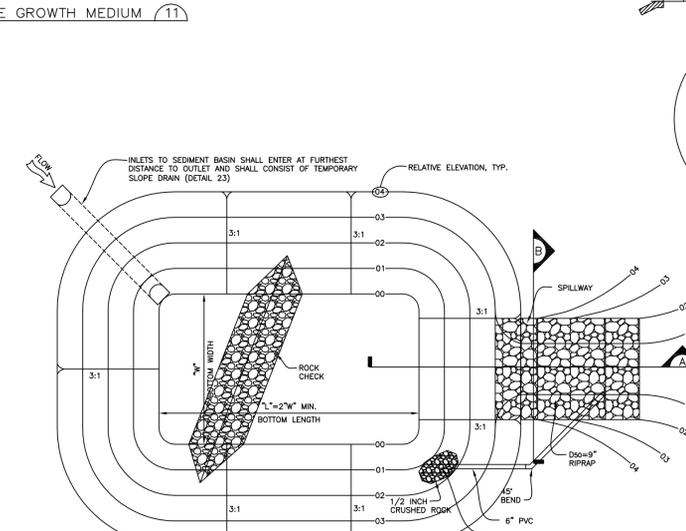
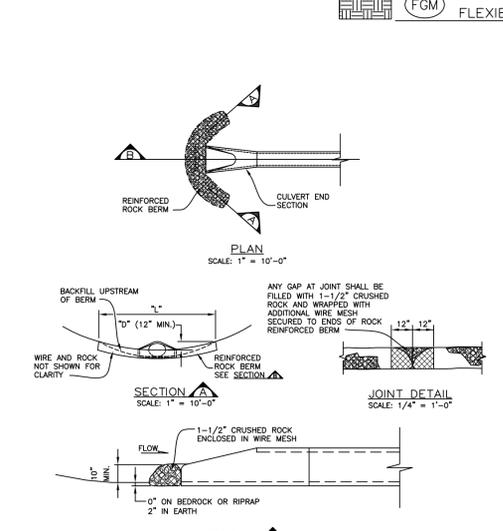
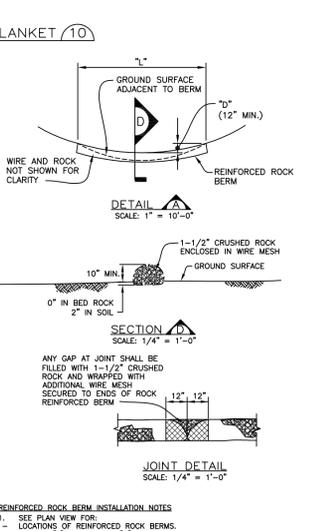
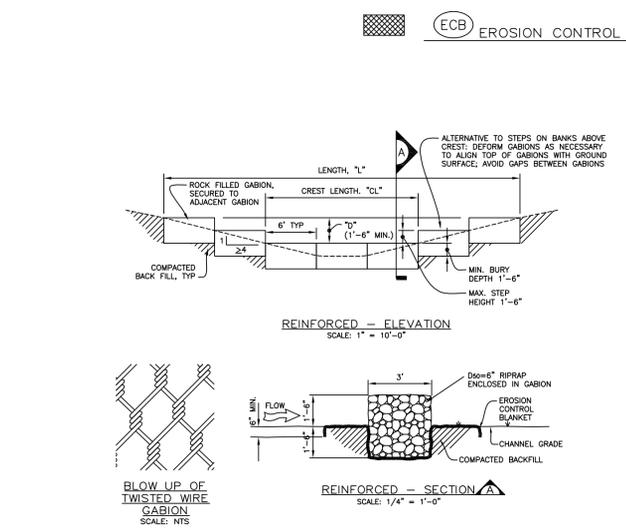
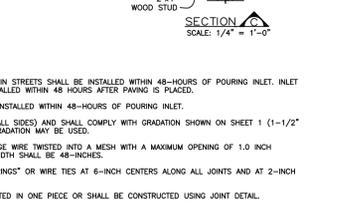
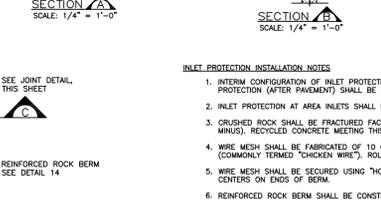
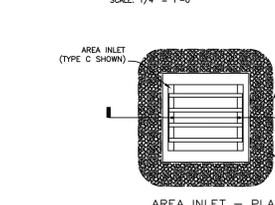
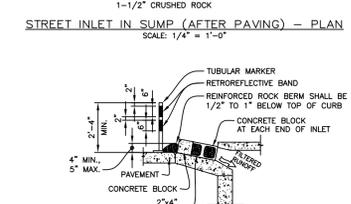
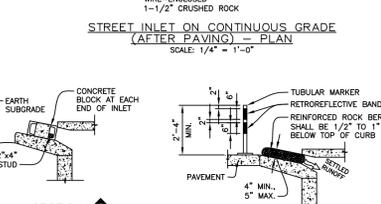
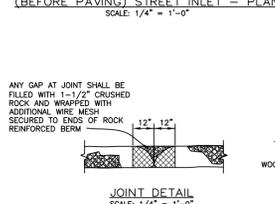
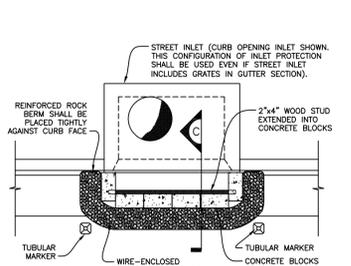
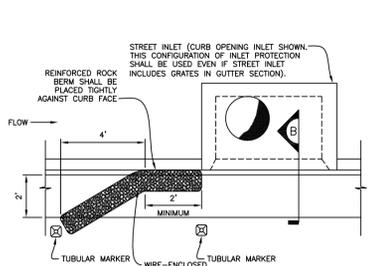
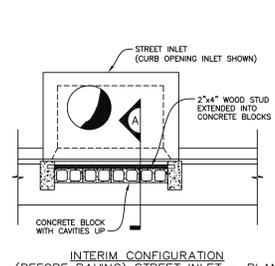
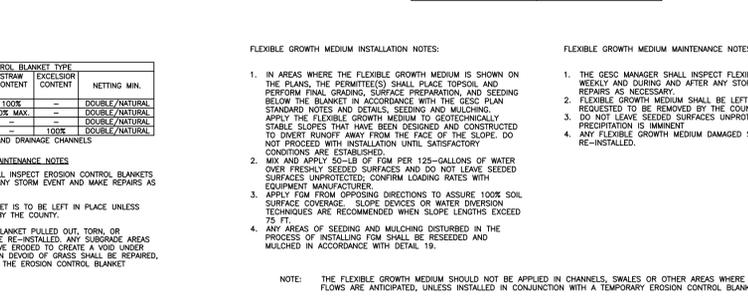


- DETAIL SHEET**
- | NO. | NO. | BMP LEGEND |
|-----|-----|-------------------------------|
| 1 | 1 | CD CHECK DAM |
| 2 | 1 | CB COMPOST BLANKET |
| 3 | 1 | CFB COMPOST FILTER BERM |
| 4 | 1 | CWA CONCRETE WASHOUT AREA |
| 5 | 1 | CF CONSTRUCTION FENCE |
| 6 | 1 | CM CONSTRUCTION MARKERS |
| 7 | 1 | CS CURB SOCK-INLET PROTECTION |
| 8 | 1 | DW DEWATERING |
| 9 | 1 | DD DIVERSION DITCH |
| 10 | 1 | ECB EROSION CONTROL BLANKET |
| 11 | 2 | FGM FLEXIBLE GROWTH MEDIUM |
| 12 | 2 | IP INLET PROTECTION |
| 13 | 2 | RDD REINFORCED CHECK DAM |
| 14 | 2 | RRB REINFORCED ROCK BERM |
| 15 | 2 | RRR RRB FOR CURB PROTECTION |
| 16 | 2 | SB SEDIMENT BASIN |
| 17 | 3 | SCL SEDIMENT CONTROL LOG |
| 18 | 3 | ST SEDIMENT TRAP |
| 19 | 3 | SM SEEDING AND MULCHING |
| 20 | 3 | SF SILT FENCE |
| 21 | 3 | SSA STABILIZED STAGING AREA |
| 22 | 3 | SR SURFACE ROUGHENING |
| 23 | 3 | TSD TEMPORARY SLOPE DRAIN |
| 24 | 3 | TSC TEMPORARY STREAM CROSSING |
| 25 | 3 | TER TERRACING |
| 26 | 3 | VTC VEHICLE TRACKING CONTROL |
| 27 | 3 | WV WITH WHEEL WASH |
| | 1 | ROCK AND RIPRAP GRADATIONS |
| | | LOC LIMITS OF CONSTRUCTION |





SLOPE CONDITION	APPLICATION RATE
≤3H:1V	3000 LBI/ACRE
BELOW ECB	1500 LBI/ACRE

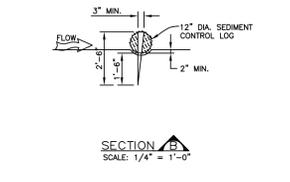
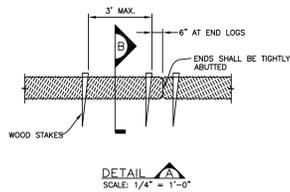


DEPARTMENT OF PUBLIC WORKS AND DEVELOPMENT - ENGINEERING SERVICES DIVISION

GESC GRADING, EROSION, AND SEDIMENT CONTROL

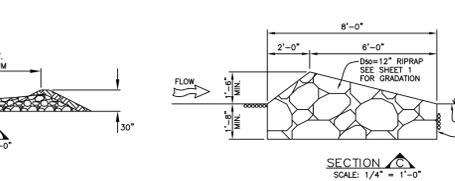
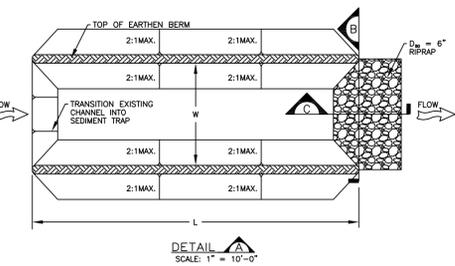
GESC PLAN
STANDARD NOTES AND DETAILS
JANUARY 2005, REVISED JANUARY 2010

SHEET 2 OF 3



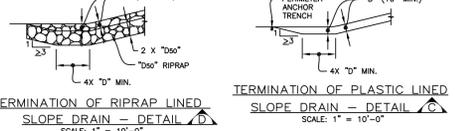
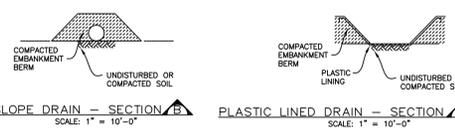
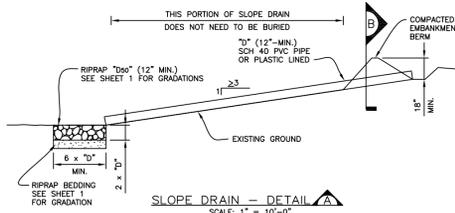
- SEDIMENT CONTROL LOG INSTALLATION NOTES**
- SEE PLAN VIEW FOR:
 - LOCATION AND LENGTH OF SEDIMENT CONTROL LOG.
 - SEDIMENT CONTROL LOGS INDICATED ON INITIAL GESC PLAN SHALL BE INSTALLED PRIOR TO ANY LAND-DISTURBING ACTIVITIES.
 - SEDIMENT CONTROL LOGS SHALL CONSIST OF STRAW, COMPOST, EXCESSOR, OR COCOFIBER.
 - NOT FOR USE IN CONCENTRATED FLOW AREAS.
 - THE SEDIMENT CONTROL LOG SHALL BE TRENCHED INTO THE GROUND A MINIMUM OF 2".

- SEDIMENT CONTROL LOG MAINTENANCE NOTES**
- THE GESC MANAGER SHALL INSPECT SEDIMENT CONTROL LOGS DAILY, DURING AND AFTER ANY STORM EVENT AND MAKE REPAIRS OR CLEAN OUT UPSTREAM SEDIMENT AS NECESSARY.
 - SEDIMENT ACCUMULATED UPSTREAM OF SEDIMENT CONTROL LOGS SHALL BE REMOVED WHEN THE UPSTREAM SEDIMENT DEPTH IS WITHIN 1/2 THE HEIGHT OF THE CREST OF LOG.
 - SEDIMENT CONTROL LOG SHALL BE REMOVED AT THE END OF CONSTRUCTION, IF ANY UNDISTURBED AREA EXISTS AFTER REMOVAL, IT SHALL BE DRILL SEEDED AND CRIMP MULCHED OR OTHERWISE STABILIZED IN A MANNER APPROVED BY THE COUNTY.



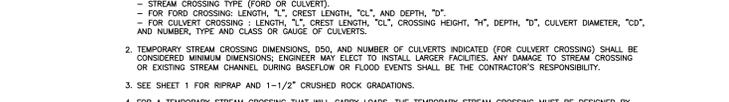
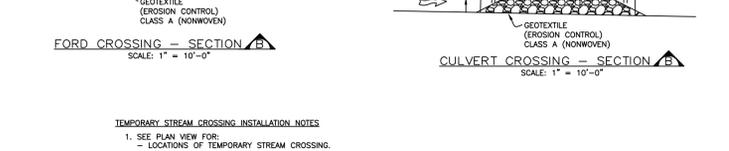
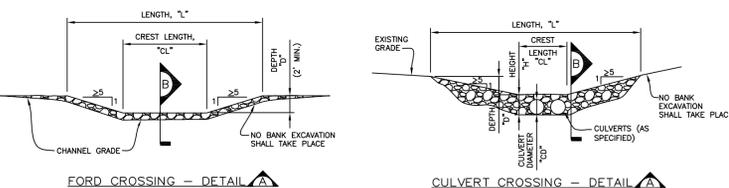
- SEDIMENT TRAP INSTALLATION NOTES**
- SEE PLAN VIEW FOR:
 - LOCATION, LENGTH AND WIDTH OF SEDIMENT TRAP.
 - SEDIMENT TRAP INDICATED ON INITIAL GESC PLAN SHALL BE INSTALLED PRIOR TO ANY LAND-DISTURBING ACTIVITIES.
 - SEDIMENT TRAP BERM SHALL BE CONSTRUCTED FROM MATERIAL FROM EXCAVATION, THE BERM SHALL BE COMPACTED TO 95% OF THE MAXIMUM DENSITY IN ACCORDANCE WITH ASTM D698.
 - RRIPRAP OUTLET SHALL BE CONSTRUCTED WITH D₉₀=12" RRIPRAP WITH A MINIMUM OVERFLOW OF 6".
 - THE TOP OF THE EARTHEN BERM SHALL BE A MINIMUM OF 6" HIGHER THAN THE TOP OF THE RRIPRAP OUTLET STRUCTURE.
 - THE ENDS OF THE RRIPRAP OUTLET STRUCTURE SHALL BE MINIMUM OF 6" HIGHER THAN THE CENTER OF THE OUTLET STRUCTURE.

- SEDIMENT TRAP MAINTENANCE NOTES**
- THE GESC MANAGER SHALL INSPECT SEDIMENT TRAPS WEEKLY, DURING AND AFTER ANY STORM EVENT AND MAKE REPAIRS OR CLEAN OUT UPSTREAM SEDIMENT AS NECESSARY.
 - SEDIMENT ACCUMULATED UPSTREAM OF RRIPRAP SHALL BE REMOVED WHEN THE UPSTREAM SEDIMENT DEPTH IS WITHIN 1/2 THE HEIGHT OF THE RRIPRAP STRUCTURE.
 - SEDIMENT TRAPS SHALL REMAIN IN PLACE UNTIL THE UPSTREAM DISTURBED AREA IS STABILIZED AND GRASS COVERAGE IS APPROVED BY THE COUNTY.
 - WHEN SEDIMENT TRAPS ARE REMOVED THE DISTURBED AREA SHALL BE DRILLED SEEDED AND CRIMP MULCHED OR STABILIZED IN A MANNER APPROVED BY THE COUNTY.



- TERMINATION OF RIPRAP LINED SLOPE DRAIN - SECTION A**
-

- TERMINATION OF PLASTIC LINED SLOPE DRAIN - DETAIL A**
-



- TEMPORARY STREAM CROSSING INSTALLATION NOTES**
- SEE PLAN VIEW FOR:
 - LOCATIONS OF TEMPORARY STREAM CROSSING.
 - STREAM CROSSING TYPE (FORD OR CULVERT).
 - FOR FORD CROSSINGS: LENGTH, "L", CREST LENGTH, "CL", AND DEPTH, "D".
 - FOR CULVERT CROSSING: LENGTH, "L", CREST LENGTH, "CL", CROSSING HEIGHT, "H", DEPTH, "D", CULVERT DIAMETER, "CD", AND NUMBER, TYPE AND CLASS OR GAUGE OF CULVERTS.
 - TEMPORARY STREAM CROSSINGS DIMENSIONS, PSD, AND NUMBER OF CULVERTS INDICATED (FOR CULVERT CROSSING) SHALL BE CONSIDERED MINIMUM DIMENSIONS; ENGINEER MAY ELECT TO INSTALL LARGER FACILITIES. ANY DAMAGE TO STREAM CROSSING OR EXISTING STREAM CHANNEL DURING BASEFLOW OR FLOOD EVENTS SHALL BE THE CONTRACTOR'S RESPONSIBILITY.
 - SEE SHEET 1 FOR RRIPRAP AND 1-1/2" CRUSHED ROCK GRADATIONS.
 - FOR A TEMPORARY STREAM CROSSING THAT WILL CARRY LOADS, THE TEMPORARY STREAM CROSSING MUST BE DESIGNED BY THE DESIGN ENGINEER.



ARAPAHOE COUNTY PERMANENT DRILL SEEDING MIX

SPECIES	VARIETY	NOTES	% IN MIX	POUNDS OF PLS PER ACRE
BIG BLUESTEM	KAW	PWNS	10	1.1
YELLOW INDOGRASS	CHEYENNE	PWNS	10	1
SWITCHGRASS	BLACKWELL	PWNS	10	0.4
SIDCOATS GRAMA	VAUGHN	PWNB	10	0.9
WESTERN WHEATGRASS	ARRIBA	PWNS	10	1.6
BLUE GRAMA	HACHITA	PWNB	10	0.3
THICKSPRIE WHEATGRASS	CRITANA	PWNS	10	1
PRAIRIE SANDREED	GOSHEN	PWNS	10	0.7
GREEN NEEDLEGRASS	LORDOM	PWNB	10	1
SLENDER WHEATGRASS	PRYOR	PWNB	5	0.6
STREAMBANK WHEATGRASS	SODAR	PWNS	5	0.6
TOTAL				9.2

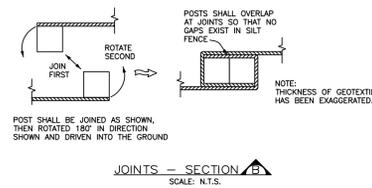
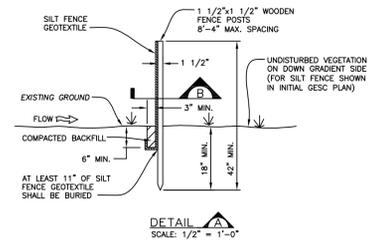
ARAPAHOE COUNTY TEMPORARY DRILL SEEDING MIX

SPECIES	VARIETY	NOTES	% IN MIX	POUNDS OF PLS PER ACRE
SMOOTH BROMEGRASS	LINCOLN	PICS	30	3.9
INTERMEDIATE WHEATGRASS	GAHE	PICS	30	4.5
PURISCHENT WHEATGRASS	LUNA	PICS	30	4.2
ANNUAL RYEGRASS	N/A	AICB	10	0.8
TOTAL				13.4

ARAPAHOE COUNTY LOW-GROWTH DRILL SEEDING MIX

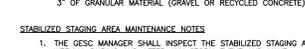
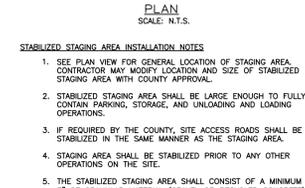
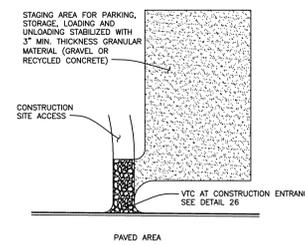
SPECIES	VARIETY	NOTES	% IN MIX	POUNDS OF PLS PER ACRE
BUFFALOGRASS	TEXOKA	PWNS	20	3.2
BLUE GRAMA	HACHITA	PWNB	20	0.6
WESTERN WHEATGRASS	ARRIBA	PWNS	20	3.2
SIDCOATS GRAMA	VAUGHN	PWNB	20	1.8
THICKSPRIE WHEATGRASS	CRITANA	PWNS	10	1
STREAMBANK WHEATGRASS	SODAR	PWNS	10	1.2
TOTAL				11.0

- SEEDING AND MULCHING MAINTENANCE NOTES**
- SEEDING AND MULCHING AREAS SHALL BE INSPECTED FOR REQUIRED COVERAGE MONTHLY FOR A PERIOD OF TWO YEARS FOLLOWING INITIAL SEEDING. REPAIRS TO AREAS FAILING TO MEET THE REQUIRED COVERAGE SHALL BE UNDERTAKEN AFTER THE FIRST GROWING SEASON FOR ANY AREAS FAILING TO MEET THE REQUIRED COVERAGE.
 - REQUIRED COVERAGE FOR TURF GRASS AREAS SHALL BE DEFINED AS FOLLOWS:
 - AT LEAST 80% VEGETATIVE COVER OF GRASS SPECIES PLANTED.
 - NO BARE AREAS LARGER THAN 4 SQUARE FEET (TWO-FEET BY TWO-FEET OR EQUIVALENT).
 - FREE OF ERODED AREAS.
 - FREE FROM INFESTATION OF NOXIOUS WEEDS IN ACCORDANCE WITH APPENDIX V OF THE GESC CRITERIA MANUAL.
 - REQUIRED COVERAGE FOR TURF GRASS AREAS SHALL BE DEFINED AS FOLLOWS:
 - AT LEAST 80% VEGETATIVE COVER OF GRASS SPECIES PLANTED.
 - NO BARE AREAS LARGER THAN 4 SQUARE FEET (TWO-FEET BY TWO-FEET OR EQUIVALENT).
 - FREE OF ERODED AREAS.
 - FREE FROM INFESTATION OF NOXIOUS WEEDS IN ACCORDANCE WITH APPENDIX V OF THE GESC CRITERIA MANUAL.
 - RILL AND GULLY EROSION SHALL BE FILLED WITH TOPSOIL PRIOR TO RESEEDING. THE RESEEDING METHOD SHALL BE APPROVED BY THE COUNTY.



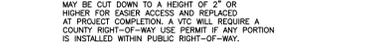
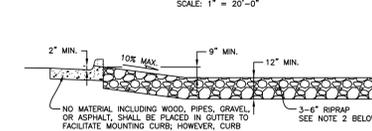
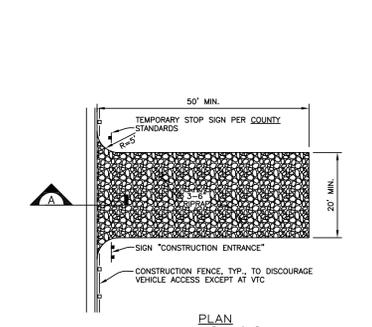
- SILT FENCE INSTALLATION NOTES**
- SEE PLAN VIEW FOR:
 - LOCATION AND LENGTH OF FENCE.
 - ANCHOR TRENCH SHALL BE EXCAVATED WITH TRENCHER, OR WITH SILT FENCE INSTALLATION MACHINE, NO ROAD GRADERS, BACKHOES, ETC. SHALL BE USED. TRENCH SHALL BE COMPACTED BY HAND, WITH "JUMPING JACK", OR BY WHEEL ROLLING. COMPACTION SHALL BE SUCH THAT SILT FENCE RESISTS BEING PULLED OUT OF ANCHOR TRENCH BY HAND.
 - SILT FENCE GEOTEXTILE SHALL MEET THE FOLLOWING REQUIREMENTS:
 - 6- TO 12-GALLONS PER MINUTE PER SQUARE FOOT FLOW CAPACITY.
 - 90 LB. TENSILE STRENGTH PER ASTM D4422.
 - UV RESISTANT AT 500 HRS MIN. 70% STRENGTH RETAINED PER ASTM D 4355.
 - SILT FENCE INDICATED ON INITIAL GESC PLAN SHALL BE INSTALLED PRIOR TO ANY LAND-DISTURBING ACTIVITIES.

- SILT FENCE MAINTENANCE NOTES**
- THE GESC MANAGER SHALL INSPECT SILT FENCE DAILY, DURING AND AFTER ANY STORM EVENT AND MAKE REPAIRS OR CLEAN OUT UPSTREAM SEDIMENT AS NECESSARY.
 - SEDIMENT ACCUMULATED UPSTREAM OF SILT FENCE SHALL BE REMOVED WHEN THE UPSTREAM SEDIMENT REACHES A DEPTH OF 6-INCHES.
 - SILT FENCE SHALL BE REMOVED WHEN THE UPSTREAM DISTURBED AREA IS STABILIZED AND GRASS COVER IS APPROVED BY THE COUNTY. IF ANY UNDISTURBED AREA EXISTS AFTER REMOVAL, IT SHALL BE SEEDED AND MULCHED OR OTHERWISE STABILIZED IN A MANNER APPROVED BY THE COUNTY.



- STABILIZED STAGING AREA INSTALLATION NOTES**
- SEE PLAN VIEW FOR GENERAL LOCATION OF STAGING AREA. CONTRACTOR MAY MODIFY LOCATION AND SIZE OF STABILIZED STAGING AREA WITH COUNTY APPROVAL.
 - STABILIZED STAGING AREA SHALL BE LARGE ENOUGH TO FULLY CONTAIN PARKING, STORAGE, AND UNLOADING AND LOADING OPERATIONS.
 - IF REQUIRED BY THE COUNTY, SITE ACCESS ROADS SHALL BE STABILIZED IN THE SAME MANNER AS THE STAGING AREA.
 - STAGING AREA SHALL BE STABILIZED PRIOR TO ANY OTHER OPERATIONS ON THE SITE.
 - THE STABILIZED STAGING AREA SHALL CONSIST OF A MINIMUM OF 3" OF GRANULAR MATERIAL (GRAVEL OR RECYCLED CONCRETE).

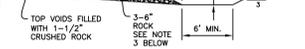
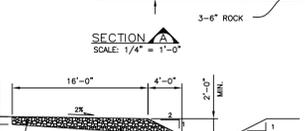
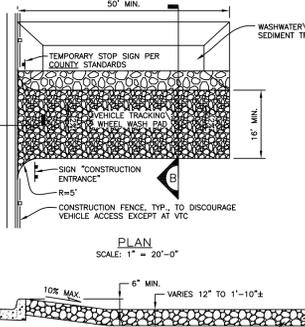
- STABILIZED STAGING AREA MAINTENANCE NOTES**
- THE GESC MANAGER SHALL INSPECT THE STABILIZED STAGING AREA WEEKLY, DURING AND AFTER ANY STORM EVENT AND MAKE REPAIRS OR CLEAN OUT UPSTREAM SEDIMENT AS NECESSARY.
 - GESC MANAGER SHALL PROVIDE ADDITIONAL THICKNESS OF GRANULAR MATERIAL TO BE REMOVED WHEN THE UNDERLYING SUBGRADE BECOMES EXPOSED.
 - STABILIZED STAGING AREA SHALL BE ENLARGED IF NECESSARY TO CONTAIN PARKING, STORAGE, AND UNLOADING AND LOADING OPERATIONS.
 - ANY ACCUMULATED DIRT OR MUD SHALL BE REMOVED FROM THE SURFACE OF THE STABILIZED STAGING AREA.
 - THE STABILIZED STAGING AREA SHALL BE REMOVED AT THE END OF CONSTRUCTION. THE GRANULAR MATERIAL SHALL BE REMOVED OR, IF APPROVED BY THE COUNTY, USED ON SITE, AND THE AREA TOPSOILED, DRILL SEEDED AND CRIMP MULCHED OR OTHERWISE STABILIZED.



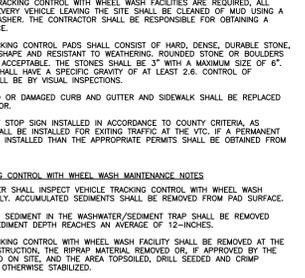
- VEHICLE TRACKING CONTROL INSTALLATION NOTES**
- VEHICLE TRACKING CONTROL PADS SHALL BE INSTALLED AT EVERY ACCESS POINT TO SITE.
 - VEHICLE TRACKING CONTROL PADS SHALL CONSIST OF HARD, DENSE, DURABLE STONE, ANGULAR IN SHAPE AND RESISTANT TO WEATHERING. ROUNDED STONE OR BOLDERS WILL NOT BE ACCEPTABLE. THE STONES SHALL BE 3" WITH A MAXIMUM SIZE OF 6". THE STONE SHALL HAVE A SPECIFIC GRAVITY OF AT LEAST 2.6. CONTROL OF GRADATION WILL BE BY VISUAL INSPECTIONS.
 - ANY CRACKED OR DAMAGED CURB AND GUTTER AND SIDEWALK SHALL BE REPAIRED BY PERMITS.
 - A VTC WILL REQUIRE A COUNTY STREET CUT & RIGHT-OF-WAY PERMIT IF ANY PORTION IS INSTALLED WITHIN PUBLIC RIGHT-OF-WAY.
 - A TEMPORARY STOP SIGN INSTALLED IN ACCORDANCE TO COUNTY CRITERIA, AS MEMBERS SHALL BE INSTALLED FOR EXITING TRAFFIC AT THE VTC. IF A PERMANENT STOP SIGN IS INSTALLED THAN THE APPROPRIATE PERMITS SHALL BE OBTAINED FROM THE COUNTY.

- VEHICLE TRACKING CONTROL MAINTENANCE NOTES**
- GESC MANAGER SHALL INSPECT VEHICLE TRACKING CONTROL DAILY. GRAVEL SURFACE SHALL BE CLEAN AND LOOSE ENOUGH TO RUT SLIGHTLY UNDER WHEEL LOADS AND CAUSE LOOSE GRAVEL TO DISLODGE MUD FROM TIRES. WHEN GRAVEL BECOMES COMPACTED OR FILLED WITH SEDIMENT SO THAT THE EFFECTIVENESS OF THE PAD IS DIMINISHED, CONTRACTOR SHALL RIP, TURN OVER, OR OTHERWISE LOOSEN GRAVEL. PLACE ADDITIONAL NEW GRAVEL, OR REPLACE WITH NEW GRAVEL AS NECESSARY TO RESTORE EFFECTIVENESS.
 - VEHICLE TRACKING CONTROL SHALL BE REMOVED AT THE END OF CONSTRUCTION. THE GRAVEL MATERIAL REMOVED OR, IF APPROVED BY THE COUNTY, USED ON SITE, AND THE AREA TOPSOILED, DRILL SEEDED AND CRIMP MULCHED OR OTHERWISE STABILIZED.

- VEHICLE TRACKING CONTROL WITH WHEEL WASH INSTALLATION NOTES**
- ALTHOUGH NOT NORMALLY USED, THE COUNTY RESERVES THE RIGHT TO REQUIRE VEHICLE TRACKING CONTROL WITH WHEEL WASH FACILITIES AT SITES WHERE TRACKING ONTO PAVED AREAS BECOMES A SIGNIFICANT PROBLEM.
 - IF VEHICLE TRACKING CONTROL WITH WHEEL WASH FACILITIES ARE REQUIRED, ALL WHEELS ON EVERY VEHICLE LEAVING THE SITE SHALL BE CLEANED OF MUD USING A PRESSURE-WASHER. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING A WATER SOURCE.
 - VEHICLE TRACKING CONTROL PADS SHALL CONSIST OF HARD, DENSE, DURABLE STONE, ANGULAR IN SHAPE AND RESISTANT TO WEATHERING. ROUNDED STONE OR BOLDERS WILL NOT BE ACCEPTABLE. THE STONES SHALL BE 3" WITH A MAXIMUM SIZE OF 6". THE STONE SHALL HAVE A SPECIFIC GRAVITY OF AT LEAST 2.6. CONTROL OF GRADATION WILL BE BY VISUAL INSPECTIONS.
 - ANY CRACKED OR DAMAGED CURB AND GUTTER AND SIDEWALK SHALL BE REPAIRED BY PERMITS.
 - A TEMPORARY STOP SIGN INSTALLED IN ACCORDANCE TO COUNTY CRITERIA, AS AMENDED, SHALL BE INSTALLED FOR EXITING TRAFFIC AT THE VTC. IF A PERMANENT STOP SIGN IS INSTALLED THAN THE APPROPRIATE PERMITS SHALL BE OBTAINED FROM THE COUNTY.



- VEHICLE TRACKING CONTROL WITH WHEEL WASH MAINTENANCE NOTES**
- GESC MANAGER SHALL INSPECT VEHICLE TRACKING CONTROL WITH WHEEL WASH FACILITIES DAILY. ACCUMULATED SEDIMENTS SHALL BE REMOVED FROM PAD SURFACE.
 - ACCUMULATED SEDIMENT IN THE WASHWATER/SEDIMENT TRAP SHALL BE REMOVED WHEN THE SEDIMENT DEPTH REACHES AN AVERAGE OF 12-INCHES.
 - VEHICLE TRACKING CONTROL WITH WHEEL WASH FACILITY SHALL BE REMOVED AT THE END OF CONSTRUCTION. THE RIPRAP MATERIAL REMOVED OR, IF APPROVED BY THE COUNTY, USED ON SITE, AND THE AREA TOPSOILED, DRILL SEEDED AND CRIMP MULCHED OR OTHERWISE STABILIZED.



DEPARTMENT OF PUBLIC WORKS AND DEVELOPMENT - ENGINEERING SERVICES DIVISION

GESC GRADING, EROSION, AND SEDIMENT CONTROL

GESC PLAN STANDARD NOTES AND DETAILS JANUARY 2005, REVISED JANUARY 2010

Appendix C

Example GESC Drawings

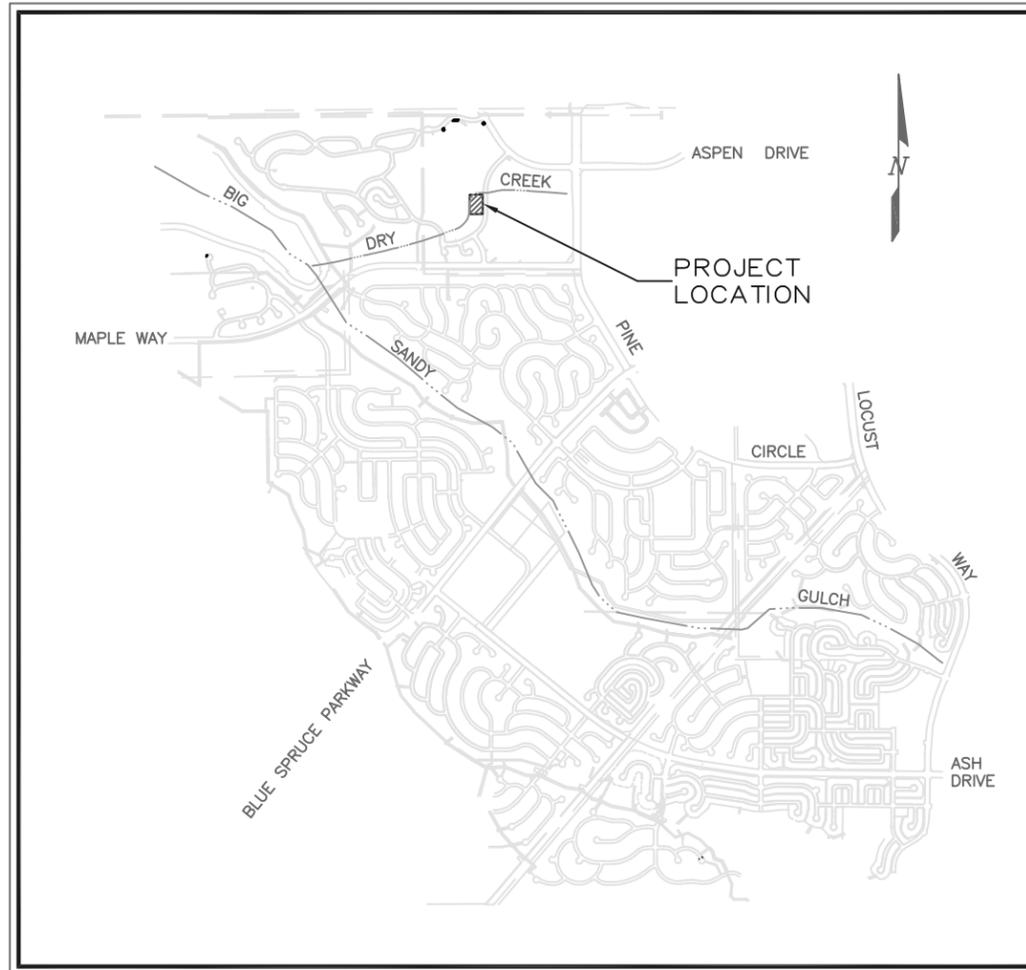
- ◆ Small Site GESC Drawings
- ◆ Utility GESC Drawings
- ◆ Staged GESC Drawings
- ◆ Staged and Phased GESC Drawings
- ◆ Low-Impact GESC Drawings
- ◆ Temporary Batch Plant GESC Drawings

Appendix C

**Small Site
Example GESC Drawings**

CONTRACT DRAWINGS FOR CONSTRUCTION OF
BUSINESS SITE A
 GRADING, EROSION AND SEDIMENT CONTROL PLAN

EXAMPLE
 ARAPAHOE COUNTY
 SMALL SITE GESC DRAWINGS



PROJECT LOCATION: SOUTHWEST QUARTER OF SECTION 9
 TOWNSHIP 6S, RANGE 68W

LOCATION MAP
 SCALE 1"=400'

CALL UTILITY NOTIFICATION
 CENTER OF COLORADO
1-800-922-1987
 CALL 2-BUSINESS DAYS IN ADVANCE
 BEFORE YOU DIG, GRADE, OR EXCAVATE
 FOR THE MARKING OF UNDERGROUND
 MEMBER UTILITIES.

LIST OF DRAWINGS		
SHEET	DRAWING NO	TITLE
GENERAL DRAWINGS		
1	G-1	COVER SHEET
GESC DRAWINGS		
2	E-1	SMALL SITE GESC PLAN
GESC STANDARD NOTES AND DETAILS		
3	SHEET 1	GESC GENERAL NOTES AND LEGEND
4 - 15	SHEETS 2 - 13	GESC DETAILS AND INSTALLATION AND MAINTENANCE NOTES
16	SHEETS 14	ROCK AND RIPRAP GRADATIONS

THE GRADING, EROSION AND SEDIMENT CONTROL PLAN INCLUDED HEREIN HAS BEEN PLACED IN THE ARAPAHOE COUNTY FILE FOR THIS PROJECT AND APPEARS TO FULFILL APPLICABLE ARAPAHOE COUNTY GRADING, EROSION AND SEDIMENT CONTROL CRITERIA. ADDITIONAL GRADING, EROSION AND SEDIMENT CONTROL MEASURES MAY BE REQUIRED OF THE OWNER OR HIS OR 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 SHALL BE THE OBLIGATION OF THE LANDOWNER, OR HIS OR HER DESIGNATED REPRESENTATIVE, UNTIL SUCH TIME AS THE PLAN IS PROPERLY COMPLETED, MODIFIED OR VOIDED.

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

GESC PLANS PREPARED BY:

 AUSTIN ENGINEERING COMPANY INC. DATE PE NUMBER

THE CONSTRUCTION PLANS INCLUDED HEREIN WERE PREPARED UNDER MY DIRECT SUPERVISION IN ACCORDANCE WITH THE REQUIREMENTS OF THE ROADWAY DESIGN AND CONSTRUCTION STANDARDS AND THE STORM DRAINAGE DESIGN AND TECHNICAL CRITERIA OF ARAPAHOE COUNTY.

CONSTRUCTION PLANS PREPARED BY:

 AUSTIN ENGINEERING COMPANY INC. DATE PE NUMBER

THESE GESC PLANS HAVE BEEN REVIEWED BY ARAPAHOE COUNTY FOR GRADING, EROSION, AND SEDIMENT CONTROL IMPROVEMENTS ONLY

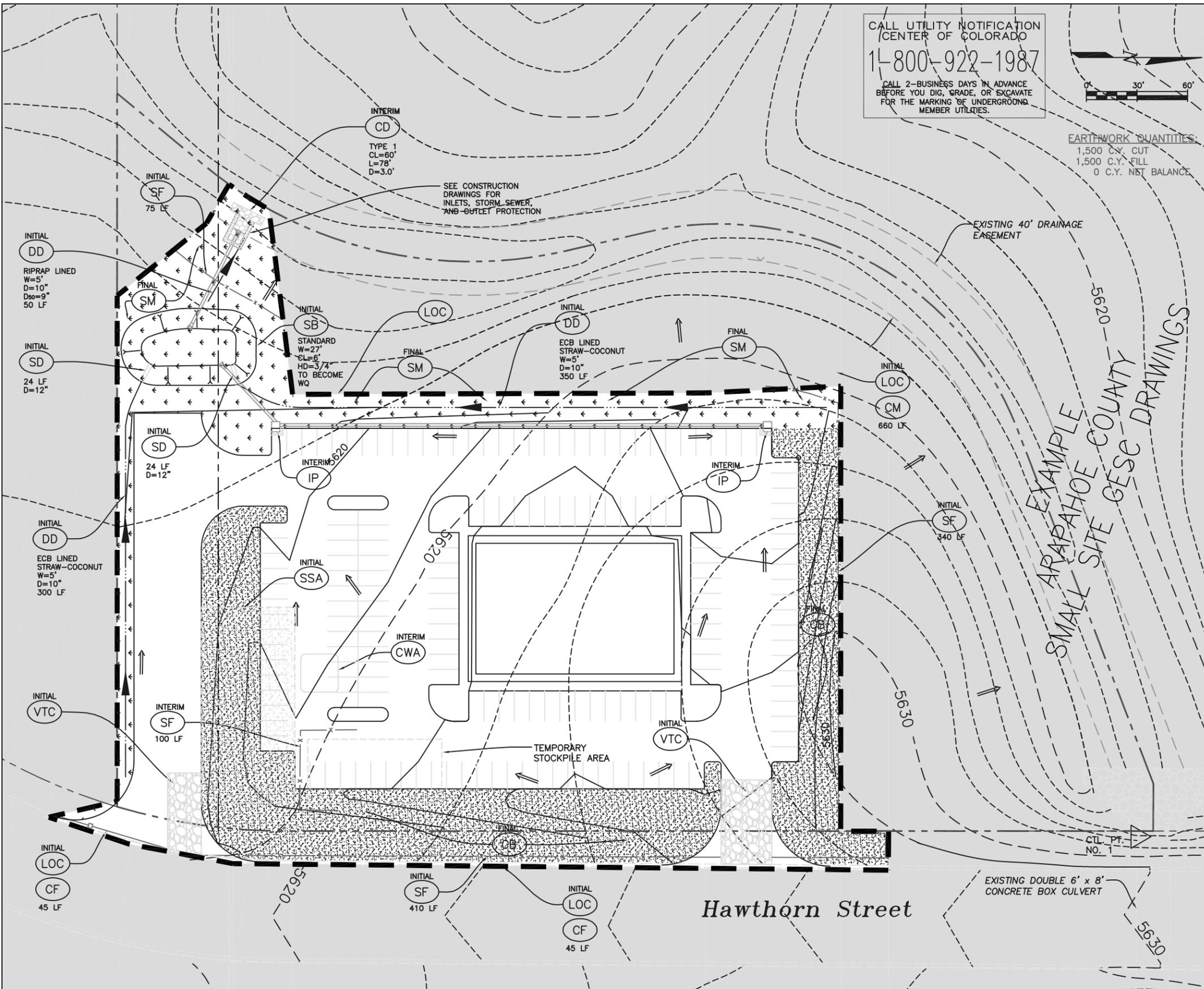
DEPARTMENT OF PUBLIC WORKS AND
 DEVELOPMENT APPROVAL BLOCK

	Sheet Revisions	AUSTIN ENGINEERING CO., INC. CONSULTING ENGINEERS 88 PLAZA DRIVE, SUITE 200 HIGHLANDS RANCH, COLORADO 80126 (303) 324-4897 FAX: (303) 324-4991	JAMESTOWN DEVELOPMENT CO., INC. 7901 GRANT STREET DENVER, COLORADO 80229 (303) 287-1722 FAX: (303) 289-1084	BUSINESS SITE A	COVER SHEET	DRAWING G-1

CALL UTILITY NOTIFICATION
CENTER OF COLORADO
1-800-922-1987
CALL 2-BUSINESS DAYS IN ADVANCE
BEFORE YOU DIG, GRADE, OR EXCAVATE
FOR THE MARKING OF UNDERGROUND
MEMBER UTILITIES.



EARTHWORK QUANTITIES:
1,500 C.Y. CUT
1,500 C.Y. FILL
0 C.Y. NET BALANCE



BMP LEGEND

- CD CHECK DAM
- CB COMPOST BLANKET
- CFB COMPOST FILTER BERM
- CWA CONCRETE WASHOUT AREA
- CF CONSTRUCTION FENCE
- CM CONSTRUCTION MARKER
- DW DEWATERING
- DD DIVERSION DITCH
- ECB EROSION CONTROL BLANKET
- IP INLET PROTECTION
- RCD REINFORCED CHECK DAM
- RRB REINFORCED ROCK BERM
- RRC RRB FOR CULVERT PROTECTION
- SB SEDIMENT BASIN
- SCL SEDIMENT CONTROL LOG
- ST SEDIMENT TRAP
- SM SEEDING AND MULCHING
- SF SILT FENCE
- SSA STABILIZED STAGING AREA
- SR SURFACE ROUGHENING
- TSD TEMPORARY SLOPE DRAIN
- TSC TEMPORARY STREAM CROSSING
- TER TERRACING
- VTC VEHICLE TRACKING CONTROL
- WW VTC WITH WHEEL WASH
- ROCK AND RIPRAP GRADATIONS
- LOC LIMITS OF CONSTRUCTION

- EXISTING 2' CONTOUR
- EXISTING 10' CONTOUR
- PROPOSED 2' CONTOUR
- PROPOSED 10' CONTOUR
- FLOW DIRECTION ARROW
- AREA OUTSIDE LIMITS OF CONSTRUCTION
- AREA TO BE DRILL SEEDED AND CRIMP MULCHED.

NOTES:
 1.) SEE COVER SHEET OF ARAPAHOE COUNTY STANDARD NOTES AND DETAILS (SHEET 1 OF 14) FOR LEGEND OF BMP NAMES AND SYMBOLS.
 2.) CONTROL POINT NO. 1: 3" BRASS CAP ON SOUTH CORNER OF WEST HEADWALL, USGS ELEVATION 5628.23.
 3.) SEE CONSTRUCTION PLANS FOR DETAILS OF PERMANENT DRAINAGE FACILITIES SUCH AS DETENTION FACILITIES, CULVERTS, STORM DRAINAGE AND INLET AND OUTLET PROTECTION.

Sheet Revisions	

AUSTIN ENGINEERING CO., INC.
 CONSULTING ENGINEERS
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 FAX: (303) 324-4991

JAMESTOWN DEVELOPMENT CO., INC.
 7901 GRANT STREET
 DENVER, COLORADO 80229
 (303) 287-1722
 FAX: (303) 289-1084

BUSINESS SITE A

SMALL SITE
 GESC PLAN

DRAWING
 E-1

ARAPAHOE COUNTY STANDARD
GESc NOTES AND DETAILS TO
GO HERE



DEPARTMENT OF PUBLIC WORKS
AND DEVELOPMENT ENGINEERING
DIVISION

GESc GRADING, EROSION, AND
SEDIMENT CONTROL

NOTE: SCALES
SHOW ARE
FOR 22"x34"
SHEETS; ADJUST
ACCORDINGLY
FOR 11"x17"
SHEET

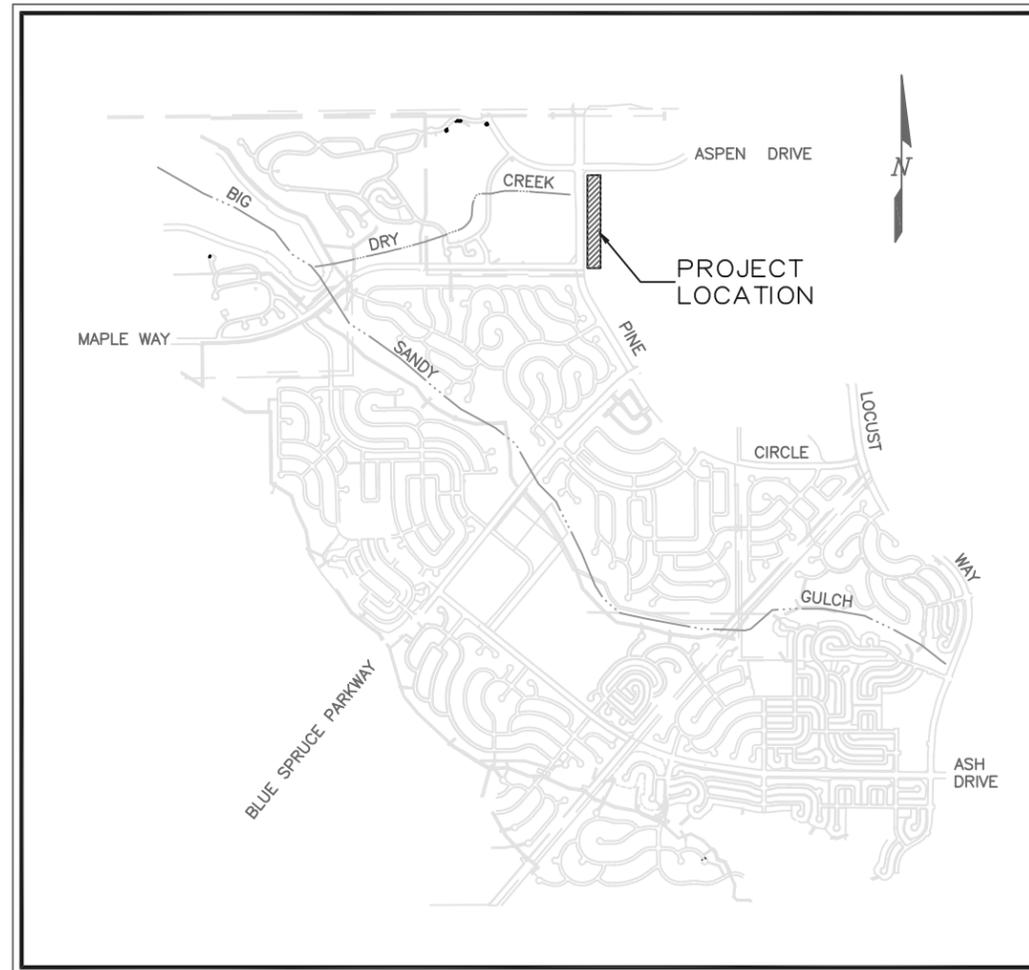
GESc PLAN
STANDARD NOTES AND DETAILS
JANUARY 2005

Appendix C

**Utility
Example GESD Drawings**

CONTRACT DRAWINGS FOR CONSTRUCTION OF
**UTILITY
 GRADING, EROSION AND SEDIMENT CONTROL PLAN**

EXAMPLE
 ARAPAHOE COUNTY
 UTILITY GESC DRAWINGS



PROJECT LOCATION: SOUTHWEST QUARTER OF SECTION 9
 TOWNSHIP 6S, RANGE 68W

LOCATION MAP
 SCALE 1"=400'

CALL UTILITY NOTIFICATION
 CENTER OF COLORADO
1-800-922-1987
 CALL 2-BUSINESS DAYS IN ADVANCE
 BEFORE YOU DIG, GRADE, OR EXCAVATE
 FOR THE MARKING OF UNDERGROUND
 MEMBER UTILITIES.

LIST OF DRAWINGS		
SHEET	DRAWING NO	TITLE
GENERAL DRAWINGS		
1	G-1	COVER SHEET
GESC DRAWINGS		
2	U-1	UTILITY GESC PLAN
3	U-2	UTILITY GESC PLAN
GESC STANDARD NOTES AND DETAILS		
4	SHEET 1	GESC GENERAL NOTES AND LEGEND
5 - 16	SHEETS 2 - 13	GESC DETAILS AND INSTALLATION AND MAINTENANCE NOTES
17	SHEETS 14	ROCK AND RIPRAP GRADATIONS

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GESC PLANS PREPARED BY:

 AUSTIN ENGINEERING COMPANY INC. DATE _____ PE NUMBER _____

THE CONSTRUCTION PLANS INCLUDED HEREIN WERE PREPARED UNDER MY DIRECT SUPERVISION IN ACCORDANCE WITH THE REQUIREMENTS OF THE ROADWAY DESIGN AND CONSTRUCTION STANDARDS AND THE STORM DRAINAGE DESIGN AND TECHNICAL CRITERIA OF ARAPAHOE COUNTY.

CONSTRUCTION PLANS PREPARED BY:

 AUSTIN ENGINEERING COMPANY INC. DATE _____ PE NUMBER _____

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DEPARTMENT OF PUBLIC WORKS AND
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ARAPAHOE COUNTY STANDARD
GESc NOTES AND DETAILS TO
GO HERE



DEPARTMENT OF PUBLIC WORKS
AND DEVELOPMENT ENGINEERING
DIVISION

GESc GRADING, EROSION, AND
SEDIMENT CONTROL

NOTE: SCALES
SHOW ARE
FOR 22"x34"
SHEETS: ADJUST
ACCORDINGLY
FOR 11"x17"
SHEET

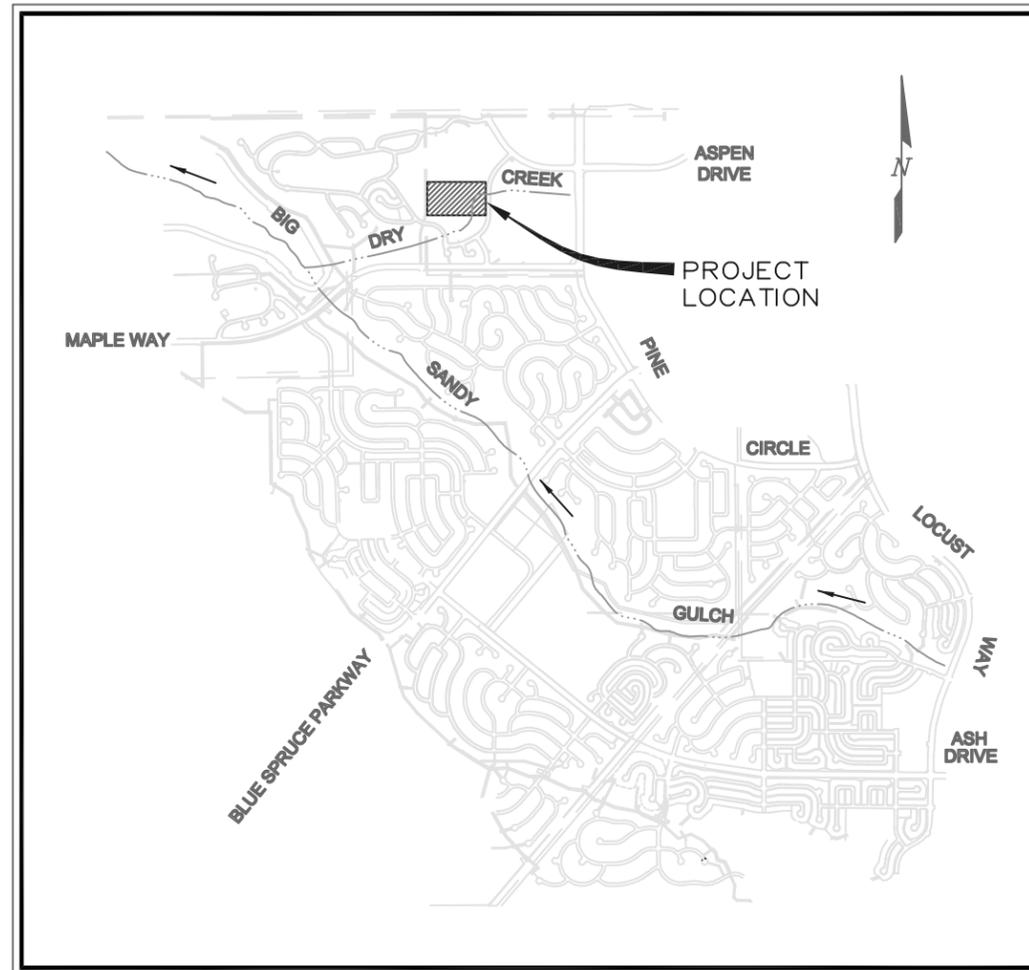
GESc PLAN
STANDARD NOTES AND DETAILS
JANUARY 2005

Appendix C

**Staged
Example GESC Drawings**

CONTRACT DRAWINGS FOR CONSTRUCTION OF
DRY CREEK BUSINESS PARK
 FILING NO. 1
 GRADING, EROSION AND SEDIMENT CONTROL PLAN

EXAMPLE
 ARAPAHOE COUNTY
 STAGED GESC DRAWINGS
 (ONE GRADING PHASE)



PROJECT LOCATION: SOUTHWEST QUARTER OF SECTION 9
 TOWNSHIP 6S, RANGE 68W

LOCATION MAP
 SCALE 1"=400'

CALL UTILITY NOTIFICATION
 CENTER OF COLORADO
1-800-922-1987
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 BEFORE YOU DIG, GRADE, OR EXCAVATE
 FOR THE MARKING OF UNDERGROUND
 MEMBER UTILITIES.

LIST OF DRAWINGS		
SHEET	DRAWING NO	TITLE
GENERAL DRAWINGS		
1	G-1	COVER SHEET
GESC DRAWINGS		
2	E-1	INITIAL GESC PLAN
3	E-2	INTERIM GESC PLAN
4	E-3	FINAL GESC PLAN
GESC STANDARD NOTES AND DETAILS		
5	SHEET 1	GESC GENERAL NOTES AND LEGEND
6 - 17	SHEETS 2 - 13	GESC DETAILS AND INSTALLATION AND MAINTENANCE NOTES
18	SHEET 14	ROCK AND RIPRAP GRADATIONS

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GESC PLANS PREPARED BY:

 AUSTIN ENGINEERING COMPANY INC. DATE PE NUMBER

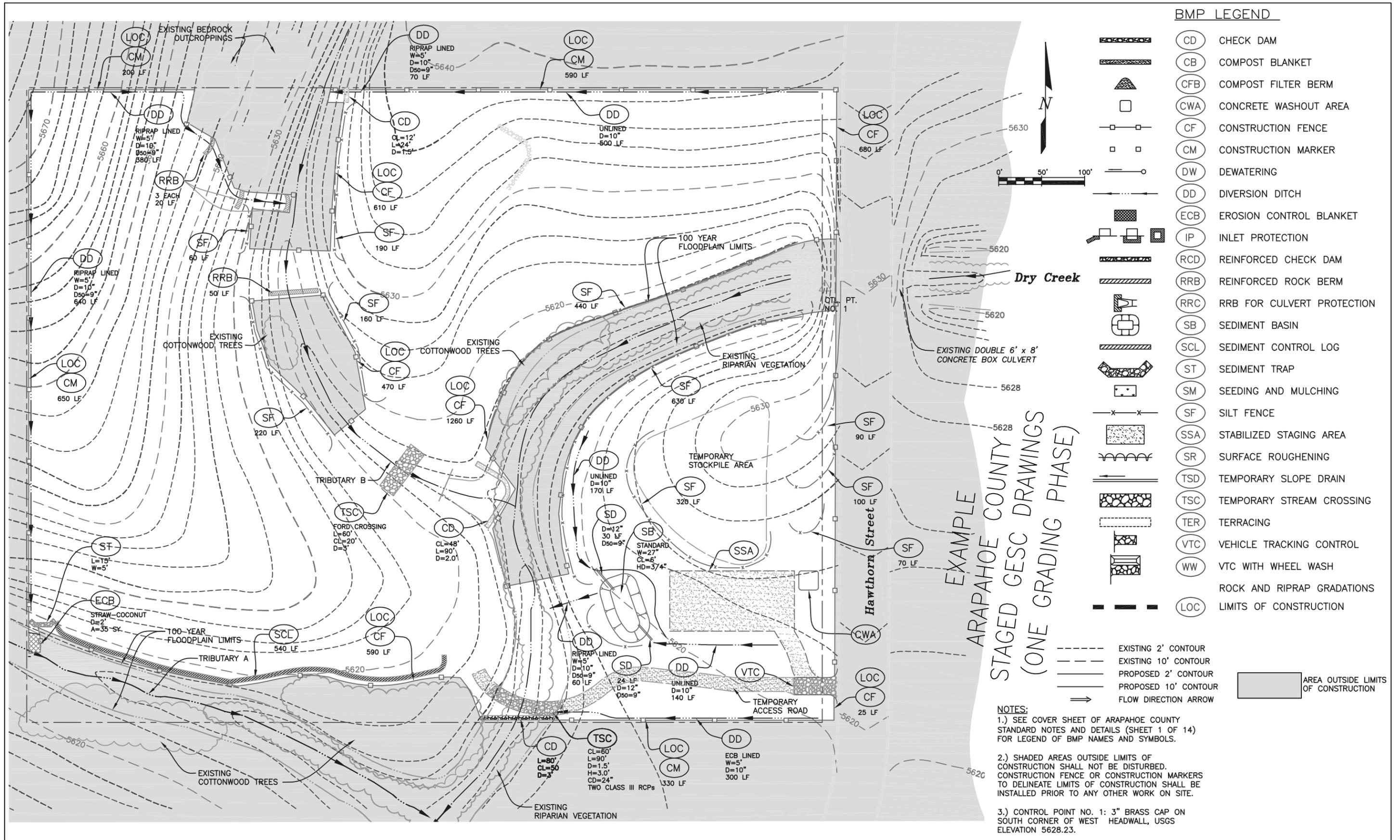
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CONSTRUCTION PLANS PREPARED BY:

 AUSTIN ENGINEERING COMPANY INC. DATE PE NUMBER

THESE GESC PLANS HAVE BEEN REVIEWED BY ARAPAHOE COUNTY FOR GRADING, EROSION, AND SEDIMENT CONTROL IMPROVEMENTS ONLY.
 DEPARTMENT OF PUBLIC WORKS AND DEVELOPMENT APPROVAL BLOCK

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Sheet Revisions	

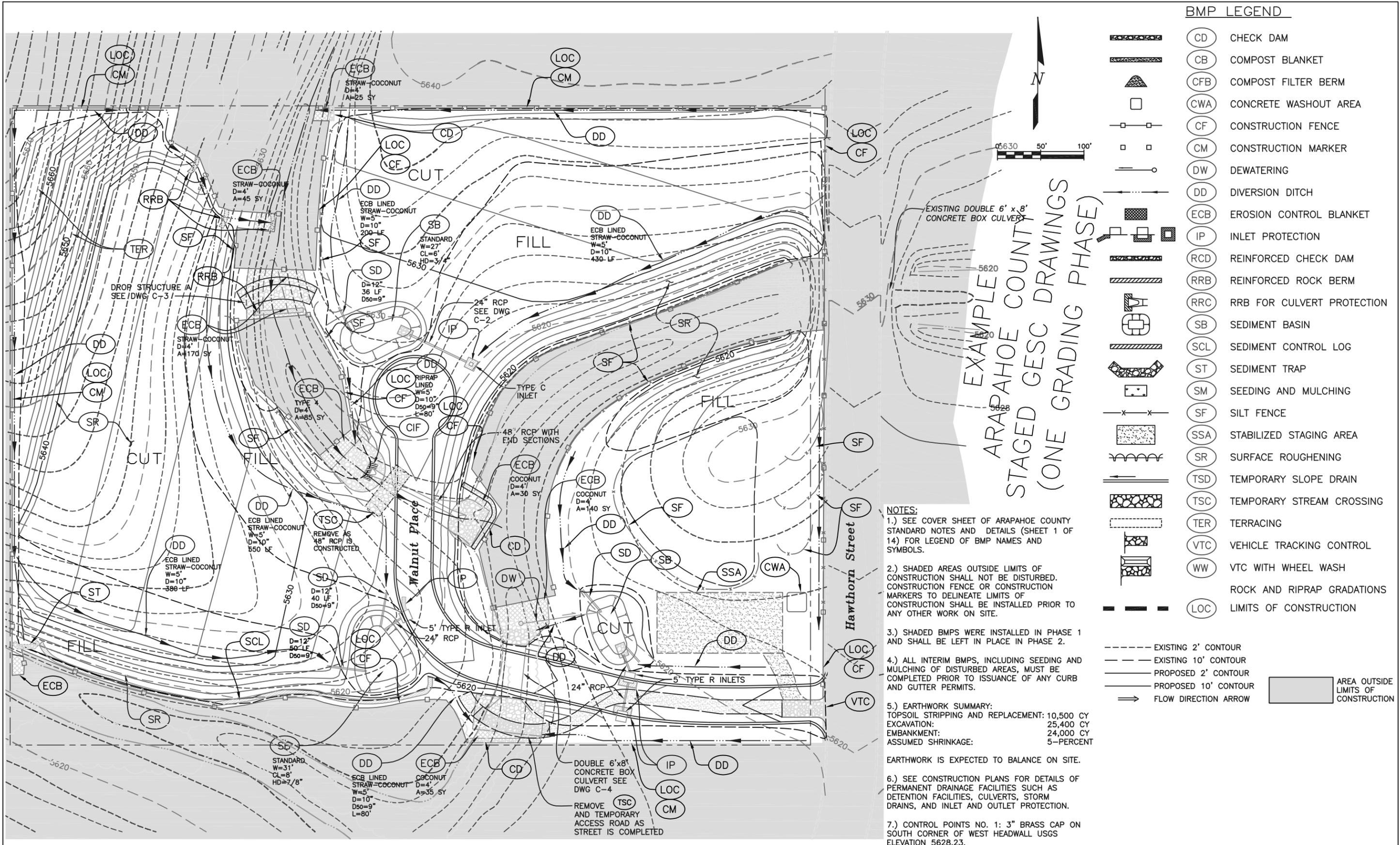
AUSTIN ENGINEERING CO., INC.
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 88 PLAZA DRIVE, SUITE 200
 HIGHLANDS RANCH, COLORADO 80126
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 7901 GRANT STREET
 DENVER, COLORADO 80229
 (303) 287-1722
 FAX: (303) 289-1084

**DRY CREEK
 BUSINESS PARK
 FILING NO. 1**

INITIAL GESC PLAN

**DRAWING
 E-1**



BMP LEGEND

- CD CHECK DAM
- CB COMPOST BLANKET
- CFB COMPOST FILTER BERM
- CWA CONCRETE WASHOUT AREA
- CF CONSTRUCTION FENCE
- CM CONSTRUCTION MARKER
- DW DEWATERING
- DD DIVERSION DITCH
- ECB EROSION CONTROL BLANKET
- IP INLET PROTECTION
- RCD REINFORCED CHECK DAM
- RRB REINFORCED ROCK BERM
- RRC RRB FOR CULVERT PROTECTION
- SB SEDIMENT BASIN
- SCL SEDIMENT CONTROL LOG
- ST SEDIMENT TRAP
- SM SEEDING AND MULCHING
- SF SILT FENCE
- SSA STABILIZED STAGING AREA
- SR SURFACE ROUGHENING
- TSD TEMPORARY SLOPE DRAIN
- TSC TEMPORARY STREAM CROSSING
- TER TERRACING
- VTC VEHICLE TRACKING CONTROL
- WW VTC WITH WHEEL WASH
- ROCK AND RIPRAP GRADATIONS
- LOC LIMITS OF CONSTRUCTION

EXAMPLE
 ARAPAHOE COUNTY
 STAGED GESC DRAWINGS
 (ONE GRADING PHASE)

- NOTES:**
- 1.) SEE COVER SHEET OF ARAPAHOE COUNTY STANDARD NOTES AND DETAILS (SHEET 1 OF 14) FOR LEGEND OF BMP NAMES AND SYMBOLS.
 - 2.) SHADED AREAS OUTSIDE LIMITS OF CONSTRUCTION SHALL NOT BE DISTURBED. CONSTRUCTION FENCE OR CONSTRUCTION MARKERS TO DELINEATE LIMITS OF CONSTRUCTION SHALL BE INSTALLED PRIOR TO ANY OTHER WORK ON SITE.
 - 3.) SHADED BMPs WERE INSTALLED IN PHASE 1 AND SHALL BE LEFT IN PLACE IN PHASE 2.
 - 4.) ALL INTERIM BMPs, INCLUDING SEEDING AND MULCHING OF DISTURBED AREAS, MUST BE COMPLETED PRIOR TO ISSUANCE OF ANY CURB AND GUTTER PERMITS.
 - 5.) EARTHWORK SUMMARY:
 TOPSOIL STRIPPING AND REPLACEMENT: 10,500 CY
 EXCAVATION: 25,400 CY
 EMBANKMENT: 24,000 CY
 ASSUMED SHRINKAGE: 5-PERCENT
 EARTHWORK IS EXPECTED TO BALANCE ON SITE.
 - 6.) SEE CONSTRUCTION PLANS FOR DETAILS OF PERMANENT DRAINAGE FACILITIES SUCH AS DETENTION FACILITIES, CULVERTS, STORM DRAINS, AND INLET AND OUTLET PROTECTION.
 - 7.) CONTROL POINTS NO. 1: 3" BRASS CAP ON SOUTH CORNER OF WEST HEADWALL USGS ELEVATION 5628.23.

- EXISTING 2' CONTOUR
- EXISTING 10' CONTOUR
- PROPOSED 2' CONTOUR
- PROPOSED 10' CONTOUR
- FLOW DIRECTION ARROW
- AREA OUTSIDE LIMITS OF CONSTRUCTION

Sheet Revisions	
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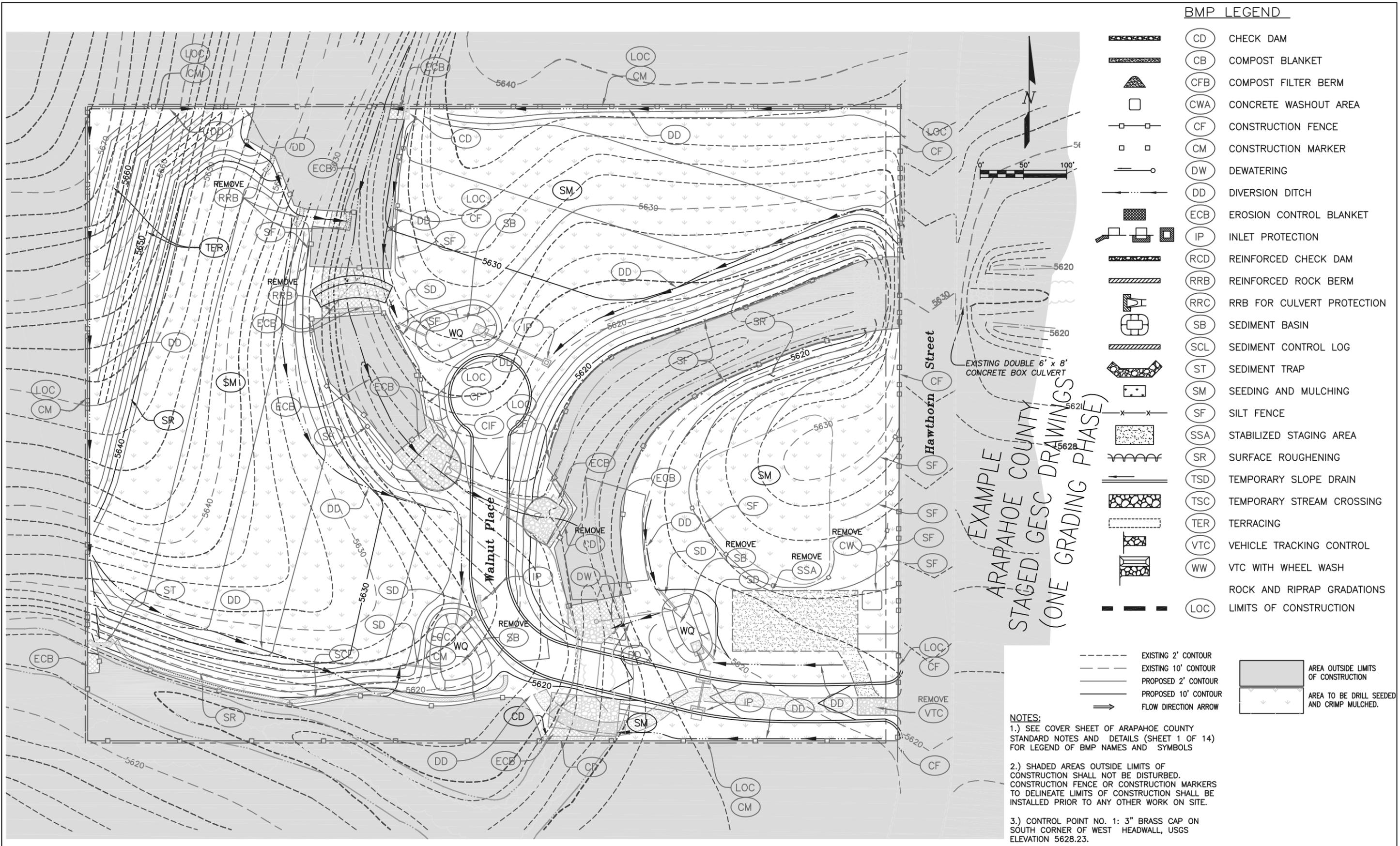
AUSTIN ENGINEERING CO., INC.
 CONSULTING ENGINEERS
 88 PLAZA DRIVE, SUITE 200
 HIGHLANDS RANCH, COLORADO 80126
 (303) 324-4897
 FAX: (303) 324-4991

JAMESTOWN DEVELOPMENT CO., INC.
 7901 GRANT STREET
 DENVER, COLORADO 80229
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 FAX: (303) 289-1084

**DRY CREEK
 BUSINESS PARK
 FILING NO. 1**

INTERIM GESC PLAN

DRAWING
E-2



BMP LEGEND

	CD	CHECK DAM
	CB	COMPOST BLANKET
	CFB	COMPOST FILTER BERM
	CWA	CONCRETE WASHOUT AREA
	CF	CONSTRUCTION FENCE
	CM	CONSTRUCTION MARKER
	DW	DEWATERING
	DD	DIVERSION DITCH
	ECB	EROSION CONTROL BLANKET
	IP	INLET PROTECTION
	RCD	REINFORCED CHECK DAM
	RRB	REINFORCED ROCK BERM
	RRC	RRB FOR CULVERT PROTECTION
	SB	SEDIMENT BASIN
	SCL	SEDIMENT CONTROL LOG
	ST	SEDIMENT TRAP
	SM	SEEDING AND MULCHING
	SF	SILT FENCE
	SSA	STABILIZED STAGING AREA
	SR	SURFACE ROUGHENING
	TSD	TEMPORARY SLOPE DRAIN
	TSC	TEMPORARY STREAM CROSSING
	TER	TERRACING
	VTC	VEHICLE TRACKING CONTROL
	VTC	VTC WITH WHEEL WASH
	LOC	ROCK AND RIPRAP GRADATIONS
	LOC	LIMITS OF CONSTRUCTION

EXAMPLE ARAPAHOE COUNTY STAGED GESC DRAWINGS (ONE GRADING PHASE)

EXISTING DOUBLE 6' x 8' CONCRETE BOX CULVERT

	EXISTING 2' CONTOUR
	EXISTING 10' CONTOUR
	PROPOSED 2' CONTOUR
	PROPOSED 10' CONTOUR
	FLOW DIRECTION ARROW
	AREA OUTSIDE LIMITS OF CONSTRUCTION
	AREA TO BE DRILL SEEDED AND CRIMP MULCHED.

NOTES:

- SEE COVER SHEET OF ARAPAHOE COUNTY STANDARD NOTES AND DETAILS (SHEET 1 OF 14) FOR LEGEND OF BMP NAMES AND SYMBOLS
- SHADED AREAS OUTSIDE LIMITS OF CONSTRUCTION SHALL NOT BE DISTURBED. CONSTRUCTION FENCE OR CONSTRUCTION MARKERS TO DELINEATE LIMITS OF CONSTRUCTION SHALL BE INSTALLED PRIOR TO ANY OTHER WORK ON SITE.
- CONTROL POINT NO. 1: 3" BRASS CAP ON SOUTH CORNER OF WEST HEADWALL, USGS ELEVATION 5628.23.

Sheet Revisions	

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 CONSULTING ENGINEERS
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 DENVER, COLORADO 80229
 (303) 287-1722
 FAX: (303) 289-1084

DRY CREEK
 BUSINESS PARK
 FILING NO. 1

FINAL GESC PLAN

DRAWING
 E-3

ARAPAHOE COUNTY STANDARD
GESc NOTES AND DETAILS TO
GO HERE



DEPARTMENT OF PUBLIC WORKS
AND DEVELOPMENT ENGINEERING
DIVISION

GESc GRADING, EROSION, AND
SEDIMENT CONTROL

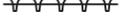
NOTE: SCALES
SHOW ARE
FOR 22"x34"
SHEETS: ADJUST
ACCORDINGLY
FOR 11"x17"
SHEET

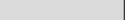
**GESc PLAN
STANDARD NOTES AND DETAILS
JANUARY 2005**

Appendix C

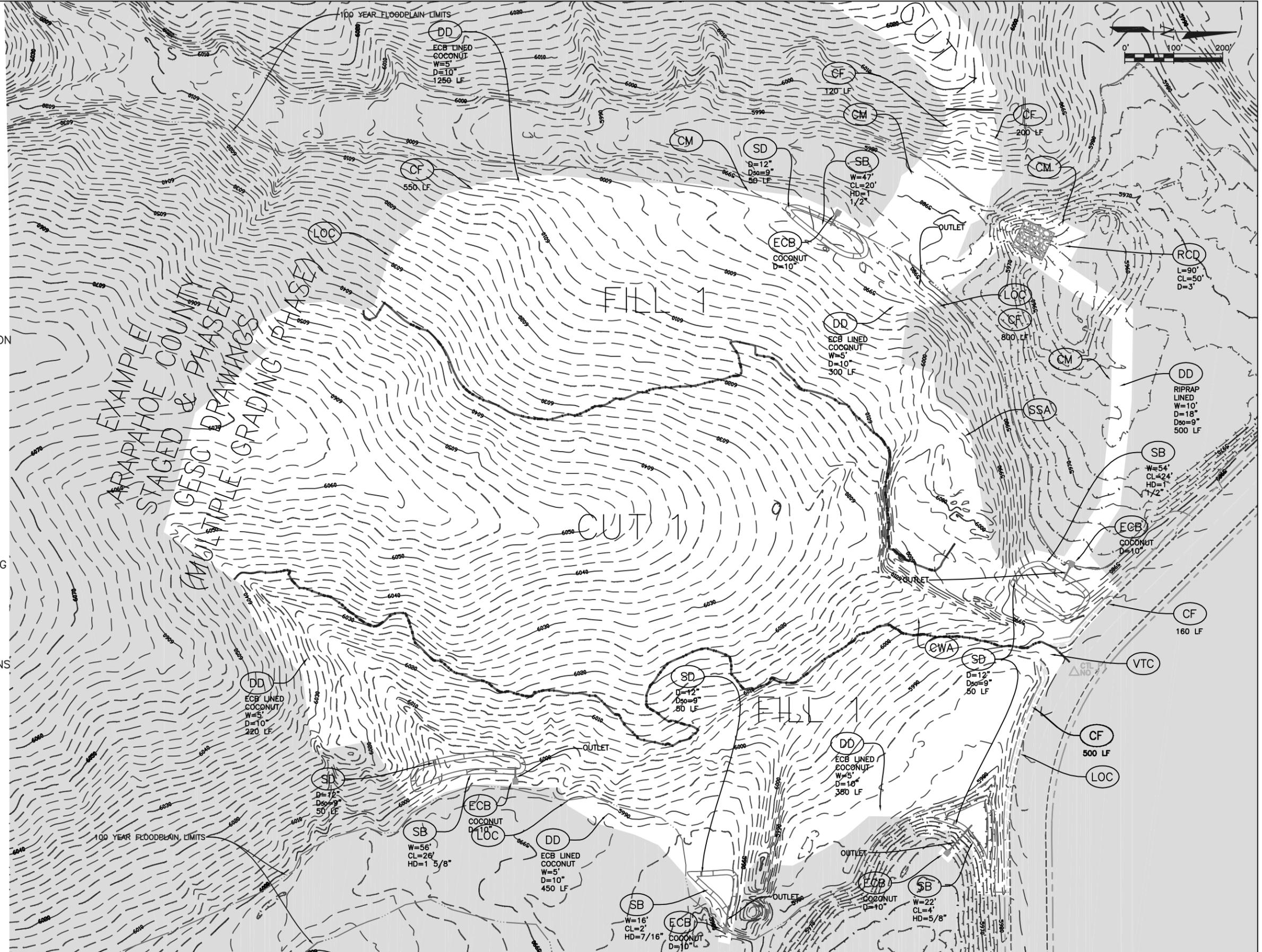
**Staged and Phased
Example GESC Drawings**

BMP LEGEND

-  (CD) CHECK DAM
-  (CB) COMPOST BLANKET
-  (CFB) COMPOST FILTER BERM
-  (CWA) CONCRETE WASHOUT AREA
-  (CF) CONSTRUCTION FENCE
-  (CM) CONSTRUCTION MARKER
-  (DW) DEWATERING
-  (DD) DIVERSION DITCH
-  (ECB) EROSION CONTROL BLANKET
-  (IP) INLET PROTECTION
-  (RCD) REINFORCED CHECK DAM
-  (RRB) REINFORCED ROCK BERM
-  (RRC) RRB FOR CULVERT PROTECTION
-  (SB) SEDIMENT BASIN
-  (SCL) SEDIMENT CONTROL LOG
-  (ST) SEDIMENT TRAP
-  (SM) SEEDING AND MULCHING
-  (SF) SILT FENCE
-  (SSA) STABILIZED STAGING AREA
-  (SR) SURFACE ROUGHENING
-  (TSD) TEMPORARY SLOPE DRAIN
-  (TSC) TEMPORARY STREAM CROSSING
-  (TER) TERRACING
-  (VTC) VEHICLE TRACKING CONTROL
-  (WW) VTC WITH WHEEL WASH
-  ROCK AND RIPRAP GRADATIONS
-  (LOC) LIMITS OF CONSTRUCTION

-  EXISTING 2' CONTOUR
-  EXISTING 10' CONTOUR
-  PROPOSED 2' CONTOUR
-  PROPOSED 10' CONTOUR
-  FLOW DIRECTION ARROW
-  AREA OUTSIDE LIMITS OF CONSTRUCTION

NOTES:
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 2.) CONTROL POINT NO. 7: 3" ALUMINUM INSIDE RANGE BOX, USGS ELEVATION 5958.37.
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Sheet Revisions	

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 DENVER, COLORADO 80229
 (303) 287-1722
 FAX: (303) 289-1084

RESIDENTIAL SITE A

**PHASE I INITIAL
 GESC PLAN**

**DRAWING
 E-1**

BMP LEGEND

- CD CHECK DAM
- CB COMPOST BLANKET
- CFB COMPOST FILTER BERM
- CWA CONCRETE WASHOUT AREA
- CF CONSTRUCTION FENCE
- CM CONSTRUCTION MARKER
- DW DEWATERING
- DD DIVERSION DITCH
- ECB EROSION CONTROL BLANKET
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- TER TERRACING
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- ROCK AND RIPRAP GRADATIONS
- LOC LIMITS OF CONSTRUCTION

- EXISTING 2' CONTOUR
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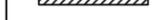
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 7901 GRANT STREET
 DENVER, COLORADO 80229
 (303) 287-1722
 FAX: (303) 289-1084

RESIDENTIAL SITE A

PHASE I INTERIM
 GESC PLAN

DRAWING
 E-2

BMP LEGEND

-  CD CHECK DAM
-  CB COMPOST BLANKET
-  CFB COMPOST FILTER BERM
-  CWA CONCRETE WASHOUT AREA
-  CF CONSTRUCTION FENCE
-  CM CONSTRUCTION MARKER
-  DW DEWATERING
-  DD DIVERSION DITCH
-  ECB EROSION CONTROL BLANKET
-  IP INLET PROTECTION
-  RCD REINFORCED CHECK DAM
-  RRB REINFORCED ROCK BERM
-  RRC RRB FOR CULVERT PROTECTION
-  SB SEDIMENT BASIN
-  SCL SEDIMENT CONTROL LOG
-  ST SEDIMENT TRAP
-  SM SEEDING AND MULCHING
-  SF SILT FENCE
-  SSA STABILIZED STAGING AREA
-  SR SURFACE ROUGHENING
-  TSD TEMPORARY SLOPE DRAIN
-  TSC TEMPORARY STREAM CROSSING
-  TER TERRACING
-  VTC VEHICLE TRACKING CONTROL
-  WW VTC WITH WHEEL WASH
-  ROCK AND RIPRAP GRADATIONS
-  LOC LIMITS OF CONSTRUCTION
-  EXISTING 2' CONTOUR
-  EXISTING 10' CONTOUR
-  PROPOSED 2' CONTOUR
-  PROPOSED 10' CONTOUR
-  FLOW DIRECTION ARROW
-  AREA OUTSIDE LIMITS OF CONSTRUCTION

- NOTES:**
- SEE COVER SHEET OF ARAPAHOE COUNTY STANDARD NOTES AND DETAILS (SHEET 1 OF 11) FOR LEGEND OF BMP NAMES AND SYMBOLS.
 - CONTROL POINT NO. 7: 3" ALUMINUM INSIDE RANGE BOX, USGS ELEVATION 5958.37.
 - SEE CONSTRUCTION PLANS FOR DETAILS OF PERMANENT DRAINAGE FACILITIES SUCH AS DETENTION FACILITIES, CULVERTS, STORM DRAINAGE AND OUTLET PROTECTION.



Sheet Revisions	

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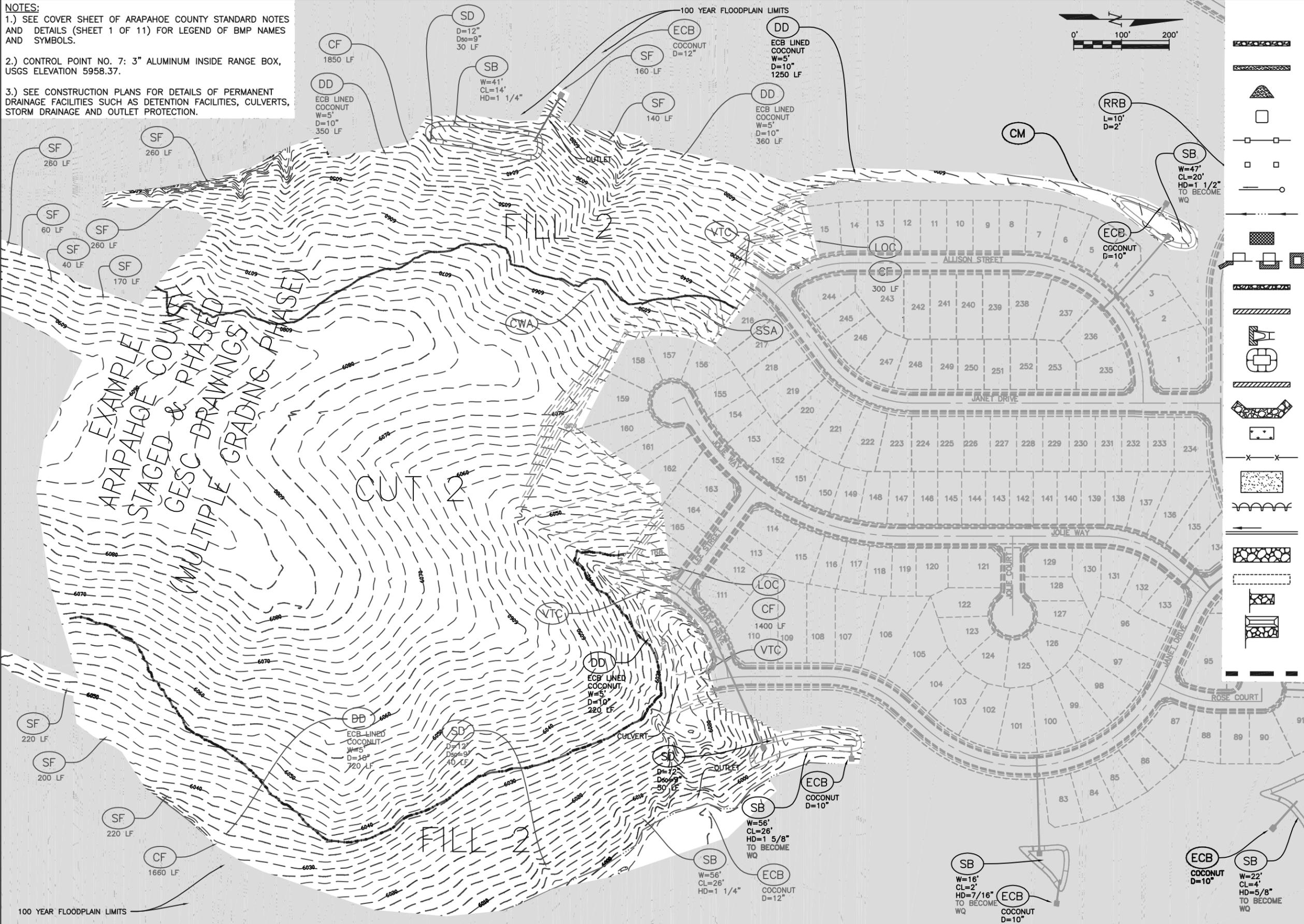
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RESIDENTIAL SITE A

PHASE I FINAL
 GESC PLAN

DRAWING
 E-3

NOTES:
 1.) SEE COVER SHEET OF ARAPAHOE COUNTY STANDARD NOTES AND DETAILS (SHEET 1 OF 11) FOR LEGEND OF BMP NAMES AND SYMBOLS.
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BMP LEGEND

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	CFB COMPOST FILTER BERM
	CWA CONCRETE WASHOUT AREA
	CF CONSTRUCTION FENCE
	CM CONSTRUCTION MARKER
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	FLOW DIRECTION ARROW
	AREA OUTSIDE LIMITS OF CONSTRUCTION

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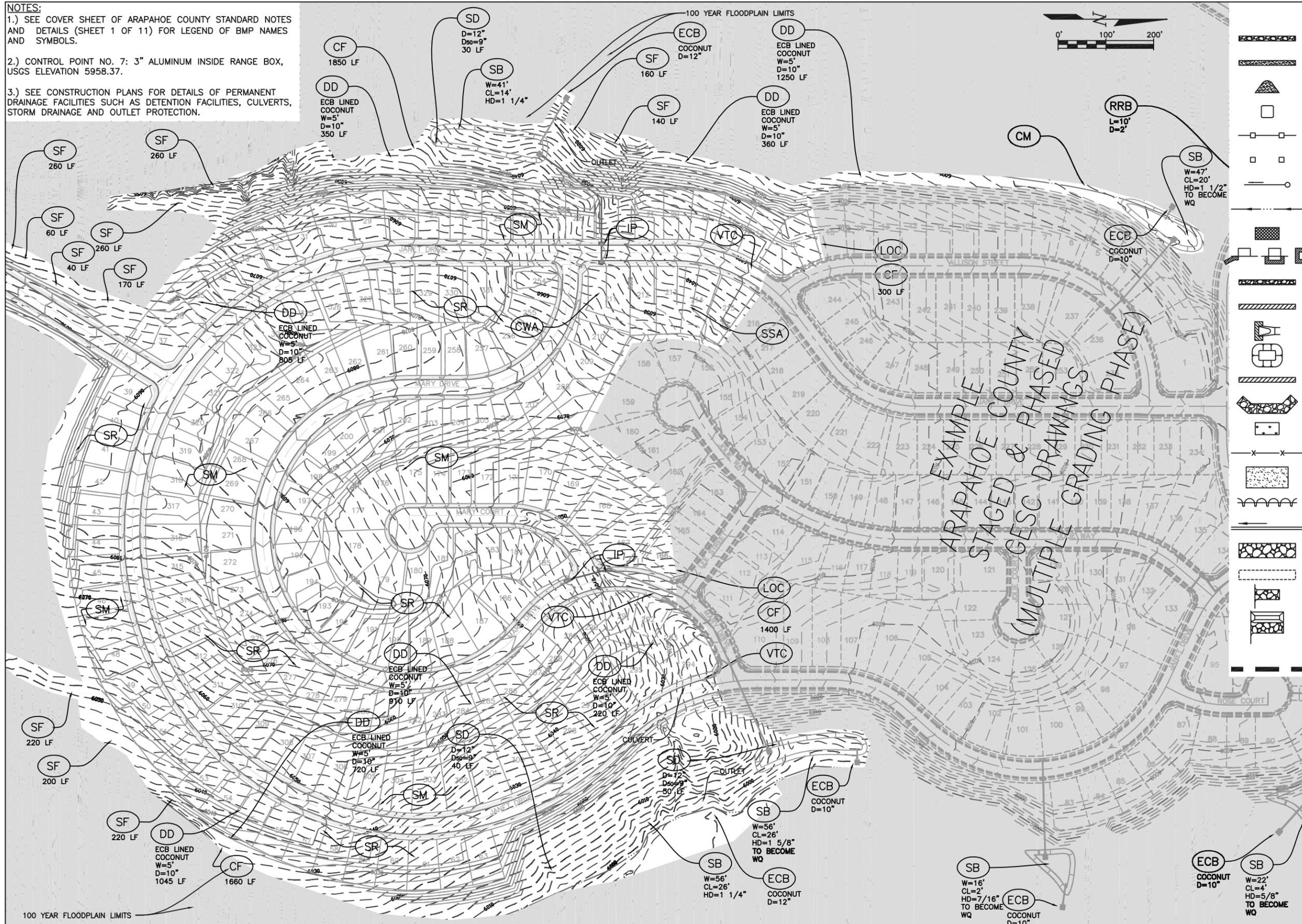
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RESIDENTIAL SITE A

PHASE II INITIAL
 GESC PLAN

DRAWING
 E-4

NOTES:
 1.) SEE COVER SHEET OF ARAPAHOE COUNTY STANDARD NOTES AND DETAILS (SHEET 1 OF 11) FOR LEGEND OF BMP NAMES AND SYMBOLS.
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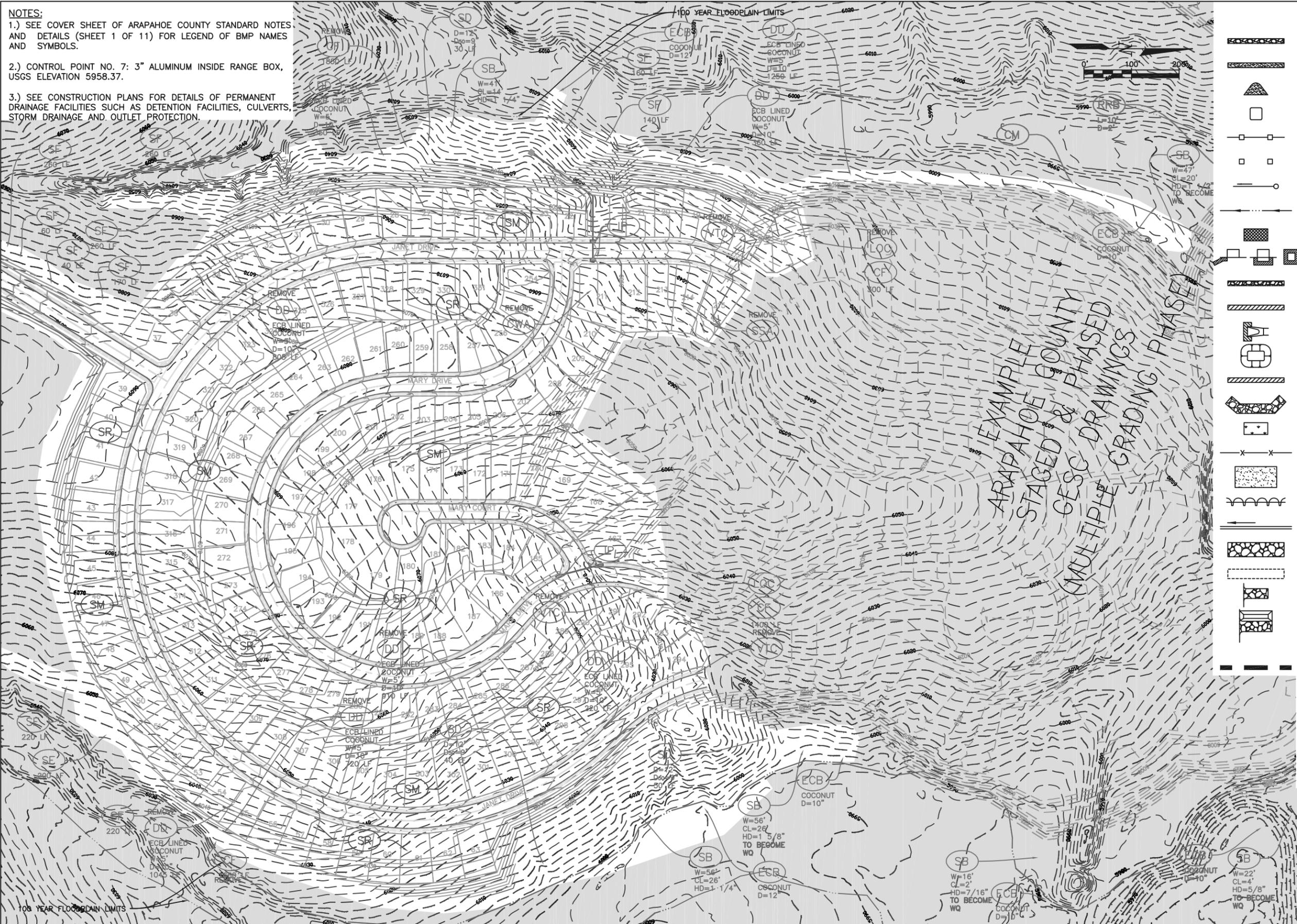
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RESIDENTIAL SITE A

PHASE II INTERIM
 GESC PLAN

DRAWING
 E-5

NOTES:
 1.) SEE COVER SHEET OF ARAPAHOE COUNTY STANDARD NOTES AND DETAILS (SHEET 1 OF 11) FOR LEGEND OF BMP NAMES AND SYMBOLS.
 2.) CONTROL POINT NO. 7: 3" ALUMINUM INSIDE RANGE BOX, USGS ELEVATION 5958.37.
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	ROCK AND RIPRAP GRADATIONS
	LOC LIMITS OF CONSTRUCTION
	EXISTING 2' CONTOUR
	EXISTING 10' CONTOUR
	PROPOSED 2' CONTOUR
	PROPOSED 10' CONTOUR
	FLOW DIRECTION ARROW
	AREA OUTSIDE LIMITS OF CONSTRUCTION

EXAMPLE ARAPAHOE COUNTY STAGED & PHASED GESC DRAWINGS (MULTIPLE GRADING PHASES)

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RESIDENTIAL SITE A

PHASE II FINAL
 GESC PLAN

DRAWING
 E-6

CUT/FILL QUANTITIES			
CUT AREA	VOLUME (CUBIC YARDS)	FILL AREA	VOLUME (CUBIC YARDS)
C1	214,851	F1	214,851
TOTALS	214,851		214,851



EXAMPLE
ARAPAHO COUNTY
STAGED & PHASED
GESC DRAWINGS
(MULTIPLE GRADING PHASE)

Sheet Revisions	
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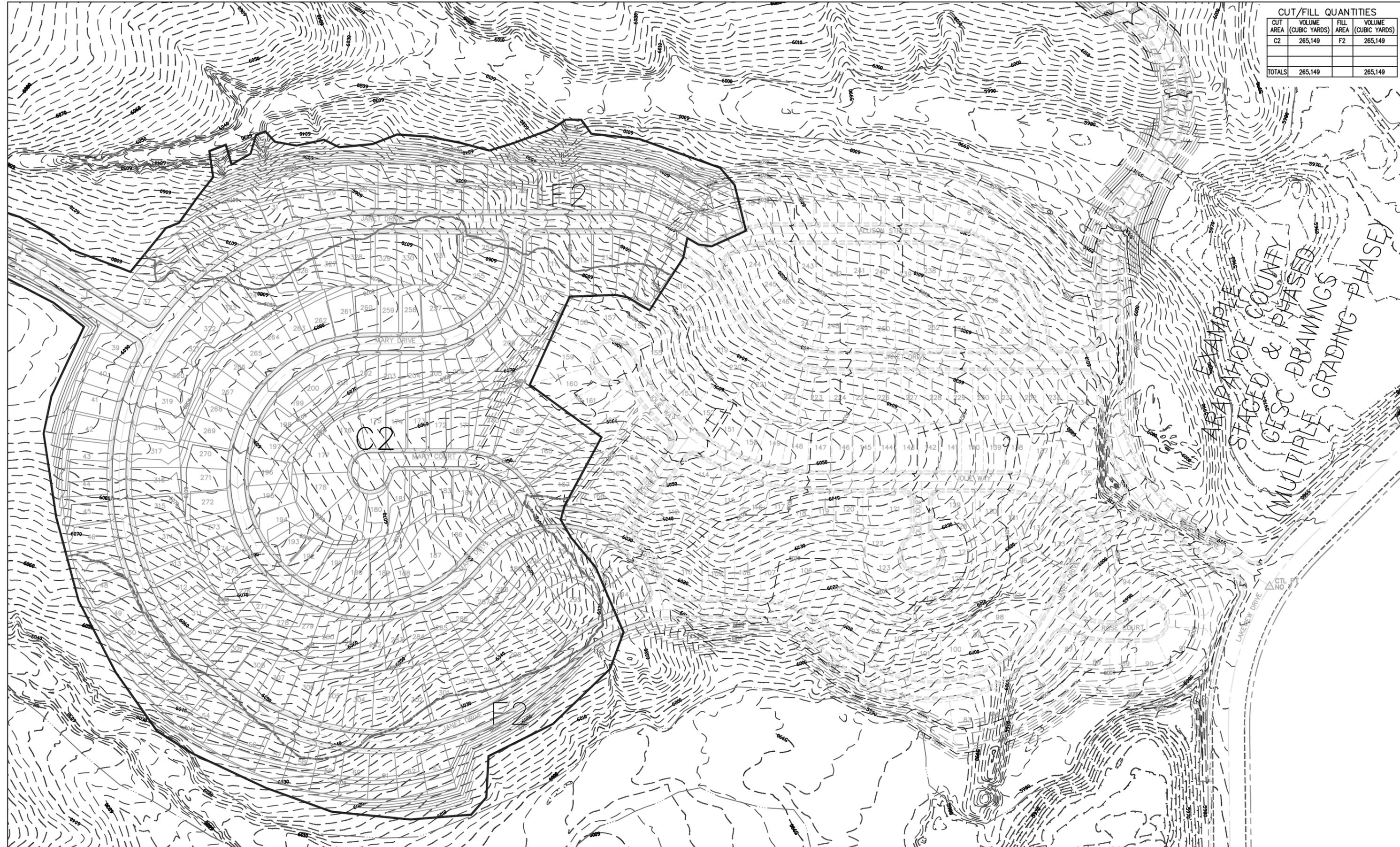
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DENVER, COLORADO 80229
(303) 287-1722
FAX: (303) 289-1084

RESIDENTIAL SITE A

PHASE I EARTHWORK
BALANCE PLAN

DRAWING
E-7

CUT/FILL QUANTITIES			
CUT AREA	VOLUME (CUBIC YARDS)	FILL AREA	VOLUME (CUBIC YARDS)
C2	265,149	F2	265,149
TOTALS	265,149		265,149



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0000	

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 FAX: (303) 289-1084

RESIDENTIAL SITE A

PHASE II EARTHWORK
 BALANCE PLAN

DRAWING
 E-8

ARAPAHOE COUNTY STANDARD
GESc NOTES AND DETAILS TO
GO HERE



DEPARTMENT OF PUBLIC WORKS
AND DEVELOPMENT ENGINEERING
DIVISION

GESc GRADING, EROSION, AND
SEDIMENT CONTROL

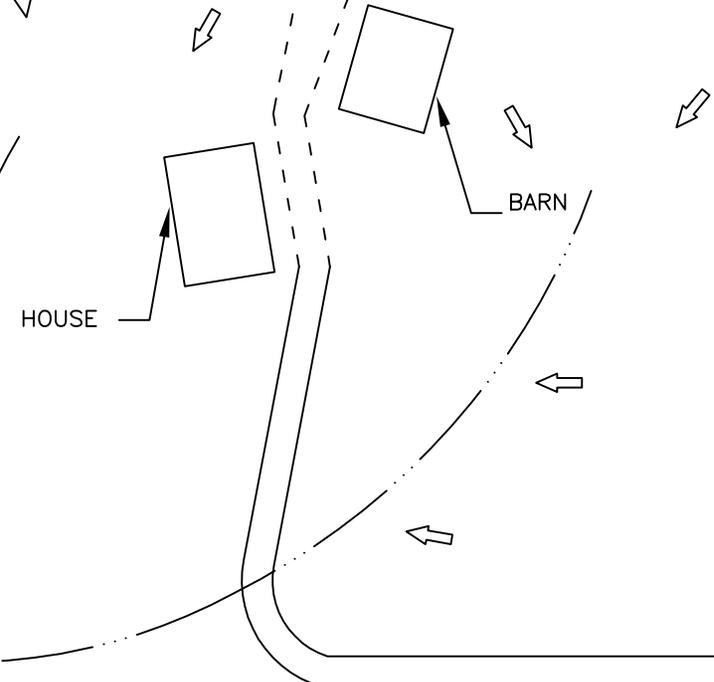
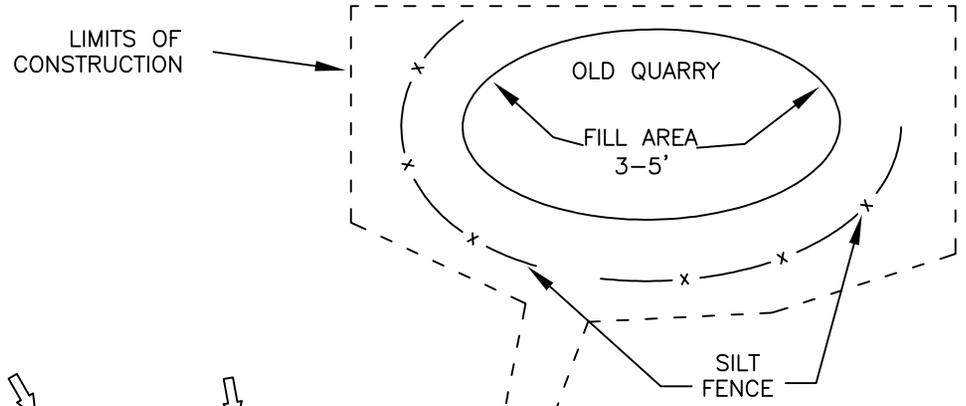
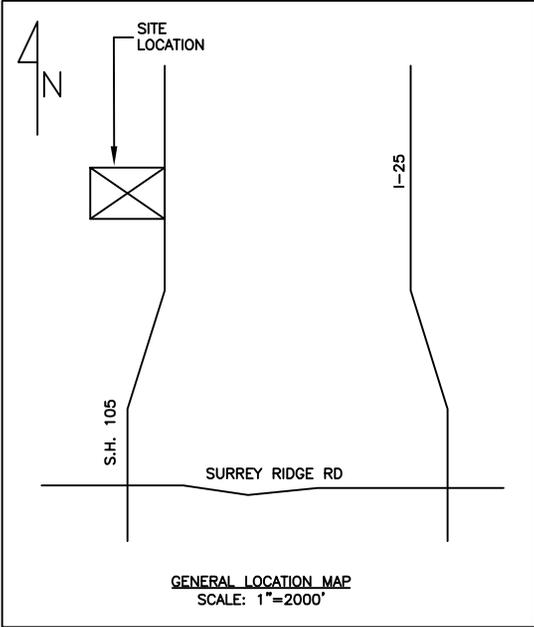
NOTE: SCALES
SHOW ARE
FOR 22"x34"
SHEETS: ADJUST
ACCORDINGLY
FOR 11"x17"
SHEET

GESc PLAN
STANDARD NOTES AND DETAILS
JANUARY 2005

Appendix C

**Low-Impact
Example GESC Drawings**

13506 STATE HIGHWAY 105



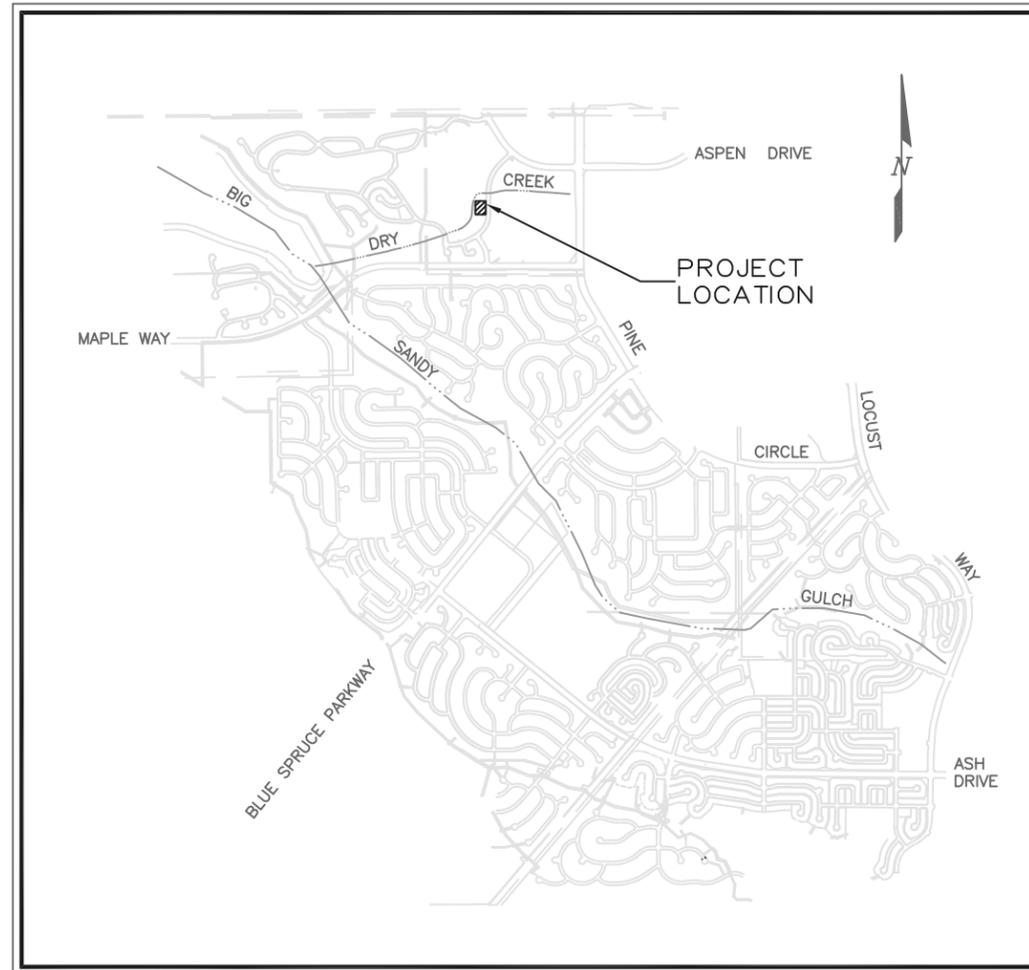
STATE HWY 105

DETAILED PLAN
1"=100'

Appendix C

**Temporary Batch Plant
Example GESC Drawings**

CONTRACT DRAWINGS FOR CONSTRUCTION OF
TEMPORARY BATCH PLANT
9429 HAWTHORN STREET



PROJECT LOCATION: SOUTHWEST QUARTER OF SECTION 9
 TOWNSHIP 6S, RANGE 68W

LOCATION MAP
 SCALE 1"=400'

CALL UTILITY NOTIFICATION
 CENTER OF COLORADO
1-800-922-1987
 CALL 2-BUSINESS DAYS IN ADVANCE
 BEFORE YOU DIG, GRADE, OR EXCAVATE
 FOR THE MARKING OF UNDERGROUND
 MEMBER UTILITIES.

LIST OF DRAWINGS

SHEET	DRAWING NO	TITLE
1	B-1	COVER SHEET
2	B-2	TEMPORARY BATCH PLANT SITE PLAN
3	B-3	TEMPORARY BATCH PLANT RECLAMATION PLAN
4	B-4	DOUGLAS COUNTY STANDARD NOTES & DETAILS
GESC STANDARD NOTES AND DETAILS		
5	SHEET 1	GESC GENERAL NOTES AND LEGEND
6 - 17	SHEETS 2 - 13	GESC DETAILS AND INSTALLATION AND MAINTENANCE NOTES
18	SHEET 14	ROCK AND RIPRAP GRADATIONS

THE TEMPORARY BATCH PLANT PLAN INCLUDED HEREIN HAS BEEN PLACED IN THE ARAPAHOE COUNTY FILE FOR THIS PROJECT AND APPEARS TO FULFILL APPLICABLE ARAPAHOE COUNTY GRADING, EROSION AND SEDIMENT CONTROL CRITERIA. ADDITIONAL GRADING, EROSION AND SEDIMENT CONTROL MEASURES MAY BE REQUIRED OF THE OWNER OR HIS OR 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 SHALL BE THE OBLIGATION OF THE LANDOWNER, OR HIS OR HER DESIGNATED REPRESENTATIVE, UNTIL SUCH TIME AS THE PLAN IS PROPERLY COMPLETED, MODIFIED OR VOIDED.

THE TEMPORARY BATCH PLANT PLAN INCLUDED HEREIN HAS BEEN PREPARED UNDER MY DIRECT SUPERVISION IN ACCORDANCE WITH THE REQUIREMENTS OF THE GRADING, EROSION, AND SEDIMENT CONTROL (GESC) MANUAL OF ARAPAHOE COUNTY.

GESC PLANS PREPARED BY:

 AUSTIN ENGINEERING COMPANY INC. DATE PE NUMBER

THE CONSTRUCTION PLANS INCLUDED HEREIN WERE PREPARED UNDER MY DIRECT SUPERVISION IN ACCORDANCE WITH THE REQUIREMENTS OF THE ROADWAY DESIGN AND CONSTRUCTION STANDARDS AND THE STORM DRAINAGE DESIGN AND TECHNICAL CRITERIA OF ARAPAHOE COUNTY.

CONSTRUCTION PLANS PREPARED BY:

 AUSTIN ENGINEERING COMPANY INC. DATE PE NUMBER

EXAMPLE
 ARAPAHOE COUNTY
 TEMPORARY BATCH PLANT
 GESC DRAWINGS

THESE GESC PLANS HAVE BEEN REVIEWED BY ARAPAHOE COUNTY FOR GRADING, EROSION, AND SEDIMENT CONTROL IMPROVEMENTS ONLY

DEPARTMENT OF PUBLIC WORKS AND
 DEVELOPMENT APPROVAL BLOCK

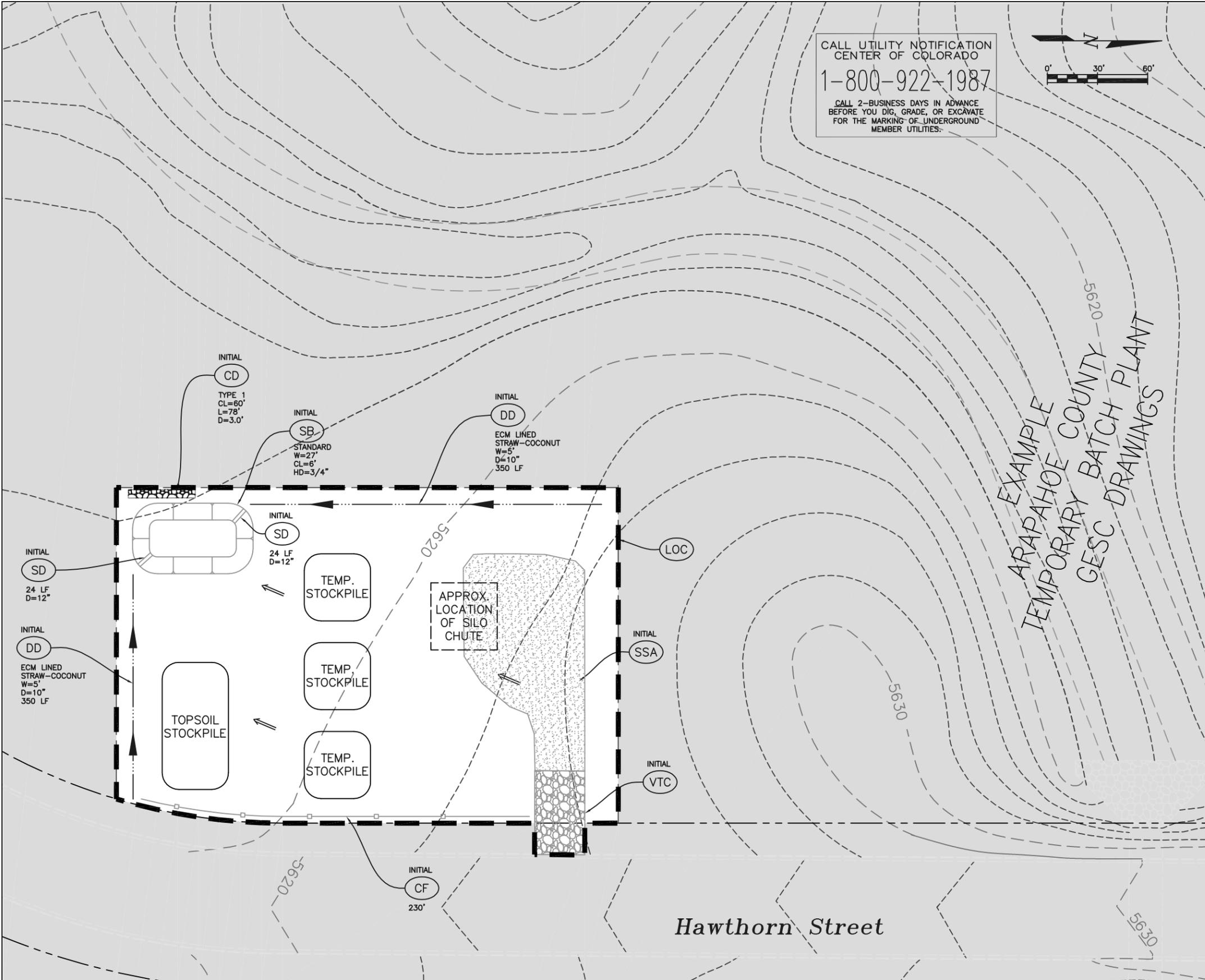
	Sheet Revisions	AUSTIN ENGINEERING CO., INC. CONSULTING ENGINEERS 88 PLAZA DRIVE, SUITE 200 HIGHLANDS RANCH, COLORADO 80128 (303) 324-4897 FAX: (303) 324-4991	JAMESTOWN DEVELOPMENT CO., INC. 7901 GRANT STREET DENVER, COLORADO 80229 (303) 287-1722 FAX: (303) 289-1084	TEMPORARY BATCH PLANT	COVER SHEET	DRAWING B-1

CALL UTILITY NOTIFICATION
CENTER OF COLORADO
1-800-922-1987
CALL 2-BUSINESS DAYS IN ADVANCE
BEFORE YOU DIG, GRADE, OR EXCAVATE
FOR THE MARKING OF UNDERGROUND
MEMBER UTILITIES.



BMP LEGEND

- CD CHECK DAM
 - CB COMPOST BLANKET
 - CFB COMPOST FILTER BERM
 - CWA CONCRETE WASHOUT AREA
 - CF CONSTRUCTION FENCE
 - CM CONSTRUCTION MARKER
 - DW DEWATERING
 - DD DIVERSION DITCH
 - ECB EROSION CONTROL BLANKET
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 - TER TERRACING
 - VTC VEHICLE TRACKING CONTROL
 - WW VTC WITH WHEEL WASH
 - ROCK AND RIPRAP GRADATIONS
 - LOC LIMITS OF CONSTRUCTION
-
- EXISTING 2' CONTOUR
 - EXISTING 10' CONTOUR
 - PROPOSED 2' CONTOUR
 - PROPOSED 10' CONTOUR
 - FLOW DIRECTION ARROW
 - AREA OUTSIDE LIMITS OF CONSTRUCTION
 - AREA TO BE DRILL SEEDED AND CRIMP MULCHED.



Sheet Revisions	

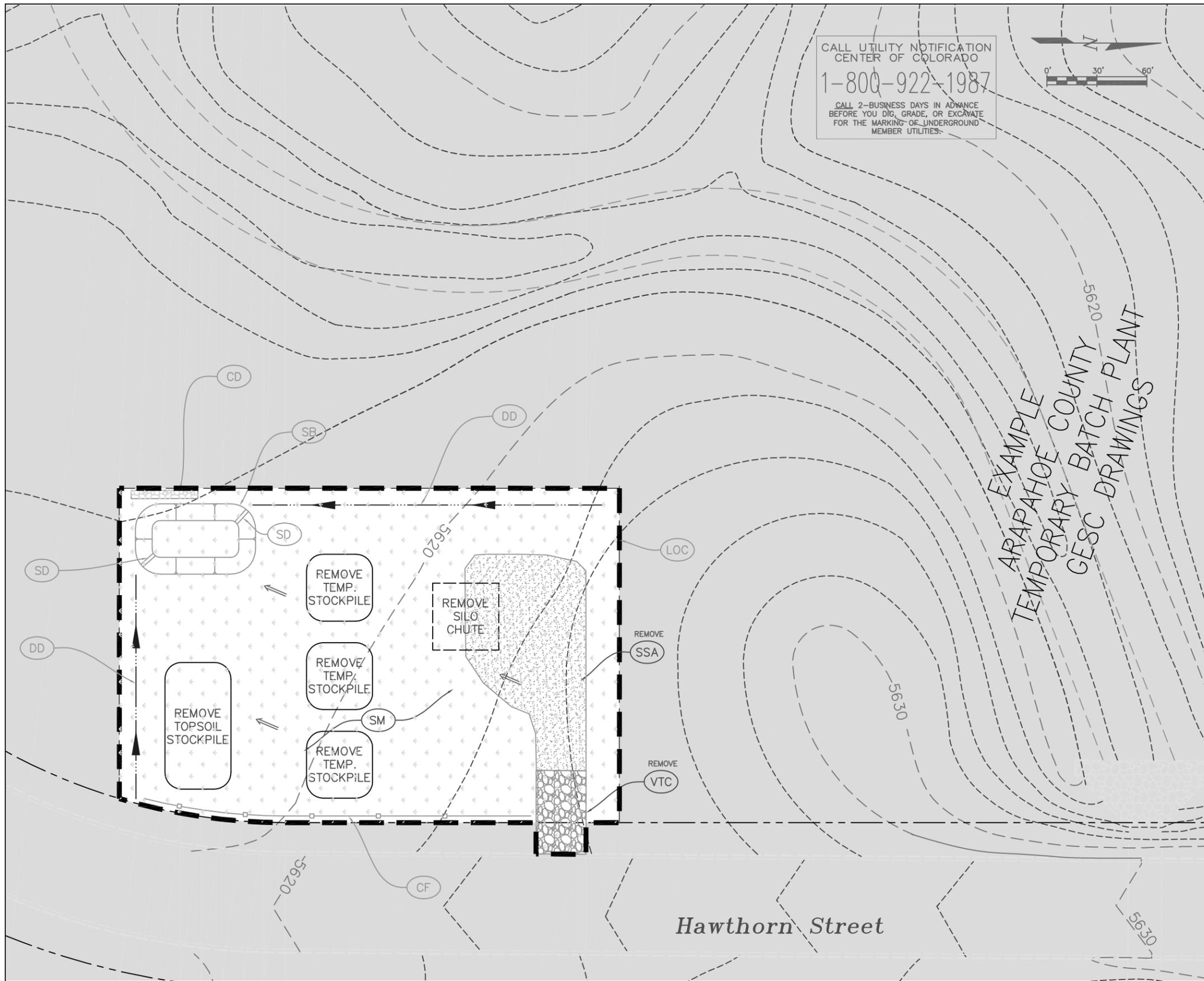
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TEMPORARY BATCH PLANT

BATCH PLANT
SITE PLAN

DRAWING
B-2



BMP LEGEND

	CD	CHECK DAM
	CB	COMPOST BLANKET
	CFB	COMPOST FILTER BERM
	CWA	CONCRETE WASHOUT AREA
	CF	CONSTRUCTION FENCE
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	TER	TERRACING
	VTC	VEHICLE TRACKING CONTROL
	WW	VTC WITH WHEEL WASH
		ROCK AND RIPRAP GRADATIONS
	LOC	LIMITS OF CONSTRUCTION

	EXISTING 2' CONTOUR		AREA OUTSIDE LIMITS OF CONSTRUCTION
	EXISTING 10' CONTOUR		AREA TO BE DRILL SEEDED AND CRIMP MULCHED.
	PROPOSED 2' CONTOUR		
	PROPOSED 10' CONTOUR		
	FLOW DIRECTION ARROW		

Sheet Revisions	

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FAX: (303) 289-1084

TEMPORARY BATCH PLANT

BATCH PLANT RECLAMATION PLAN

DRAWING
B-3

ARAPAHOE COUNTY STANDARD
NOTES AND DETAILS TO GO
HERE



DEPARTMENT OF PUBLIC WORKS
AND DEVELOPMENT ENGINEERING
DIVISION

GESC GRADING, EROSION, AND
SEDIMENT CONTROL

NOTE: SCALES
SHOW ARE
FOR 22"x34"
SHEETS: ADJUST
ACCORDINGLY
FOR 11"x17"
SHEET

GESC PLAN
STANDARD NOTES AND DETAILS
JANUARY 2005

Appendix D

**Checklist for Developing
a GESC Plan**

CHECKLIST FOR DEVELOPING A GESC PLAN
Selecting BMPs Based on Ten Elements of an Effective GESC Plan

ELEMENT 1. PRESERVE AND STABILIZE DRAINAGEWAYS

A. DRAINAGEWAYS SHALL NOT BE FILLED, REGRADED, OR REALIGNED

- yes no 1. Determine design discharges for drainageways (2 year and 100 year at a minimum).
- yes no 2. Delineate floodplain limits for all drainageways.
- yes no 3. Show limits of fill adjacent to drainageways and channel area to be preserved (shade undisturbed areas on drawings).
- yes no 4. Show **Construction Fence (CF)** or, if approved, **Construction Markers (CM)** around all stream preservation areas.

B. FREEBOARD ABOVE THE 100-YEAR FLOODPLAIN SHALL BE PROVIDED

- yes no 1. Provide freeboard above the 100-year floodplain to lot grade and lowest floor elevations (including basements in fill). Refer to Arapahoe County Stormwater Manual, as amended, and consider potential rise in 100-year water surface over the long term due to increased channel vegetation, roughness, and sediment deposition.

C. EXISTING DRAINAGEWAYS SHALL BE STABILIZED

- yes no 1. Design grade control structures in all drainage channels as necessary. Refer to Arapahoe County Stormwater Manual, as amended.
- yes no 2. Design bank stabilization improvements as necessary.
- yes no 3. Emulate natural systems in the design of Items C1 and C2, above.

D. DISTURBANCE TO EXISTING DRAINAGEWAYS SHALL BE MINIMIZED AND QUICKLY RESTORED

- yes no 1. Identify features whose construction within drainageways is unavoidable, such as the following:
 - yes no a. grade control structures
 - yes no b. bank stabilization
 - yes no c. road crossings (bridges or culverts)
 - yes no d. storm sewer outfalls
 - yes no e. utility crossings
 - yes no f. temporary stream crossings for construction access
- yes no 2. Determine limits of construction around the features identified

in Item D. 1 above that are just large enough to allow construction, but no larger than necessary, to minimize disturbance.

- yes no 3. Show **Construction Fence (CF)** or, if approved, **Construction Markers (CM)**.
- yes no 4. Identify coordinates or other means of locating **Construction Fence (CF) or Construction Markers (CM)** for contractor.
- yes no 5. Show **Check Dam (CD) or Reinforced Check Dam (RCD)** immediately downstream of each disturbed area in the stream. Check sizing criteria in Section 4.15 of the GESC Manual.
- yes no 6. Show **Temporary Stream Crossings (TSC)**, as necessary. Stream crossings shall be limited to the minimum number necessary (no more than one per 2000 lineal feet of stream unless otherwise approved).
- yes no 7. Show **Erosion Control Blanket (ECB)** in all disturbed areas of streams (within construction fence defining limits of construction) up to the top of the bank, to be installed immediately after construction in the stream is complete.

E. ANY ADDITIONAL DRAINAGEWAYS SHALL BE DESIGNED AND STABILIZED

- yes no 1. Identify any additional small drainageways that are necessary to manage stormwater runoff on the site.
- yes no 2. Determine design discharges and size the drainageways.
- yes no 3. Design stabilization improvements as necessary for drainageways including any drop structures or lining. For 2- year flows less than 10 cfs, criteria for Diversion Ditches (DD) may be used.

F. STREAM RELATED PERMITTING SHALL BE COMPLETED

- yes no 1. Determine if the following permits (and any others) are necessary. If so, complete the required documentation and submit applications.
 - a. Arapahoe County Floodplain Development Permit
 - b. US Army Corps of Engineers Section 404 Permit
 - c. US Fish and Wildlife Service Threatened & Endangered Species Approvals
 - d. Conditional Letter of Map Revision

ELEMENT 2. AVOID THE CLEARING AND GRADING OF SENSITIVE AREAS

- yes no 1. Conduct a resource inventory on the site and identify on the GESC Plan the type and Aerial extent of features such as the following:
 - a. Protected habitat for endangered species
 - b. Wetlands
 - c. Nesting bird habitat
 - d. Riparian buffer zones
 - e. Forested areas(cont.)

- f. Mature cottonwood stands
- g. Bedrock outcroppings
- h. Steep slopes
- i. Potential stormwater infiltration areas
- j. Historic, cultural, or archeological resources
- k. Areas of unique or pristine vegetation, or habitat

yes no

2. Endeavor to avoid, or minimize, disturbance to the sensitive areas identified in 1.a-k above.

yes no

3. Show **Construction Fence (CF)** or, if approved, **Construction Markers (CM)** to delineate the limits of construction adjacent to areas to be preserved.

ELEMENT 3. EARTHWORK BALANCE ENCOURAGED ONSITE

yes no

1. Endeavor to balance earthwork quantities on site through the following tasks:

yes no

- a. Develop initial grading plan.

yes no

- b. Check earthwork quantities for balance (consider shrink/swell).

yes no

- c. Raise or lower portions of the site as necessary to try to balance earthwork.

yes no

- d. Repeat steps b and c until balance is optimized.

ELEMENT 4. LIMIT THE SIZE OF GRADING PHASES TO REDUCE SOIL EXPOSURE

yes no

1. For large projects, determine separate grading phases, each disturbing less than 40 acres (70 acres for soil mitigation projects).

yes no

2. Balance earthwork for each phase following the guidance from Element 3 above.

ELEMENT 5. STABILIZE SOILS IN A TIMELY MANNER

yes no

1. Show **Surface Roughening (SR)** for all areas of grading, to be performed immediately after portions of grading are complete.

yes no

2. Indicate **Seeding and Mulching (SM)** in all areas to be seeded.

yes no

3. Indicate **Erosion Control Blanket (ECB)**, **Flexible Growth Medium (FGM)** or **Compost Blanket (CB)** on slopes steeper than 4:1 and in all areas where an extra

ELEMENT 6. IMPLEMENT PERIMETER CONTROLS

A. UPSLOPE PERIMETER

yes no

1. Show **Construction Fence (CF)** and **Construction Markers (CM)** to delineate the limits of construction along the site perimeter, unless an existing fence is located there.

- yes no 2. Use **Diversion Ditch (DD)** to capture runoff entering the site via sheet flow. Follow design guidance in Section 4.15 of the GESC Manual.
- yes no 3. For steep reaches, such as where the ditch conveys runoff down a channel bank to the bottom of a stream, the diversion ditch is to be lined based on the criteria shown in Section 4.15 of the GESC Manual.
- yes no 4. For an alternative to a lined ditch in steep sections, consider a Temporary Slope Drain.

B. DOWNSLOPE PERIMETER

- yes no 1. Show **Construction Fence (CF) or Construction Markers (CM)** to delineate the limits of construction along the site perimeter, unless an existing fence is located there.
- yes no 2. If the upslope disturbed drainage area exceeds 1.0 acre, use a **Diversion Ditch (DD)** or permanent drainageway to convey runoff to a **Sediment Basin (SB)**.
- yes no 3. If the upslope disturbed drainage area is less than 1.0 acre, use a **Diversion Ditch (DD), Reinforced Rock Bern (RRB)/Curb Sock (CS), Sediment Control Log (SCL), or Silt Fence (SF)**. In general, the latter three BMPs are to be used on the contour. Check Section 4.15 of the GESC Manual for specific guidance pertaining to the use of these downslope perimeter controls.
- yes no 4. Use a **Check Dam (CD) or Reinforced Check Dam (RCD)** across a stream or drainage channel at the downslope perimeter of the site.

ELEMENT 7. TREAT RUNOFF IN A SEDIMENT BASIN

- yes no 1. Runoff from all disturbed areas greater than 1.0 acre shall be treated in a **Sediment Basin (SB)**. Use the standard design for drainage areas less than 15 acres. For areas less than 1.0 acre, a **Sediment Trap (S)** may be used.
- yes no 2. If a non standard design is used, construction drawings detailing the storage volume, embankment, spillway, and outlet are required. Refer to Arapahoe County Stormwater Manual, as amended.
- yes no 3. Wherever possible, sediment basins are to be located within any permanent water quality or quantity detention facilities. Permanent water quality or quantity detention facilities shall have a sediment basin incorporated within them.

ELEMENT 8. PROTECT STEEP SLOPES

A. PROPOSED SLOPES SHALL BE NO STEEPER THAN 3 TO 1

- yes no 1. Ensure that no proposed slopes are steeper than 3H to 1V, except small areas of riprap outlet protection near outfalls and culverts.
- yes no 2. Show **Erosion Control Blanket (ECB) or Flexible Growth Medium (FGM)** on slopes steeper than 4:1.

B. RUNOFF SHALL BE DIVERTED AWAY FROM STEEP SLOPES

___ yes ___ no

1. Use **Diversion Ditch (DD)** at the top of steep slopes to capture runoff before it flows down the slope.

C. TERRACING SHALL BE INCORPORATED INTO THE GRADING OF STEEP SLOPES

___ yes ___ no

1. Use **Terracing (TER)** in steep slopes to break up the flow of incidental water and reduce the development of rill and gully erosion runoff before it flows down the slope.

ELEMENT 9. PROTECT INLETS, STORM SEWER OUTFALLS, AND CULVERTS

___ yes ___ no

1. Show **Inlet Protection (IP)** at all street and area inlets.

___ yes ___ no

2. Show **Reinforced Rock Berm for Culvert Protection (RRP)** at all culvert inlets.

___ yes ___ no

3. Design outlet protection for all storm sewer outfalls and culvert outlets per the Arapahoe County Stormwater Manual.

___ yes ___ no

4. Show **Erosion Control Blanket (ECB) or Flexible Growth Medium (FGM)** in stream areas disturbed by the construction of the outfall or culvert.

ELEMENT 10. PROVIDE ACCESS AND GENERAL CONSTRUCTION CONTROLS

___ yes ___ no

1. Identify all limits of construction. Use **Construction Fence (CF)** or **Construction Markers (CM)** to delineate the limits of construction.

___ yes ___ no

2. Provide one or more **Vehicle Tracking Controls (VTC)** at all entrance/exit points from a public street to a site.

___ yes ___ no

3. Show a **Stabilized Staging Area (SSA)** near the main access point.

___ yes ___ no

4. Show a **Concrete Washout Area (CWA)** near all concrete work areas.

___ yes ___ no

5. Show temporary access roads and a stockpile areas.

___ yes ___ no

6. Select areas for the vehicle tracking control, stabilized staging area, access roads, and stockpile areas that avoid disturbance to trees, desirable vegetation, steep areas, and low, wet areas.

Appendix E

**GESC Drawing and Report
Checklist**

**ARAPAHOE COUNTY DRAWING AND REPORT CHECKLIST
FOR STANDARD GESC PERMITS**

A. DRAWINGS

I. COVER SHEET

- yes no 1. Project Name.
- yes no 2. Project address (if applicable) shall include zip code.
- yes no 3. Owner address (shall include zip code).
- yes no 4. Design firm's name and address (shall include zip code).
- yes no 5. Plan sheet index.
- yes no 6. Design Engineer's Signature Block.
- yes no 7. Arapahoe County Case Number in the lower left hand corner.
- yes no 8. The following note:
"This *Grading, Erosion and Sediment Control (GESC)* document has been placed in the Arapahoe County file for this project and appears to fulfill the latest version of the *Arapahoe County Grading, Erosion and Sediment Control Manual*. Additional grading, erosion and sediment control measures may be required of the owner or his/her agents, due to unforeseen erosion problems or if the submitted plan does not function as intended. The requirements of this GESC document 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."
- yes no 9. GESC Drawing Design Engineer's signature block with name, date, and Professional Engineer registration number. Signature block shall include the following certification statement:
"I hereby attest that this Grading, Erosion, and Sediment Control (GESC) document for (*name of subdivision/development*) has been prepared by me or under my direct supervision, and to the best of my knowledge and ability has been prepared in accordance with the latest version of the Arapahoe County GESC Manual. The signature and stamp affixed hereon certifies that this GESC document was prepared in accordance with the required regulations and criteria; however, the stamp and signature does not certify or guarantee future performance of the execution of the plan by the Contractor. The Contractor is responsible for executing the construction work according to the information set forth in the plan and in accordance with all applicable requirements."

Registered Professional Engineer _____
State of Colorado No. _____
Affix Seal w/date
- yes no 10. Landowner/authorized agent acknowledging GESC review and the acceptance of GESC responsibility. Signature block shall include the following certification statement:
"I hereby certify that the Grading, Erosion, and Sediment Control measures for (*Name of Subdivision/Development/address*) shall be constructed according to the design presented in this document. I understand that additional erosion control, sediment control and water quality enhancing measures may be required of the owner and his or her agents due to unforeseen pollutant discharges or if the submitted plan does not function as intended. The requirements of the plan shall be the obligation of the land owner and/or his successors or heirs; until such time as the plan is properly completed, modified or voided."

Owner or Authorized Agent _____
Authorized Signature _____ Date _____

GESC Drawing and Report Checklist

- yes no 11. Arapahoe County Approval Block (see Appendix H)
- yes no 12. 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

II. GESC DRAWING INDEX SHEET

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

III. INITIAL GESC DRAWING

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

- yes no 1. Property lines.
- yes no 2. Existing and proposed easements.
- yes no 3. Existing topography at one or two foot contour intervals, extending a minimum of 100 feet beyond the property line.
- yes no 4. Location of any existing structures or hydrologic features within the mapping limits.
- yes no 5. USGS Benchmark used for project (must be NAVD 88)
- yes no 6. Limits of construction encompassing all areas of work access points, storage and staging areas, borrow areas, stockpiles, and utility tie-in locations in on-site and off-site locations. Stream corridors and other resource areas to be preserved and all other areas outside the limits of construction shall be lightly shaded to clearly show area not to be disturbed.
- yes no 7. Location of stockpiles, including topsoil, imported aggregates, and excess material.
- yes no 8. Location of storage and staging areas for equipment, fuel lubricant, chemical (and other materials) and waste storage.
- yes no 9. Location of borrow or disposal areas.
- yes no 10. Location of temporary roads, including haul roads.
- yes no 11. Location, map symbol, and letter callouts of all initial erosion and sediment control BMPs.
- yes no 12. Information to be specified for each BMP, such as type and dimensions as called for in the Standard Notes and Details.
- yes no 13. The following notes:
- SEE COVER SHEET OF ARAPAHOE COUNTY STANDARD NOTES AND DETAILS (SHEET 1 OF 3) FOR LEGEND OF BMP NAMES AND SYMBOLS.
 - ANY BMPS SHOWN THAT REQUIRE GRADING, E.G. SEDIMENT BASINS, SEDIMENT TRAPS, CONCRETE WASH OUT AREAS, ETC..., SHALL NOT BE PLACED UNTIL AFTER THE PRE-CONSTRUCTION MEETING. IN ADDITION, THE SEDIMENT BASIN (OR OTHER BMP) SHALL NOT BE INSTALLED UNTIL AFTER THE GESC PRE-CONSTRUCTION MEETING AND ISSUANCE OF THE GESC PERMIT BUT MUST BE FULLY FUNCTIONAL PRIOR TO ANY LARGE SCALE GRADING. THE INITIAL PLAN ILLUSTRATES EXISTING CONDITIONS NO PROPOSED INFRASTRUCTURE IS SHOWN.
- yes no 14. Other information as may be required by Arapahoe County.

IV. INTERIM GESC DRAWING

This plan sheet shows BMPs to control grading, erosion and sediment during the initial overlot grading, site construction and site re-vegetation process. The Interim GESC Plan shall show all the information included on the Initial GESC Plan, as noted below. At a minimum, it shall contain the following information:

- yes no 1. Existing topography at one or two foot contour intervals extending a minimum of 100 feet beyond the property line, as shown on Initial GESC Plan. **These contours shall be screened.**
- yes no 2. Location of all existing erosion and sediment control measures on site, as shown on the **INITIAL** GESC Plan Sheet. **These control measures shall be screened. Dimension information for initial stage BMPs shall not be shown.**
- yes no 3. Items 1, 2, and 4 through 14 from the Initial GESC Plan (Section III of this checklist).
- yes no 4. Proposed topography at one or two foot contour intervals, showing elevations, dimensions, locations, and slope of all proposed grading.
- yes no 5. Outlines of cut and fill areas.
- yes no 6. Location of all interim erosion and sediment controls designed in conjunction with the proposed site topography, but also considering the controls designed in the Initial GESC Plan.
- yes no 7. Locations of all buildings, drainage features and facilities, paved areas, retaining walls, cribbing, water quality facilities, or other permanent features to be constructed in connection with, or as a part of, the proposed work, per approved plat or land use plan (e.g. Final Development Plan), or other improvement plan.
- yes no 8. The following notes:
 - SEE COVER SHEET OF ARAPAHOE COUNTY STANDARD NOTES AND DETAILS (SHEET 1 OF 3) FOR LEGEND OF BMP NAMES AND SYMBOLS.
 - SHADED BMPs WERE INSTALLED IN THE INITIAL STAGE AND SHALL BE LEFT IN PLACE IN INTERIM STAGE UNLESS OTHERWISE NOTED.
 - ALL INTERIM BMPs, INCLUDING SEEDING AND MULCHING OF DISTURBED AREAS, MUST BE COMPLETED PRIOR TO ISSUANCE OF ANY CURB AND GUTTER PERMITS.
 - ALL INTERIM BMPs, INCLUDING SEEDING AND MULCHING OF DISTURBED AREAS, MUST BE COMPLETED WITHIN 14 DAYS IF THE AREAS WILL REMAIN UNDISTURBED FOR A PERIOD GREATER THAN 30 DAYS AND PRIOR TO ISSUANCE OF ANY CURB AND GUTTER PERMITS.
 - ALL PROPOSED SLOPES ON THIS PLAN HAVE A MAXIMUM SLOPE OF 4:1. ANY SLOPES BETWEEN 3:1 AND 4:1 WILL REQUIRE THE USE OF EROSION CONTROL BLANKETS OR FLEXIBLE GROWTH MEDIUM.
 - SEE CONSTRUCTION PLANS FOR DETAILS OF PERMANENT DRAINAGE FACILITIES SUCH AS DETENTION FACILITIES, WATER QUALITY FACILITIES, CULVERTS, STORM DRAINS, AND INLET AND OUTLET PROTECTION.
 - AT NO TIME DURING THE DEVELOPMENT/CONSTRUCTION OF SITE SHALL RUNOFF BE ALLOWED TO ENTER THE POST-CONSTRUCTION PERMANENT BMPs WITHOUT FIRST HAVING BEEN TREATED IN A SEDIMENT BASIN. ALLOWING RUNOFF FROM THE SITE DURING CONSTRUCTION MAY RESULT IN THE POST-CONSTRUCTION PERMANENT BMPs HAVING TO BE RECONSTRUCTED IN ITS ENTIRETY.
 - (WHERE APPLICABLE) REMOVAL OF SEDIMENT PONDS ON SITE SHALL ONLY OCCUR AFTER ALL AREAS TRIBUTARY TO THE SEDIMENT POND HAVE BEEN FINAL LANDSCAPED AND ALL VEGETATION HAS BEEN ESTABLISHED IN THE OPINION OF THE COUNTY AND SEMSWA.
- yes no 9. Summary of cut and fill volumes showing how earthwork balance is attempted on site.
- yes no 10. Design Engineer sign-off block
- yes no 11. Other information or data as may be required by Arapahoe County.

V. FINAL GESC DRAWING

This plan sheet shows controls for final completion of the site. The Final GESC Plan shall include all information shown on the Initial and Interim Plans, as noted below. At a minimum, this plan sheet shall contain the following information:

- yes no 1. Existing topography in areas of proposed contours need not be shown.
- yes no 2. Existing Initial and Interim BMPs shall be shown, (**screened**). Dimension information shall not be shown
- yes no 3. Directional flow arrows on all drainage features.
- yes no 4. Any Initial or Interim BMPs that are to be removed and any resulting disturbed area to be stabilized.
- yes no 5. Location of all Final erosion and sediment control BMPs (including seeding and mulching of any areas not stabilized in the Interim Plan), permanent landscaping, and measures necessary to minimize the movement of sediment off site until permanent vegetation can be established.
- yes no 6. Show area of buildings, pavement, sod and permanent landscaping (define types) per approved plat or land use plan (e.g. Final Development Plan), or other improvement plan.
- yes no 7. Show seeding and mulching (SM) everywhere except buildings, pavement areas, and permanent landscaped areas.
- yes no 8. Show other BMPs considered by the Design Engineer to be appropriate.
- yes no 9. Show the following BMPs to be removed at the end of construction:
- Indicate dewatering (DW) to be removed.
 - Indicate temporary stream crossing (TSC) to be removed.
 - Indicate stabilized staging area (SSA) to be removed.
 - Indicate vehicle tracking control (VTC) to be removed.
 - Indicate construction fence (CF) to be removed.
- yes no 10. The following notes:
- SEE COVER SHEET OF ARAPAHOE COUNTY STANDARD NOTES AND DETAILS (SHEET 1 OF 3) FOR LEGEND OF BMP NAMES AND SYMBOLS.
 - SHADED BMPs WERE INSTALLED IN INITIAL OR INTERIM GESC PLAN AND, UNLESS OTHERWISE INDICATED, SHALL BE LEFT IN PLACE UNTIL REVEGETATION ESTABLISHMENT IS APPROVED BY THE COUNTY.
 - ALL INTERIM BMPs, INCLUDING SEEDING AND MULCHING OF DISTURBED AREAS, MUST BE COMPLETED WITHIN 14 DAYS IF THE AREAS WILL REMAIN UNDISTURBED FOR A PERIOD GREATER THAN 30 DAYS AND PRIOR TO ISSUANCE OF ANY CURB AND GUTTER PERMITS.
 - ALL PROPOSED SLOPES ON THIS PLAN HAVE A MAXIMUM SLOPE OF 4:1. ANY SLOPES BETWEEN 3:1 AND 4:1 WILL REQUIRE THE USE OF EROSION CONTROL BLANKETS OR FLEXIBLE GROWTH MEDIUM.
 - SEE CONSTRUCTION PLANS FOR DETAILS OF PERMANENT DRAINAGE FACILITIES SUCH AS DETENTION FACILITIES, WATER QUALITY FACILITIES, CULVERTS, STORM DRAINS, AND OUTLET PROTECTION.
 - ACCEPTANCE OF THE POST-CONSTRUCTION PERMANENT BMPs WILL NOT OCCUR UNTIL ALL TRIBUTARY TO THE POST-CONSTRUCTION PERMANENT BMPs ARE COMPLETE AND FINAL LANDSCAPE HAS BEEN ESTABLISHED.
- yes no 11. Design Engineer sign-off block
- yes no 12. Other information or data as may be required by Arapahoe County.

VI. GESC PLAN STANDARD NOTES AND DETAILS

A copy of the GESC Drawing Standard Notes and Details (included in Appendix B) shall be bound into

GESC Drawing and Report Checklist

each set of GESC Documents.

VII. GESC DRAWING AND REPORT CHECKLIST

A copy of this GESC Drawing and Report Checklist must be completely filled out, signed by the designer, and submitted with the GESC Documents.

B. REPORT REQUIREMENTS FOR STANDARD GESC PERMITS

The narrative report shall contain the following information:

- yes no 1. Name, address (include zip code), telephone number of the applicant, and the Arapahoe County Case Number - The name, address, Arapahoe County Case Number, and telephone number of the Professional Engineer preparing (or supervising the preparation of) the GESC Plan shall also be included, if different from the applicant.
- yes no 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, and project location including township, range, section and quarter-section, or the latitude and longitude, of the approximate center of the project.
- yes no 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.
- yes no 4. Adjacent areas - A description of neighboring areas such as streams, lakes, residential areas, roads, etc., which might be affected by the land disturbance.
- yes no 5. Soils – A brief description of the soils on the site including information on soil type and names, mapping unit, erodibility, permeability, hydrologic soil group, depth, texture, and soil structure (This information may be obtained from the soil report for the site, from adjacent sites if acceptable to the County, or the applicable Soil Survey prepared by the Natural Resources Conservation Service (NRCS)).
- yes no 6. Areas and Volumes - An estimate of the quantity (in cubic yards) of excavation and fill involved (attempting to achieve an earthwork balance), haul road information, and the surface area (in acres) of the proposed disturbance.
- yes no 7. Erosion and sediment control measures - A description of the methods presented in the GESC Criteria Manual that will be used to control erosion and sediment on the site. These descriptions should describe how BMPs would address specific site conditions and clarify anything that cannot be clearly shown on Plans.
- yes no 8. Timing/Phasing schedule – A schedule indicating the anticipated starting and completion time periods of the site grading and/or construction sequence, including the installation and removal of erosion and sediment control BMPs. Indicate the anticipated starting and completion time periods of individual project phases.
- yes no 9. Permanent stabilization - A brief description, including applicable specifications, of how the site will be stabilized after construction is completed.
- yes no 10. Stormwater management considerations – Explain how stormwater runoff from and through the site will be handled during construction.
- yes no 11. Maintenance – Any special maintenance requirements over and above what is identified in the standard notes and details.
- yes no 12. Calculations – Any calculations made for the design of such items as sediment basins, diversion ditches, and/or erosion control matting selection.
- yes no 13. Other information or data - As may be required by Arapahoe County.

GESC Drawing and Report Checklist

- yes no 14. The following note above Certification Statements on Signature Page –
“This *Grading, Erosion and Sediment Control (GESC)* document has been placed in the Arapahoe County file for this project and appears to fulfill the latest version of the *Arapahoe County Grading, Erosion and Sediment Control Manual*. Additional grading, erosion and sediment control measures may be required of the owner or his/her agents, due to unforeseen erosion problems or if the submitted plan does not function as intended. The requirements of this GESC document 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.”
- yes no 15. Signature Page – For landowner/authorized agent acknowledging the review and acceptance of responsibility, and for the professional engineer acknowledging responsibility for the preparation of the GESC plan, the Certification Statements are as follows:
- “I hereby certify that the Grading, Erosion, and Sediment Control measures for (Name of Subdivision/Development/address) shall be constructed according to the design presented in this document. I understand that additional erosion control, sediment control and water quality enhancing measures may be required of the owner and his or her agents due to unforeseen pollutant discharges or if the submitted plan does not function as intended. The requirements of the plan shall be the obligation of the land owner and/or his successors or heirs; until such time as the plan is properly completed, modified or voided.”
- Owner or Authorized Agent _____
Authorized Signature _____
- “I hereby attest that this Grading, Erosion, and Sediment Control (GESC) document for (name of subdivision/development) has been prepared by me or under my direct supervision, and to the best of my knowledge and ability has been prepared in accordance with the latest version of the Arapahoe County GESC Manual. The signature and stamp affixed hereon certifies that this GESC document was prepared in accordance with the required regulations and criteria; however, the stamp and signature does not certify or guarantee future performance of the execution of the plan by the contractor. The contractor is responsible for executing the construction work according to the information set forth in the plan and in accordance with all applicable requirements.”
- Registered Professional Engineer _____
State of Colorado No. _____
Affix Seal w/date
- yes no 16. Engineer's Cost Estimate for installation and maintenance of controls –
An Engineer's Cost Estimate, as a stand alone document for erosion and sediment control, including anticipated maintenance during the construction phase, shall be submitted with the GESC documents. This will be reviewed by County staff and used as a basis for collateral. A copy of a spreadsheet to be used for preparing the Engineer's Cost Estimate for erosion and sediment control is included in Appendix F&G of the GESC Criteria Manual. An electronic copy of the spreadsheet is available from the Arapahoe County Engineering services Division of the Department of Public Works and Development.
Unit costs used to develop probable erosion and sediment control costs shall be those shown in the spreadsheet.

Appendix F

**Engineer's GESCC Cost
Estimate Spreadsheet for
Initial and Interim BMPs**

Note: Engineer's GESCC cost estimates shall be submitted under separate cover from report and drawings.

Arapahoe County GESC Permit

Engineer's GESC Cost Estimate Spreadsheet for Initial and Interim BMPs

Note: *Initial* and *Interim* BMPs shall be added together for the Cost Estimate; signature of Applicant/Developer, engineer, and case review engineer required.

Project Name: _____ Date: _____

BMP No.	BMP	ID	Unit	Installation Unit Cost	Initial/Interim Quantity	Initial/Interim Cost
1	Check Dam	CD	LF	\$ 24.00	_____	\$ _____ -
2	Compost Blanket	CB	SF	\$ 0.36	_____	\$ _____ -
3	Compost Filter Berm	CFB	LF	\$ 2.00	_____	\$ _____ -
4	Concrete Washout Area	CWA	EA	\$ 100.00	_____	\$ _____ -
5	Construction Fence	CF	LF	\$ 2.00	_____	\$ _____ -
6	Construction Markers	CM	LF	\$ 0.20	_____	\$ _____ -
7	Curb Sock	CS	LF	\$ 16.00	_____	\$ _____ -
8	Dewatering	DW	EA	\$ 600.00	_____	\$ _____ -
9	Diversion Ditch (2-yr flow less than 10 cfs)	DD	LF	\$ 1.60	_____	\$ _____ -
	(2-yr flow greater than 10 cfs)	DD	LF	\$ 3.00	_____	\$ _____ -
10	Erosion Control Blanket	ECB	SY	\$ 5.00	_____	\$ _____ -
11	Inlet Protection	IP	EA	\$ 200.00	_____	\$ _____ -
12	Flexible Growth Medium	FGM	SY	\$ -	_____	\$ _____ -
13	Reinforced Check Dam	RCD	LF	\$ 36.00	_____	\$ _____ -
14	Reinforced Rock Berm	RRB	LF	\$ 9.00	_____	\$ _____ -
15	RRB for Culvert Protection	RRC	LF	\$ 9.00	_____	\$ _____ -
16	Sediment Basin	SB	AC	\$ 1,000.00	_____	\$ _____ -
17	Sediment Control Log	SCL	LF	\$ 2.00	_____	\$ _____ -
18	Sediment Trap	ST	EA	\$ 600.00	_____	\$ _____ -
19	Seeding & Mulching (Less than 10 Acres)	SM	AC	\$ 2,500.00	_____	\$ _____ -
	(Greater than 10 Acres)	SM	AC	\$ 1,500.00	_____	\$ _____ -
20	Silt Fence	SF	LF	\$ 2.00	_____	\$ _____ -
21	Stabilized Staging Area	SSA	SY	\$ 2.00	_____	\$ _____ -
22	Surface Roughening	SR	AC	\$ 600.00	_____	\$ _____ -
23	Temporary Slope Drain	TSD	LF	\$ 30.00	_____	\$ _____ -
24	Temporary Stream Crossing (2-yr flow less than 10 cfs)	TSC	EA	\$ 1,000.00	_____	\$ _____ -
	(2-yr flow greater than 10 cfs)	TSC	EA	\$ 2,000.00	_____	\$ _____ -
25	Terracing	TER		\$ -	_____	\$ _____ -
26	Vehicle Tracking Control	VTC	EA	\$ 1,000.00	_____	\$ _____ -
27	VTC with Wheel Wash	WW	EA	\$ 1,500.00	_____	\$ _____ -
28	Mobilization (required on all projects)	MB	LS	\$ 5,000.00	1	\$ 5,000.00 -
29	Pond Maintenance/Sediment Removal (Based on area tributary to the pond)	PM	AC	\$ 1,000.00	_____	\$ _____ -
30	Street Maintenance (Based on lane miles of streets within project and frontage)	SM	LM	\$ 500.00	_____	\$ _____ -
31	Other:			\$ -	_____	\$ _____ -
Total Cost of Initial/Interim BMPs						\$ _____

Agreed and Accepted by:

Applicant/Developer:

By: _____

Name: _____

Title: _____

Date: _____

Engineer for Applicant:

By: _____

Name: _____

Title: _____

Date: _____

Case Engineer:

By: _____

Name: _____

Title: _____

Date: _____

Appendix G

**Engineer's GESC Cost
Estimate Spreadsheet for Final
BMPs**

Note: Engineer's GESC cost estimates shall be submitted under separate cover from report and drawings.

Arapahoe County GESC Permit

Engineer's GESC Cost Estimate Spreadsheet for Final BMPs

Note: Signature of Applicant/Developer, engineer, and case review engineer required.

Project Name: _____

Date: _____

BMP No.	BMP	ID	Unit	Installation Unit Cost	Final BMP Quantity	Final BMP Cost
1	Check Dam	CD	LF	\$ 24.00	_____	\$ _____ -
2	Compost Blanket	CB	SF	\$ 0.36	_____	\$ _____ -
3	Compost Filter Berm	CFB	LF	\$ 2.00	_____	\$ _____ -
4	Concrete Washout Area	CWA	EA	\$ 100.00	_____	\$ _____ -
5	Construction Fence	CF	LF	\$ 2.00	_____	\$ _____ -
6	Construction Markers	CM	LF	\$ 0.20	_____	\$ _____ -
7	Curb Sock	CS	LF	\$ 16.00	_____	\$ _____ -
8	Dewatering	DW	EA	\$ 600.00	_____	\$ _____ -
9	Diversion Ditch (2-yr flow less than 10 cfs)	DD	LF	\$ 1.60	_____	\$ _____ -
	(2-yr flow greater than 10 cfs)	DD	LF	\$ 3.00	_____	\$ _____ -
10	Erosion Control Blanket	ECB	SY	\$ 5.00	_____	\$ _____ -
11	Inlet Protection	IP	EA	\$ 200.00	_____	\$ _____ -
12	Flexible Growth Medium	FGM	SY	\$ -	_____	\$ _____ -
13	Reinforced Check Dam	RCD	LF	\$ 36.00	_____	\$ _____ -
14	Reinforced Rock Berm	RRB	LF	\$ 9.00	_____	\$ _____ -
15	RRB for Culvert Protection	RRC	LF	\$ 9.00	_____	\$ _____ -
16	Sediment Basin	SB	AC	\$ 1,000.00	_____	\$ _____ -
17	Sediment Control Log	SCL	LF	\$ 2.00	_____	\$ _____ -
18	Sediment Trap	ST	EA	\$ 600.00	_____	\$ _____ -
19	Seeding & Mulching (Less than 10 Acres)	SM	AC	\$ 2,500.00	_____	\$ _____ -
	(Greater than 10 Acres)	SM	AC	\$ 1,500.00	_____	\$ _____ -
20	Silt Fence	SF	LF	\$ 2.00	_____	\$ _____ -
21	Stabilized Staging Area	SSA	SY	\$ 2.00	_____	\$ _____ -
22	Surface Roughening	SR	AC	\$ 600.00	_____	\$ _____ -
23	Temporary Slope Drain	TSD	LF	\$ 30.00	_____	\$ _____ -
24	Temporary Stream Crossing (2-yr flow less than 10 cfs)	TSC	EA	\$ 1,000.00	_____	\$ _____ -
	(2-yr flow greater than 10 cfs)	TSC	EA	\$ 2,000.00	_____	\$ _____ -
25	Terracing	TER		\$ -	_____	\$ _____ -
26	Vehicle Tracking Control	VTC	EA	\$ 1,000.00	_____	\$ _____ -
27	VTC with Wheel Wash	WW	EA	\$ 1,500.00	_____	\$ _____ -
28	Mobilization (required on all projects)	MB	LS	\$ 5,000.00	1	\$ 5,000.00 -
29	Pond Maintenance/Sediment Removal (Based on area tributary to the pond)	PM	AC	\$ 1,000.00	_____	\$ _____ -
30	Street Maintenance (Based on lane miles of streets within project and frontage)	SM	LM	\$ 500.00	_____	\$ _____ -
31	Other:			\$ -	_____	\$ _____ -
Total Cost of Final BMPs						\$ _____

Agreed and Accepted by:

Applicant/Developer:

By: _____

Name: _____

Title: _____

Date: _____

Engineer for Applicant:

By: _____

Name: _____

Title: _____

Date: _____

Case Engineer:

By: _____

Name: _____

Title: _____

Date: _____

Appendix H

**Arapahoe County GESC
Approval Block**

4.50'

5.5

THESE GESC PLANS HAVE BEEN REVIEWED BY ARAPAHOE COUNTY FOR GRADING, EROSION, AND SEDIMENT CONTROL IMPROVEMENTS ONLY

FOR AND ON BEHALF OF THE
ARAPAHOE COUNTY
DEPARTMENT OF PUBLIC
WORKS AND DEVELOPMENT

Sheet Revisions		
0000		
GESC	GRADING, EROSION, AND SEDIMENT CONTROL	GESC DRAWINGS APPROVAL BLOCK

Appendix I

**Comprehensive
Grading Plan**

Comprehensive Grading Plan Requirements

I.1 General. The County recognizes that, on large-scale projects, where there are long term continual earthwork operations, certain criteria within the GESC requirements may need to be adjusted in order to allow the grading operations to progress in an efficient, cost effective manner. The overall goal of completing grading operations with minimal disruption and impact may best be achieved by preparing a site-specific grading plan, which addresses the grading and erosion control measures necessary to reflect the intended construction sequence and schedule.

For these types of projects, the County has included a provision to allow for a Comprehensive Grading Plan (CGP). The CGP will be considered for sites in which the applicant demonstrates a need to waive certain specific GESC requirements in order to perform the grading operations in an efficient manner.

Typically, CGPs may be considered for projects that meet the following criteria:

- total grading operations will exceed 40 acres
- the project proposes long-term, continual grading operations
- the site will drain to a temporary sedimentation pond(s)
- the site is not located within the Cherry Creek Basin, tributary to the Cherry Creek Reservoir (the Cherry Creek Control Regulation requires strict adherence to the GESC criteria.)
- the site is not tributary to an impaired waterway
- grading of the site is contained within defined construction limits and does not have the potential to significantly impact existing roadways, drainageways, and other public infrastructure.
- the site is a mining activity that may be allowed within certain approved areas of Arapahoe County.

The County shall have the ultimate approval on whether a CGP is appropriate for a particular project.

I.2 CGP Requirements. A CGP will be used by the County to determine whether specific GESC requirements may be modified for a project. The CGP must provide sufficient detailed information to address the specific site elements that will be involved in the grading of the project. CGP reports and drawings must meet all GESC report and drawing requirements, and in addition must provide any additional information which would support a variance of the GESC requirements.

I.3 Applicable GESC Criteria. Applicants are required to meet the intent of all of the GESC criteria on a CGP. However, the County will consider a variance request for specific elements of the GESC criteria when appropriate justification is provided. The variances will be for the specific GESC criteria that is being requested. All GESC requirements must be met on a CGP, except for those which have been specifically modified through a variance by the County.

The GESCS criteria which may be considered for a variance on a CGP are listed below. Following the specific GESCS criteria, is a description of the intent of the GESCS requirement and the elements that will be considered when entertaining variances of the specific criteria. The applicant must demonstrate that the intent of the GESCS requirement is being met in order for the County to agree to the variance request.

◆ **Section 4.8 Require separate grading phases for sites that exceed 40 acres of disturbed area.**

Intent: The intent of this requirement is to limit the area of land disturbance to reduce the potential for erosion and sedimentation. It is recognized that even the most effective BMPs, with diligent maintenance cannot provide 100% effectiveness in reducing erosion; therefore the County will require that the areas of impact be minimized and stabilization measures be provided as soon as possible. The County will consider allowing larger areas of land disturbance phases, but will still require that the phasing be limited to areas that are reasonable for the project.

Elements to be considered in the variance justification shall include: proposed area of phased disturbance with relationship to entire project site; schedule for development/build out of site; time of year of earthwork operations; location of project; impacts to adjacent infrastructure; location and impact to affected drainageways; and others as determined by the County.

◆ **Section 4.14.6 Stockpile Areas. (10 ft. maximum height: 3:1 side slopes)**

Intent: The intent of this requirement is to limit side slopes and heights of stockpiles to minimize the potential for erosion from the stockpile to the surrounding property. Tall, steep stockpiles create excessive velocities and result in significant erosion. However, the County recognizes that stockpiles that are a part of a larger earthwork operation and are part of a larger land disturbance, may be less of an impact to the site if allowed to impact less areas through taller, steeper stockpiles. For these sites, the County will consider allowing steeper side slopes and taller stockpiles, but may require engineering slope stability analyses depending on site conditions.

Elements to be considered in this variance will include: the extent and the location of the stockpile with regard to the entire project; the time frame for the stockpile to remain, the impact to adjacent properties and surrounding areas, the condition of the land adjacent to the stockpile (i.e. disturbed or undisturbed.) and others as determined by the County.

◆ **Section 6.1.8 and Section 10.2 At the end of a work day, no trench shall be left open and backfill must be completed to grade.**

Intent: The intent of this requirement is to backfill utility trenches as soon as possible to avoid the need for dewatering and to limit the amount of time the backfill piles are subject to erosion. Trench dewatering requires devices to ensure that the trench discharges are clean. These dewatering techniques are often neglected on project sites. The stockpiles of backfill material are often not protected adequately from erosion. However, the County recognizes that on a large site, with continual earthwork operations, and adjacent land already disturbed from grading operations, the impact may be less significant. Therefore,

variances of this requirement will be considered.

Elements to be considered in a variance request include: location of utility trench; condition of area adjacent to the utility trench (i.e. disturbed, undisturbed); time frame for utility trench to be backfilled, and others as determined by the County.

- ◆ Others, as determined appropriate by the County on a case-by-case basis. Applicants may request variances from other specific GESC criteria that is not applicable or appropriate to the project. As stated, the intent of the GESC requirement must be met, and elements applicable to the variance request must be considered.

I.4 Submittals. It is recommended that the applicant schedule a pre-submittal meeting with the County to address the CGP and the specific variance requests prior to the submittal of a CGP to the County. All submittal requirements shall be consistent with the Standard GESC Report and Plan submittal requirements outlined in the GESC Manual.

I.5 Report and Drawing Requirements. Comprehensive Grading Plans must be prepared and submitted in accordance with all of the GESC requirements outlined in the GESC Manual. CGP submittals will differ from standard GESC reports and plans, in that they must specifically identify any variances that are being requested of the standard GESC requirements. Appropriate justification, including discussion of the elements associated with the variance request must be provided in the GESC report. Special notes will be required on the GESC drawings to address modifications to the GESC requirements, and to identify schedules, construction sequences, etc., that have been provided to support the GESC variance request.

I.6 Approvals. Approvals of CGPs will be generally consistent with the approval of a Standard GESC report and drawing. CGP approvals will differ from Standard GESC approvals in that the approval will identify the specific elements of the GESC requirements that have been modified for the project, based on additional information provided to the County in the CGP.

Appendix J

**Standard GESC
Permit Application**

Case No:
Section:

Permit No:

RAPAHOE COUNTY
PUBLIC WORKS AND DEVELOPMENT
ENGINEERING DIVISION
 (See Reverse For Terms and Conditions)
 720 874-6500

GRADING, EROSION AND SEDIMENT CONTROL (GESC) PERMIT APPLICATION

Each question must be fully and accurately answered. No action can be taken on this application until all questions have been answered.
PLEASE PRINT, except for signature.

Project Owner/Developer _____	Contractor _____
Address _____	Address _____
Telephone # _____ Fax _____	Telephone # _____ Fax _____
Contact Name _____	Contact Name _____

Acres (including grading/excavation/fill) _____	Estimated material volume _____ cu yd
Project Name _____	Section _____, T _____ S, R _____ W
Construction Location _____	

By signing below, both applicants hereby apply for a RAPAHOE COUNTY GESC Permit for the aforementioned property and certify as follows:

- To the best of my/our knowledge, the information provided herein is correct; and is consistent with the approved engineering plans.
- A GESC Plan for the disturbed area on this site was prepared and submitted in accordance with the GESC Manual, as amended and the Arapahoe County Stormwater Manual.
- I certify I am legally authorized to sign on behalf of and bind the above-listed entity.

The GESC Permit is granted with the explicit understanding that it is the permittee's responsibility to:

- Comply with all requirements in accordance with the Arapahoe County GESC Manual, Arapahoe County Stormwater Manual, GESC Plan and Report, and GESC Permit.
- Allow Arapahoe County, or its designee, unrestricted access to the site to conduct regular site inspections and to perform corrective actions in the event the Permittee fails to provide sufficient remedies to correct site deficiencies.
- Immediately cease land-disturbing activities upon receipt of a written Stop Work Order from an authorized representative of Arapahoe County. A Stop Work Order shall be issued and this permit revoked if the permittees are not in compliance with the Arapahoe County Stormwater Manual, GESC Permit, GESC Plan and Report and GESC Manual or the permittees fail to take corrective action within the time specified on the written notification of such non-compliance.
- Understand that in addition to other remedies, a violation of the GESC Permit shall constitute a violation of the Arapahoe County Zoning Resolution; and
- Understand any approval obtained from Arapahoe County does not absolve the need to comply with the requirements of Sections 7 and 9 of the Endangered Species Act of 1973, 16 U.S.C. 11531, et seq., as amended, or with any other applicable federal, state or local laws or regulations.
- Eliminate designated hazards whenever an Arapahoe County representative determines that an excavation or embankment of fill on private property jeopardizes life and limb, or endangers property, or adversely affects the safety, use, or stability of a public way or drainage channel. Failure to eliminate a designated hazard within 48 hours will result in issuance of a stop work order.

Property Owner: _____ Date: _____	Contractor: _____ Date: _____
Print Name: _____	Print Name: _____

ARAPAHOE COUNTY OPEN SPACE SALES & USE TAX FEE
 List invoice costs for construction and building material used with this permit

Value of Materials: \$ _____ Open Space Tax (.25%) Fee Due: \$ _____ Tax Exempt: Yes or No Tax I.D. Number: _____

Permit Approval (Staff Use Only)

Base Fee:	Additional Cost: \$ _____ x _____ disturbed acres= \$ _____	Base Fee: \$ _____ Penalty: \$ _____ Total Fee: \$ _____	Renewal <input type="checkbox"/> \$ _____ Transfer <input type="checkbox"/> \$ _____
-----------	--	--	---

Engineer's Estimate \$ _____ Total Security \$ _____ Security Received Y N

STAFF APPROVALS

Preliminary Plan/Site Plan Approved Y <input type="checkbox"/> N <input type="checkbox"/> Development Review Engineer: _____ Date: _____	Land Development Inspector: _____ Date: _____
---	--

Initial BMP's Field Approved: _____ Date _____ GESC Inspector: _____ Date _____	Cash <input type="checkbox"/> Check <input type="checkbox"/> Check# _____ Amount \$ _____ Date Paid _____ Issued By _____ Date _____
--	--

Appendix K

**Low-Impact GESC
Permit Application**

Case No:
Section:

Permit No:

ARAPAHOE COUNTY
PUBLIC WORKS AND DEVELOPMENT
ENGINEERING DIVISION
(See Reverse For Terms and Conditions)
720 874-6500

GRADING, EROSION AND SEDIMENT CONTROL (GESC) LOW IMPACT PERMIT APPLICATION

Each question must be fully and accurately answered. No action can be taken on this application until all questions have been answered.
PLEASE PRINT, except for signature.

Project Owner/Developer _____	Contractor _____
Address _____	Address _____
Telephone # _____ Fax _____	Telephone # _____ Fax _____
Contact Name _____	Contact Name _____

Acres (including grading/excavation/fill) _____	Estimated material volume _____ cu yd
Subdivision/Project Name _____	Section _____, T _____, S, R _____, W _____
Construction Location _____	

Project Description: Use Additional Sheets if necessary _____ _____ _____ _____	Required Information: ___1. General location map-at a scale of 1-inch to 1000-feet to 1-inch to 8000-feet indicating the general vicinity of site location, including all roadways. ___2. Detailed plan showing: limits of work area, proximity of work area to property lines, all surface water hydrologic features within 100 feet of proposed work area, directional flow of surface water runoff, and proposed erosion and sediment controls.
--	---

By signing below, both applicants hereby apply for an ARAPAHOE COUNTY GESC Permit for the aforementioned property and certify as follows:

- To the best of my/our knowledge, the information provided herein is correct.
- A GESC Plan for the disturbed area on this site was prepared and submitted in accordance with the Arapahoe County GESC Manual, as amended and the Arapahoe County Stormwater Manual.
- I certify I am legally authorized to sign on behalf of and bind the above-listed entity.

The GESC Permit is granted with the explicit understanding that it is the permittee's responsibility to:

- Comply with all requirements in accordance with the Arapahoe County GESC Manual, accepted GESC Plan, and GESC Permit
- Allow Arapahoe County, or it's designee, unrestricted access to the site to conduct regular site inspections and to perform corrective actions in the event the Permittee fails to provide sufficient remedies to correct site deficiencies.
- Immediately cease land-disturbing activities upon receipt of a written Stop Work Order from an authorized representative of Arapahoe County. A Stop Work Order shall be issued and this permit revoked if the permittees are not in compliance with the GESC Permit, GESC Plan and GESC Criteria Manual or the permittees fail to take corrective action within the time specified on the written notification of such non-compliance.
- Understand that in addition to other remedies, a violation of the GESC Permits shall constitute a violation of the Arapahoe County Zoning Resolution; and
- Understand any approval obtained from Arapahoe County does not absolve the need to comply with the requirements of Sections 6 and 7 of the Endangered Species Act of 1973, 16 U.S.C. 11531, et seq., as amended, or with any other applicable federal, state or local laws or regulations.
- Eliminate designated hazards whenever an Arapahoe County representative determines that an excavation or embankment of fill on private property jeopardizes life and limb, or endangers property, or adversely affects the safety, use, or stability of a public way or drainage channel. Failure to eliminate a designated hazard within 48 hours will result in issuance of a stop work order.

Property Owner: _____	Date: _____	Contractor: _____	Date: _____
Print Name: _____		Print Name: _____	

ARAPAHOE COUNTY OPEN SPACE SALES & USE TAX FEE
List invoice costs for construction and building material used with this permit

Value of Materials: \$ _____ Open Space Tax (.25%) Fee Due: _____ Tax Exempt: Yes or No Tax I.D. Number _____

Permit Approval (Staff Use Only)

Base Fee:	Additional Cost: \$ _____ x _____ disturbed acres = \$ _____	Base Fee: \$ _____ Penalty: \$ _____ Total Fee: \$ _____	Renewal _____ Transfer _____
-----------	---	--	---------------------------------

Engineer's Estimate \$ _____ Total Security \$ _____ Security Received Y N

STAFF APPROVALS

Preliminary Plan/Site Plan Approved Y <input type="checkbox"/> N <input type="checkbox"/> Development Review Engineer: _____ Date: _____	Land Development Inspector: _____ Date: _____ _____
Initial BMP's Field Approved _____ Date _____ GESC Inspector: _____ Date _____	Cash <input type="checkbox"/> Check <input type="checkbox"/> Check# _____ Amount \$ _____ Date Paid _____ Issued By _____ Date _____

Appendix L

**Irrevocable Letter of
Credit Form**

(Use this form for Colorado Bank)

THIS MUST BE ON BANK LETTER HEAD

IRREVOCABLE LETTER OF CREDIT

Board of County Commissioners
of Arapahoe County
5334 South Prince Street
Littleton, Colorado 80166

Letter of Credit No.:
Date:
Amount:
Expiry Date:

RE: (Customer)

Dear County Commissioners:

At the request of and for the account of our customer, (Applicant Name), we hereby establish this Irrevocable Letter of Credit in your favor for the aggregate amount, but not exceeding _____ DOLLARS. Funds under this Letter of Credit are available to you by your drafts drawn at sight on us mentioning thereon this Letter of Credit No. _____.

This Letter of Credit is to cover the estimated costs of public and/or private improvements for a development designated (Arapahoe County's Case Project Name), Arapahoe County, State of Colorado.

This Letter of Credit shall be effective from the date hereof and terminate on _____, and drafts must bear the reference "DRAWN ON _____, LETTER OF CREDIT NUMBER _____, DATED _____."

This is a notation Letter of Credit. Each draft thereon must be accompanied by the original Letter of Credit for endorsement by (Bank Name), for the amount and date of each draft and the balance remaining. This Letter of Credit shall be surrendered to (Bank Name) when exhausted.

All drafts must be accompanied by the following documents:

- a. Presentation of the Letter of Credit for notation.
- b. A signed statement to the effect that the developer is in default of its obligations relating to Case No. (Arapahoe County's Case Number for Project) which arise out of developer's agreement with Arapahoe County, or which arise out of applicable regulations, resolution or policies of Arapahoe County.

The forum for all disputes regarding this letter of credit shall be the District Court for the County of Arapahoe, State of Colorado. The parties disclaim any agreement or obligation to arbitrate any dispute related to this letter of credit. The law of the state of Colorado shall control the interpretation and enforcement of this letter of credit. The Uniform Customs and Practice for Documentary Letters of Credits (1993 Revision), International Chamber of Commerce, Publication No. 500 shall apply to the extent it is not inconsistent with Article 5, Title 4, Colorado Revised Statutes.

This Letter of Credit sets forth in full the terms of our understanding, and such understanding shall not in any way be modified, amended or amplified by reference to any document or instrument referred to herein or in which this Letter of Credit related, and any such reference shall not be deemed to incorporate therein by reference any document or instrument.

By: _____ (Bank Officers Signature)

(Use this form for Out-of-state Bank)

THIS MUST BE ON BANK LETTER HEAD

IRREVOCABLE LETTER OF CREDIT

Board of County Commissioners
of Arapahoe County
5334 South Prince Street
Littleton, Colorado 80166

Letter of Credit No.:

Date:

Amount:

Expiry Date:

RE: (Customer)

Dear County Commissioners:

At the request of and for the account of our customer, (Applicant Name), we hereby establish this Irrevocable Letter of Credit in your favor for the aggregate amount, but not exceeding _____ DOLLARS. Funds under this Letter of Credit are available to you by your drafts drawn at sight on us mentioning thereon this Letter of Credit No. _____.

This Letter of Credit is to cover the estimated costs of public and/or private improvements for a development designated (Arapahoe County's Case Project Name), Arapahoe County, State of Colorado.

This Letter of Credit shall be effective from the date hereof and terminate on _____, and drafts must bear the reference "DRAWN ON _____, LETTER OF CREDIT NUMBER _____, DATED _____.

This is a notation Letter of Credit. Each draft thereon must be accompanied by the original Letter of Credit for endorsement by (Bank Name), for the amount and date of each draft and the balance remaining. This Letter of Credit shall be surrendered to (Bank Name) when exhausted.

All drafts must be accompanied by the following documents:

- a. Presentation of the Letter of Credit for notation.
- b. A signed statement to the effect that the developer is in default of its obligations relating to Case No. (Arapahoe County's Case Number for Project) which arise out of developer's agreement with Arapahoe County, or which arise out of applicable regulations, resolution or policies of Arapahoe County.

We hereby engage with you that all drafts drawn under and in compliance with all the terms and conditions of this credit will be duly honored if drawn and presented for payment to Bank Name and address. Attention: Letter of Credit Department.

The forum for all disputes regarding this letter of credit shall be the District Court for the County of Arapahoe, State of Colorado. The parties disclaim any agreement or obligation to arbitrate any dispute related to this letter of credit. The law of the state of Colorado shall control the interpretation and enforcement of this letter of credit. The Uniform Customs and Practice for Documentary Letters of Credits (1993 Revision), International Chamber of Commerce, Publication No. 500 shall apply to the extent it is not inconsistent with Article 5, Title 4, Colorado Revised Statutes.

This Letter of Credit sets forth in full the terms of our understanding, and such understanding shall not in any way be modified, amended or amplified by reference to any document or instrument referred to herein or in which this Letter of Credit related, and any such reference shall not be deemed to incorporate therein by reference any document or instrument.

By: (Bank Officers Signature)

Appendix M

**Example Hold
Harmless Letter**

Arapahoe County GESC Permit

**HOLD HARMLESS LETTER FORM
FOR
EARLY START OF GRADING**

Chuck Haskins
LDS Program Manager
Arapahoe County Engineering
10730 E. Briarwood Ave. Suite 100
Centennial, Colorado 80112-3853

Subject: Early Start (Grading Only) for:

Project No: _____

Project Name: _____

Dear Mr. Haskins:

The construction plans for the above-mentioned project are currently being reviewed by the County at this time and have not been approved. We are requesting an early start on the Grading, Erosion and Sediment Control (GESC) Plan for the project. We understand that we will be proceeding at our own risk, since we do not have final approvals from the County. We also understand that prior to approval of the project construction plans, there may be revisions required by Arapahoe County, and we will be required to implement changes in accordance with the approved plans. We acknowledge that Arapahoe County will not be held responsible for those changes. We shall be responsible for all the costs associated with any changes that may be required by Arapahoe County. The County shall not be responsible for any costs.

Prior to the issuance of a GESC Permit, we will submit the required surety for the revegetation of the site and all of the erosion and sediment control measures that are required per the GESC Plan.

Sincerely,

(Owner's Name, Title, and Signature)

Date: _____

Appendix N

Phasing Acceptance Sheet

Appendix O

**Letter of GES
Permit Compliance**

Arapahoe County GESC Permit

Letter of GESC Permit Compliance

(submitted by New Property Owners within GESC Permitted site)

Original GESC Permit Information

GESC Permit No. _____ Project Name: _____
Original GESC Permittee(s): _____

New Property Owner Associated with GESC Permit – Attach map of property ownership

Name: _____ Phone No. _____
Address: _____ Fax No. _____
Field Contact Name: _____ Field Contact Phone No. _____
Description of property ownership: _____
I am a: Developer ___ Builder ___ Project Owner ___ Other (please describe): _____

As an owner of property within the above project covered under an existing GESC Permit, I hereby agree to become a party to the GESC permit for this site, and agree to comply with the GESC permit requirements, including:

1. Comply with all requirements in accordance with the Arapahoe County GESC Manual, Arapahoe County Stormwater Manual, the approved GESC Plan and GESC Permit for this project.
2. Allow Arapahoe County, or its designee, unrestricted access to the site to conduct regular site inspections and to perform corrective actions in the event the Permittee fails to provide sufficient remedies to correct site deficiencies.
3. Immediately cease land-disturbing activities upon receipt of a Stop Work Order from an authorized representative of Arapahoe County. A Stop Work Order shall be issued for the site, and the GESC Permit revoked if the Permittee(s) fail to take corrective action within the time specified on the written notification of such noncompliance.
4. Understand that in addition to other remedies, a violation of the GESC Permit shall constitute a violation of Arapahoe County Zoning Resolution.
5. Understand that any approval obtained from Arapahoe County does not absolve the need to comply with the requirements of Sections 7 and 9 or the Endangered Species Act of 1973, or with any other applicable Federal, State, or local laws or regulations.
6. Eliminate designated hazards whenever a County representative determines that an excavation or embankment of fill on private property jeopardizes life and limb, or endangers property, or adversely affects the safety, use or stability of a public way or drainage channel. Failure to eliminate a designated hazard within 48 hours will result in issuance of a Stop Work Order.
7. Agree to notify all future property owners, including other builders and owners of the requirements of the GESC permit, including the Letter of GESC Permit Compliance.

Signature of
Property Owner: _____ Date: _____

Print Name: _____

Appendix P

**Initial Close-out
Acceptance Forms**

- ◆ Initial Close-out Acceptance Form
- ◆ Seeding and Mulching Certification
- ◆ Topsoil Certification
- ◆ Initial Close-Out GESC Inspections Certification
- ◆ Detention/Water Quality Pond Volume Statement

Arapahoe County
Grading, Erosion and Sediment Control Permit
Initial Close-Out Acceptance Form

This section completed by GESC Manager

Project Name : _____	GESC Permit No.: _____
Project Owner: _____	Phase: _____
Address : _____	Project Number: _____
Phone : _____ Fax: _____	Date: _____
Contractor: _____	

The following items must be submitted with this form to request Initial Close-Out Acceptance:

Owner Sign-off

County Sign-off

- Seeding & Mulching Certification:
- Top Soil Certification:
- Detention/WQ Pond Volume Statement
- Initial Close-Out GESC Inspections Certification
- Probationary Acceptance of Public Improvements Letter

The information provided herein is to the best of my knowledge, correct and consistent with the approved GESC Plans for the site.

Project Owner: _____	Date: _____
Contractor: _____	Date: _____

Collateral:

Comments/Descriptions:

\$ _____ Original amount of collateral	This is the amount stated in the Engineer's Cost Estimate for the initial/ Interim, or final BMPs - whichever has a larger dollar quantity.
\$ _____ Reduced amount of collateral (if applicable)	This is only used if collateral has been reduced prior to initial close-out acceptance - submit appropriate collateral history information.
\$ _____ Original amount of collateral to be retained until Final Close-Out	This is the amount stated in the Engineer's Cost Estimate for final BMPs.

Revised Amount of Collateral:

Comments/Descriptions:

(Use only if Engineer's Cost Estimate for Final BMPs is revised)

\$ _____ Revised amount of collateral to be retained until Final Close-Out	This is the amount stated in the Revised Engineer's Cost Estimate for final BMPs.
--	---

This Section Completed by Arapahoe County Inspector:

Close-Out Inspection:

Close-Out inspection date: _____	Re-inspection Required? _____ Yes _____ No	Follow-up Inspection date: _____
Close-Out inspection approval date: _____		

Initial Close-Out Acceptance

Arapahoe County hereby grants Initial Close-Out Acceptance to the above referenced project:

Signature: _____	Date: _____
Arapahoe County Inspector	

Authorization to reduce collateral to:	\$ _____
	(amount to be held)

Signature: _____	Date: _____
Arapahoe County Inspector	

The Permittee is responsible for the required inspections and maintenance of the site until Final Close-Out Acceptance. Final Close-Out Acceptance cannot be requested until all of the disturbed areas are revegetated in accordance with the GESC Manual and approved GESC Plan requirements. The Permittee shall notify the County to schedule a Vegetation Acceptance when all disturbed areas are permanently stabilized. This will begin the process for the Final Close-Out Acceptance.

White Case File **Green** GESC Inspector **Canary** Applicant **Pink** Permit Location File **Gold** LDS Inspector

Arapahoe County GESC Permit

Seeding & Mulching Certification
(submitted by permittee at Initial Close-out Acceptance)

GESC Permit Number: _____ Date: _____

Project Name: _____

Project Owner: _____

GESC Manager: _____

I hereby certify that:

All seeding has been accomplished using a drill seeder to a minimum depth of ¼” and not more than ¾” at the rates specified in the GESC Drawings and Standard Notes and Details. If there were areas that were unable to be seeded using a drill seeder, with prior County approval, the seed was hand broadcast at twice the drilled seed rate, lightly raked to cover the seed, and crimp mulched. The mulch was applied at a rate of 2-tons per acre and mechanically crimped into the soil.

I am aware that revegetation is considered complete when the site is covered by an average of 3 plants per square foot of the variety and species found in the Arapahoe County approved mixes. For blue-grass or equivalent turf grass, the required coverage shall be at least 80% cover of the species planted. There shall be no bare areas larger than 4 square feet, and the site shall be free of eroded areas and shall be free from infestation of noxious weeds in accordance with Section 7.3.2 of the Arapahoe County GESC Manual. All maintenance, repairs, and inspections will be done in a timely matter, in accordance with the GESC Manual, so as to promote the quick re-establishment of vegetation and minimize unnecessary erosion and sedimentation of County facilities and / or drainage ways.

Signed: _____ Print: _____ Date: _____
(GESC Manager) (Name)

Signed: _____ Print: _____ Date: _____
(Project Owner) (Name)

Arapahoe County GESC Permit

Topsoil Certification

(submitted by permittee at Initial Close-out Acceptance)

GESC Permit Number: _____ Date: _____

Project Name: _____

Project Owner: _____

GESC Manager: _____

I hereby certify that:

All the topsoil on the project was stripped, then replaced to a depth of 6" in all areas to be seeded. If the on-site quantities were inadequate to provide a replacement depth of 6 inches, topsoil was imported, or the onsite soil was conditioned as approved by the County, and records can be provided to Arapahoe County verifying the quantity of topsoil or soil amendments imported. All disturbed areas were ripped prior to placing topsoil, and all the topsoil was thoroughly loosened, prior to seeding, to a depth of at least 6 inches.

I am aware that based on requirements set forth in the Arapahoe County GESC Manual that it is my responsibility or my authorized representative for all maintenance and repairs of the site that are necessary to achieve Final Vegetative Coverage and subsequently Final Close-Out Acceptance. All maintenance, repairs, and inspections will be done in a timely matter, in accordance with the GESC Manual, so as to promote the quick re-establishment of vegetation and minimize unnecessary erosion and sedimentation of County facilities and / or drainage ways.

Signed: _____ Print: _____ Date: _____
(GESC Manager) (Name)

Signed: _____ Print: _____ Date: _____
(Project Owner) (Name)

Arapahoe County GESC Permit

Initial Close-Out GESC Inspections Certification

(submitted by permittee at Initial Close-out Acceptance)

GESC Permit Number: _____ Date: _____

Project Name: _____

Project Owner: _____

GESC Manager: _____

I hereby certify that:

All GESC inspections required by the Arapahoe County GESC permit for this project have been performed under my direction or supervision in accordance with the requirements set forth in the Arapahoe County GESC Manual. I am aware that failure to comply with the GESC Manual requirements is a violation of the Arapahoe County Land Development Code, and is therefore subject to penalties.

I am aware that there are additional GESC inspections that are required to be performed by the GESC permittee in the interim period between Initial Close-out Acceptance and Final Close-out Acceptance. I will ensure that these inspections, along with appropriate maintenance and repair, will be done in accordance with the Arapahoe County GESC manual.

Signed: _____ Print: _____ Date: _____
(GESC Manager) (Name)

Signed: _____ Print: _____ Date: _____
(Project Owner) (Name)

Arapahoe County GESC Permit

Detention/Water Quality Pond Volume Statement

(submitted by GESC permittee at Initial/Final Close-out)

**Surveyor's Statement of Substantial Compliance of
Detention/Water Quality Pond Volume**

A field survey was conducted by _____ (Surveyor) _____, on _____ (Date) _____
for the purpose of verifying that the Detention/Water Quality Pond Volumes are
consistent with the Record Drawings for the Detention/Water Quality Pond(s).

I, _____ (Surveyor) _____, hereby state that in my professional opinion, the
Detention/Water Quality Pond Volumes are consistent with the Detention/Water Quality
Pond Volumes depicted on the Record Drawings.

(Surveyor's Name)
Colorado Professional Land Surveyor No. _____

Date

(Seal)

Appendix Q

**Final Close-out
Acceptance Forms**

- ◆ Final Close-out Acceptance Form
- ◆ Final Close-Out GESC Inspections Certification
- ◆ Vegetation Acceptance
- ◆ Detention/Water Quality Pond Volume Statement

Arapahoe County
Grading, Erosion and Sediment Control Permit
Final Close-Out Acceptance Form

This Section completed by GESC Manager

Project Name : _____	GESC Permit No.: _____
Project Owner: _____	Phase: _____
Address : _____	Project Number: _____
Phone : _____ Fax: _____	Date: _____
Contractor: _____	

The following items must be submitted with this form to request Final Close-Out Acceptance:

Owner Sign-off

County Sign-off

Final Close-Out GESC Inspections Certification
 Vegetation Acceptance
 Detention/WQ Pond Volume Statement
 Final Acceptance of Public Improvements Letter

The information provided herein is to the best of my knowledge, correct and consistent with the approved GESC Plans for the site.

Project Owner: _____ Date: _____
 Contractor: _____ Date: _____

Completed by Arapahoe County Permits Technician

Collateral History:

Comments/Descriptions:

\$ _____ Original amount of collateral	This is the amount stated in the Engineer's Cost Estimate for the initial/ Interim, or final BMPs - whichever has a larger dollar quantity.
\$ _____ Amount of collateral held at Initial Close-Out	This is the amount of collateral held at initial close-out
\$ _____ Collateral Reductions (if applicable)	These are reductions previously approved by the County prior to Final Close-out (provide copy of reduction requests)
\$ _____ Amount of Collateral currently being held by County	This is the amount of collateral currently held by the County for final BMPs.

Completed by Arapahoe County Inspector:

Close-Out Inspection:

Close-Out inspection date: _____
 Re-inspection Required: _____ Yes (see inspection report for action needed)
 _____ No
 Close-Out inspection approval date: _____

Final Close-Out Acceptance

Arapahoe County hereby grants Final Close-Out Acceptance to the above referenced project:

Signature: _____ Date: _____
 Arapahoe County Inspector

Authorization to release collateral:

Signature: _____ Date: _____
 Arapahoe County Inspector

White Case File **Green** GESC Inspector **Canary** Applicant **Pink** Permit Location File **Gold** LDS Inspector

Arapahoe County GESC Permit

Final Close-Out GESC Inspections Certification

(submitted by permittee at Final Close-out Acceptance)

GESC Permit Number: _____ Date: _____

Project Name: _____

Project Owner: _____

GESC Manager: _____

I hereby certify that:

All GESC inspections required by the Arapahoe County GESC permit for this project have been performed under my direction or supervision in accordance with the requirements set forth in the Arapahoe County GESC Manual. I am aware that failure to comply with the GESC Manual requirements is a violation of the Arapahoe County Land Development Code, and is therefore subject to penalties.

To the best of my knowledge, all seeded and mulched areas were inspected monthly and repairs, reseeding and mulching were done at least twice per year or as requested by the County. All rill and gully erosion was filled with topsoil prior to reseeding and all noxious weeds have been controlled.

Signed: _____ Print: _____ Date: _____
(GESC Manager)

Signed: _____ Print: _____ Date: _____
(GESC Permittee)

Arapahoe County GESC Permit

Vegetation Acceptance Form

(submitted by permittee to request Vegetation Acceptance)

GESC Permit Number: _____ Date: _____

Project Name: _____

Project Owner: _____

GESC Manager: _____

I hereby certify that:

All maintenance, repairs, and inspections have been done in a timely matter, in accordance with the GESC Manual. The site is covered by an average of 3 plants per square foot with a minimum height of 3 inches. The 3 plants per square foot are of the variety and species designated on the plans or of those found in the Arapahoe County approved mixes. For blue-grass or equivalent turf grass, the required coverage is at least 80% cover of the species planted. There are no bare areas larger than 4 square feet, and the site is free of eroded areas and free from infestation of noxious weeds in accordance with the Arapahoe County GESC Manual.

Signed: _____ Print: _____ Date: _____
(GESC Manager) (Name)

Signed: _____ Print: _____ Date: _____
(Project Owner) (Name)

This section completed by County Inspector

Vegetation Inspection date: _____ Re-inspection required? Yes ___ No ___

Comments: _____

Vegetation Acceptance date: _____

Arapahoe County hereby Grants Vegetation Acceptance: _____
Arapahoe County Inspector

Arapahoe County GESC Permit

Detention/Water Quality Pond Volume Statement

(submitted by GESC Permittee at Initial/Final Close-out)

**Surveyor's Statement of Substantial Compliance of
Detention/Water Quality Pond Volume**

A field survey was conducted by _____ (Surveyor) _____, on _____ (Date) _____
for the purpose of verifying that the Detention/Water Quality Pond Volumes are
consistent with the Record Drawings for the Detention/Water Quality Pond(s).

I, _____ (Surveyor) _____, hereby state that in my professional opinion, the
Detention/Water Quality Pond Volumes are consistent with the Detention/Water Quality
Pond Volumes depicted on the Record Drawings.

(Surveyor's Name)
Colorado Professional Land Surveyor No. _____

Date

(Seal)

Appendix R

**Request for Reduction
of Collateral Form**

Arapahoe County GESC Permit

Request for Reduction of Collateral

(submitted by Permittee when requesting reduction in collateral)

GESC Permit Number: _____ Date: _____

Project Name: _____

Project Owner: _____

Address: _____

Collateral History:

Amount of Collateral currently held by County: _____

Amount of Collateral reduction requested: _____

Remaining Collateral to be held by County: _____

Provide Explanation for Collateral Reduction Request

A Revised Final BMP Plan and Engineer's Cost Estimate must be submitted with this Collateral Reduction request. The Revised Cost Estimate will be used to determine the amount of collateral to be retained by the County.

This section to be completed by County Inspector

Arapahoe County hereby grants the approval of the Revised Final BMP Plan and Revised Final Cost Estimate dated _____.
Plan approval date

The collateral may be reduced to the amount of _____

Signature: _____ Date: _____
Arapahoe County Inspector

Collateral reduction processed by _____ Date: _____

Appendix S

Single Family Lot Certificates

- ◆ Single Family Lot Erosion Control Certificate
- ◆ Drainage Certificate

Arapahoe County GESC Permit

**Single-Family Residential
Single-Family Lot Erosion Control
Certificate**

(Submitted by Builder prior to issuance of Certificate of Occupancy)

Date: _____

Builder: _____ Building Permit #: _____

Property Address: _____

Subdivision: _____ Lot: _____ Block: _____

I hereby certify that:

All minimum drainage, erosion, and sediment control requirements set forth by Arapahoe County Zoning Resolution have been adhered to, including the following:

- Adequate drainage away from the structure(s) and off the lot has been established and verified on the Drainage Certificate.
- The purchaser has been informed of the need to maintain established drainage patterns as shown on the Drainage Certificate.
- Permanent erosion controls or adequate temporary erosion and sediment control measures designed to be effective for 90 days have been properly implemented on this lot.

I shall cause the purchaser to be aware of the need for regular inspection and maintenance of the temporary erosion and sediment control measures implemented and the need for timely installation of permanent measures, all to prevent drainage, erosion, and sedimentation problems.

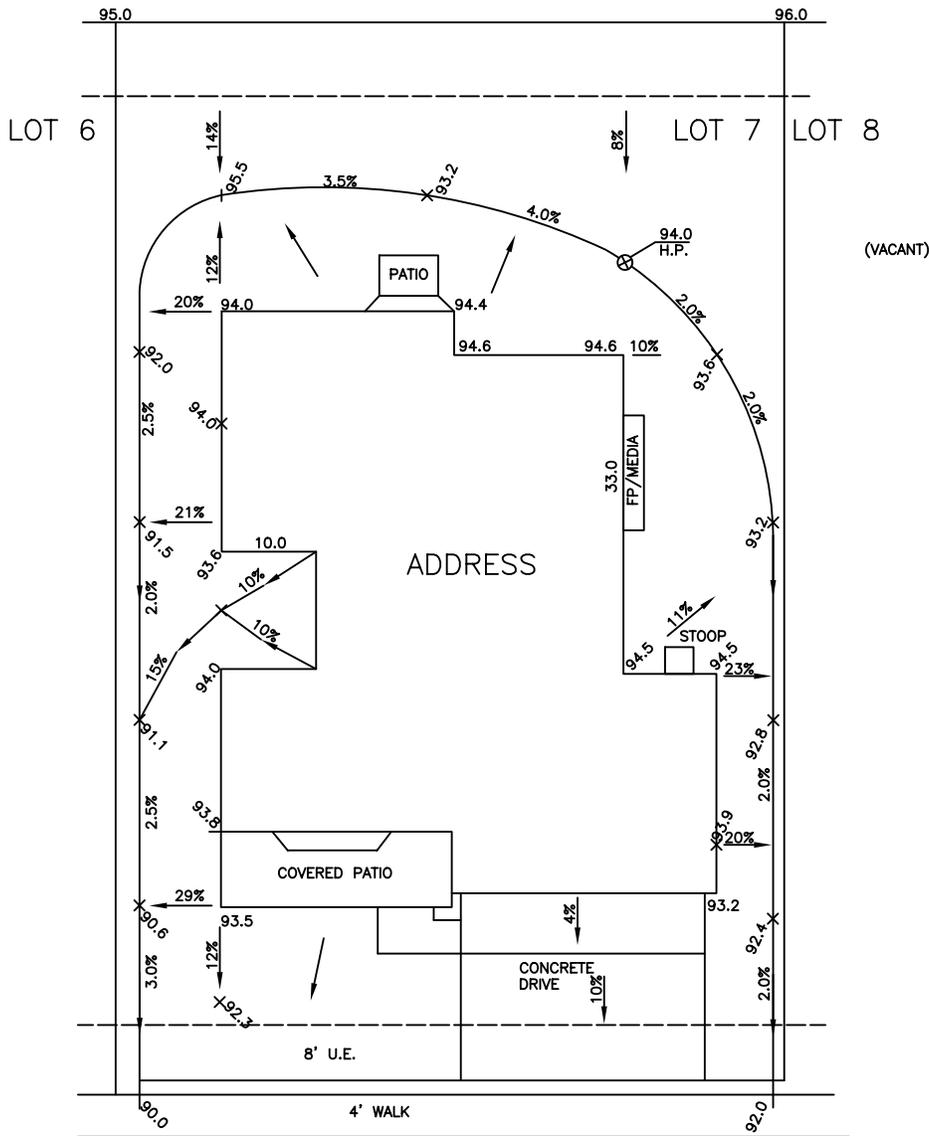
Signed: _____ Print: _____ Date: _____
(Superintendent)

Signed: _____ Print: _____ Date: _____
(Project Manager)

DRAINAGE CERTIFICATE

NO. _____

SAMPLE



STREET NAME

(50' R.O.W.)

SEAL AND
SIGNATURE

DATE OF ELEVATION SURVEY

I hereby certify that: The grading and drainage patterns shown hereon were developed from a survey of the above described property, performed on the date shown and accurately depict the relative elevations as they existed on the date of said survey. The relative elevations as depicted on the attached drainage certificate are correct to the nearest 0.1 foot. I have inspected the survey data and concluded that, to the best of my knowledge and belief, the lot will drain adequately in substantial conformance with the approved Phase III Drainage Report, the Final Development Plan (FDP) for the project, and the County's Building Code Ordinance. The elevations depicted hereon may change subsequent to the date hereon due to subsidence or upheaval of soils, addition or removal of soils, erosion of soils by wind or water, or other factors. Drainage swales or flow may be blocked by fences, walks, landscaping or other improvements, therefore this survey may not accurately depict the grading and drainage patterns subsequent to the date of this survey.

Appendix T

Seed Mix Information

Arapahoe County GESC Permit

Standard Seed Mix Information

Arapahoe County Permanent Drill Seeding Mix				
Species	Variety	Notes	% in Mix	PLS#/AC
Big Bluestem	Kaw	PNWS	10	1.1
Yellow Indiangrass	Cheyenne	PNWS	10	1.0
Switchgrass	Blackwell	PNWS	10	0.4
Sideoats Grama	Vaughn	PNWB	10	0.9
Western Wheatgrass	Arriba	PNCS	10	1.6
Blue Grama	Hachita	PNWS	10	0.3
Thickspike Wheatgrass	Critana	PNCS	10	1.0
Prarie Sandreed	Goshen	PNWS	10	0.7
Green Needlegrass	Lodorm	PNCS	10	1.0
Slender Wheatgrass	Pryor	PNCS	5	0.6
Streambank Wheatgrass	Sodar	PNCS	5	0.6

Arapahoe County Temporary Drill Seeding Mix				
Species	Variety	Notes	% in Mix	PLS#/AC
Smooth Bromegrass	Lincoln	PICS	30	3.9
Inetermediate Wheatgrass	Oahe	PICS	30	4.5
Pubescent Wheatgrass	Luna	PICS	30	4.2
Annual Ryegrass	N/A	AICB	10	0.8

Arapahoe County Low-Growth Drill Seeding Mix				
Species	Variety	Notes	% in Mix	PLS#/AC
Buffalograss	Texoka	PNWS	20	3.2
Blue Grama	Hachita	PNWB	20	0.6
Western Wheatgrass	Arriba	PNCS	20	3.2
Sideoats Grama	Vaughn	PNWB	20	1.8
Thickspike Wheatgrass	Critana	PNCS	10	1
Streambank Wheatgrass	Sodar	PNCS	5	0.6

Notes:

- P = Perennial**
- A = Annual**
- N= Native**
- I = Introduced**
- W = Warm Season**
- C = Cool Season**
- S = Sod Former**
- B = Bunchgrass**

Appendix U

**Temporary Batch Plant
GESC Permit Application**

The Temporary Batch Plant GESC Permit Application is under development.

Use Standard GESC Permit Application

Appendix V

Noxious Weeds

Control of Noxious Weeds

V.1

Arapahoe County, through its County Ordinances, requires landowners to control noxious weeds on their property. Noxious weeds negatively impact agriculture, water quality, recreational opportunities, and wild-life. For these reasons, all projects subject to acceptance for final revegetation shall be free of noxious weed infestation.

Arapahoe County has designated the following as noxious weeds:

1. *Leafy spurge.*
2. *Diffuse knapweed.*
3. *Russian knapweed.*
4. *Spotted knapweed.*
5. *Musk thistle.*
6. *Canada thistle.*
7. *Scotch thistle.*
8. *Salt Cedar.*
9. *Dalmation toadflax.*
10. *Yellow toadflax.*

The following information is intended to be used as a guide for landowners, developers and Contractors to identify noxious weeds on project sites and to take early measures to control the weeds in the early stages of infestation. This will 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 Arapahoe County Weed Control Specialist. Contact information for the Arapahoe County Weed Control Specialist can be found in Appendix A.

LEAFY SPURGE

(*Euphorbia esula*) is a perennial, up to 3-feet tall; reproducing by vigorous rootstalks and seeds. Leaves are alternate, narrow, and 1- to 4-inches long. Stems are thickly clustered. Flowers are yellowish-green, very small, arranged in numerous small clusters. Roots are brown, containing numerous pink buds which may produce new shoots or roots. The entire plant contains a caustic milky sap, which has been known to cause dermatitis. Seeds are oblong, grayish to purple, contained in a three-celled capsule, each cell with a single seed.



Yellow flowered Leafy Spurge



Spurge buds in spring



Spurge sprout by quarter

Control of Noxious Weeds, continued

DIFFUSE KNAPWEED (*Centaurea diffusa*) is a diffusely branched annual or biennial, 1- to 2-feet tall. Stems are rough to the touch. Leaves are small, divided; flowering heads are numerous and narrow. Ray flowers are white to rose or sometimes purplish; leaflets around base of flower head are divided like the teeth of a comb, tipped with definite slender spines.



Pink and white flowered diffuse knapweed

RUSSIAN KNAPWEED

(*Centaurea repens*) is a creeping perennial that reproduces from seed and vegetative buds in its root system. Stems wither away annually. Shoots are erect, about 18 to 36 inches tall, and many branched. Lower leaves are 2 to 4 inches long and deeply lobed; upper leaves are smaller generally with smooth margins, but can be slightly lobed. Shoots and leaves are covered with dense gray hairs. The cone-shaped flowering heads are solitary and occur on shoot tips; they generally are 1/4- to 1/2-inches in diameter and have smooth papery bracts. Flower color can be pink, lavender, or white. Russian knapweed has horizontal roots that have a brown to black, scaly appearance. Russian knapweed forms dense, single species stands over time due to release of toxins and competition.



Russian Knapweed



SPOTTED KNAPWEED

(*Centaurea maculosa*) is a short-lived perennial with a stout taproot, (like a dandelion). It can have one or more stems, branched 1- to 3-feet tall. Base leaves are up to six inches long, blades are narrowly oblong to lance shaped tapering at both ends, with feather-like ends; principal stem leaves are also featherlike. Flowering head is solitary, with terminating branches;



Spotted Knapweed

the circle of leaflets below flower is stiff and tipped with a dark comb-like fringe. The flowers are pinkish-purple or on rare occasions cream colored.

Control of Noxious Weeds, continued

MUSK THISTLE

(*Carduus nutans*) is biennial or sometimes a winter annual, which grows up to six feet tall. Leaves are dark green with light green midrib, deeply lobed, serrated or with spiny margins. Edges of leaves are often a grayish-silver color. The leaves extend onto the stem giving a winged appearance. Flower ends each branch, solitary, 1½- to 3-inches in diameter. It is usually bent over. Flowers are deep rose, violet, or purple, and occasionally white. Flowers have a base of long narrow, spine-tipped leaflets.



Musk Thistle

CANADA THISTLE

(*Cirsium arvense*) is a colony-forming perennial from deep underground and extensive horizontal roots. Stems are 1- to 4-feet tall, ridged, and branching. Leaves are alternate, lacking stalks, oblong or lance-shaped, divided into spiny tipped irregular lobes. Flowers are purple in heads ½- to ¾-inches in diameter; with a circle of leaflets below the flowers.



Canada Thistle

SCOTCH THISTLE

(*Cirsium arvense*) Scotch thistle is a biennial, producing a large rosette of spiny leaves the first year. The second year the weed transforms into a coarse branching plant up to eight feet tall and five feet in diameter. Under poor growing conditions, the plants may stand less than a foot tall, but can produce nearly as many seeds as the larger plant.



Scotch Thistle



Scotch Thistle

Scotch thistle leaves are deeply lobed or serrated with long, stiff spines along the margins. The leaves have winged appearance that continues down the stems of the plant. Fine hairs give the plant a grayish appearance. Purple flowers, more than an inch in diameter, are produced in the summer. Flower heads remain upright, rather than nodding as Musk thistle flowers do. Stocks supporting the flowers are leafy.

Control of Noxious Weeds, continued

SALT CEDAR

(Tamarix ramosissima) can grow as a deciduous or evergreen shrub, or can become a small tree. The height can range from 5 to 20 feet tall. The bark is a distinctive reddish-brown color and the leaves are small and scale-like. The flowers are pink or white in color and have 5 petals. The Saltcedar reproduces from seed as well as from underground roots.



Saltcedar



Saltcedar

DALMATION TOADFLAX

(Linaria dalmatica) is a colony-forming perennial from deep underground and extensive horizontal roots. Stems are 1- to 4-feet tall, ridged, and branching. Leaves are alternate, oblong or lance-shaped, divided into spiny tipped irregular lobes. Flowers are purple in heads ½- to ¾-inches in diameter; with a circle of leaflets below the flower.



Dalmation Toadflax

Photos by the British Columbia Ministry of Agriculture



Dalmation Toadflax

Control of Noxious Weeds, continued

YELLOW TOADFLAX
(Linaria vulgaris) is a perennial, often over 3-feet tall. Numerous long and narrow pale green leaves are smooth and pointed. Flowers are snapdragon type 1- to 1½-inches long, bright yellow with deep orange centers. Vigorous roots are woody, creeping, and well branched, with multiple laterals. Yellow toadflax spreads by seeds and roots.



Yellow Toadflax