

# **Stormwater Management**

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**Volume I**

**Erosion and Sediment**

**Control (ESC) Manual**

**West Plains, Missouri  
Engineering Department**

**2010**





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This manual is organized into 9 sections, as follows:

**Section 1. Introduction**

This section introduces the ESC Permit and discusses the reasons and legislative mandate for the ESC Permit Program. The section summarizes the 20 permit steps involved in the ESC Permit and describes the authorization of the *Stormwater Management Erosion and Sediment Control (ESC) Manual Volume I*. Sections 2 through 6 cover the entire 20-step process for the ESC Permit.

**Section 2. Getting Started (Steps 1-3)**

This section provides information for the permittee(s) on the first three steps in the 20-step ESC Permit process. It clarifies that a professional engineer shall prepare an ESC Plan, describes the types of ESC drawings, and identifies related plans and permits that must be addressed.

**Section 3. Preparing an ESC Plan (Step 4)**

This section provides guidance for the design engineer on Step 4, preparing an ESC Plan, following the eleven elements of an effective ESC Plan, design intent and guidance for ESC drawings, design parameters, and submittal requirements for preliminary acceptance of ESC Plan.

**Section 4. ESC Plan Acceptance and ESC Permit Application (Steps 5-7)**

This section describes the process of applying for an ESC Permit (Steps 5 through 7), from the review and approval of the ESC Plan documents to filling out the permit application, paying the permit fee, and posting fiscal security.

**Section 5. Field Section (Steps 8-14)**

This section provides information for field personnel on Steps 8 through 14, covering the construction of the project, including designation of the ESC Manager, installation of initial BMPs, the mandatory preconstruction meeting, picking up the completed ESC Permit, the construction inspection process, and violations and enforcement.

**Section 6. Project Acceptance and Close-Out (Steps 15-20)**

This section describes the last six steps in the process, including the initial close-out inspection, requirements for vegetation establishment, final inspections, removal of BMPs when the permittee(s) leave the site, and the release of fiscal security.

**Section 7. Acronyms and Glossary**

This section provides a glossary of terms and acronyms used in the *ESC Manual*.

**Section 8. Bibliography**

This section provides a list of references used in the development of the *ESC Manual*.

**Section 9. Revisions**

This section allows for placement of any revisions and updated information that will be made available to holders of the *ESC Manual* prior to the time that the entire *ESC Manual* is republished.

**Appendices**

This section includes a number of appendices containing supplemental information. Two key appendices include the ESC Plan General Standard Notes and Details and Example ESC Drawings.

A detailed table of contents and list of appendices follows.

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**Preparation of  
the Manual**

West Plains wishes to acknowledge those who contributed to the preparation of the *Erosion and Sediment Control (ESC) Manual*.

**West Plains, Missouri**

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**Purpose of the  
Manual**

This manual is intended to be used as a guidance and requirements manual by a professional engineer to develop an ESC Plan in order to receive an ESC Permit from the City. The City will also use the manual to update ESC requirements and is enforceable by ordinance and the Clean Water Act. Contractor's guidance and requirements manual is the erosion and sediment control field manual which is issued to permitte after the ESC plan is accepted. When developing plans for permanent stormwater facilities or conveyance infrastructure to receive a stormwater permit for a site with over an acre of impervious area, follow the guidance and requirements within the *Stormwater Management Manual Volume II*.



## Section 1. Introduction

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### Overview of Section 1

#### 1.0

Section 1 addresses the following introductory topics:

Section 1.1, **The ESC Permit**, introduces West Plains' Erosion and Sediment Control (ESC) 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 ESC Permit Program is mandated by legislation, including the Federal Clean Water Act's National Pollutant Discharge Elimination System (NPDES) Stormwater Phase II Regulations.

Section 1.4, **Projects Requiring an ESC Permit**, indicates the types of land-disturbing activities in West Plains that require an ESC Permit.

Section 1.5, **Who Obtains an ESC Permit**, states that the property owner and contractor, together referred to as "applicants" before an ESC Permit is issued and "permittee(s)" afterwards, are the parties who sign the ESC Permit application form and are legally responsible for complying with the requirements of the ESC Permit.

Section 1.6, **What Steps are Included in the ESC Permit Process?**, outlines the 20 steps involved in the ESC Permit process.

Section 1.7, **Authorization of the ESC Manual**, states that the *ESC Manual* is authorized by passage and adoption of a City ordinance. This section discusses the interpretation and enforcement of the ESC Permit requirements described herein.

***The Permit Steps.*** Each of the 20 steps in the ESC Permit process is highlighted in Section 2 through 6 of the ESC Manual. Each step is shown in a blue box, such as this one. A header is provided on each page identifying the step being addressed.

# Erosion and Sediment Control



*Rates of erosion increase dramatically during construction.*

### The ESC Permit

#### 1.1

West Plains has a permitting program for erosion and sediment control on public and private construction projects within the City. This *Erosion and Sediment Control Manual (ESC Manual)* describes the permitting program that has been adopted to promote environmentally-sound construction practices in the City.

#### Terminology

*The Erosion and Sediment Control Permit is termed simply the “ESC” Permit for short*

### Reasons for the ESC Permit

#### 1.2

The goal of the ESC 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 predevelopment 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.*

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

### *Legislative Mandate*

#### **1.3**

**NPDES Regulations.** The development, implementation, and enforcement of the West Plains ESC Permit program is mandated by both the Federal Government and the State of Missouri. 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 permit 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 in population. The regulation was expanded in 2003 to include smaller municipalities, including West Plains. This expansion of the program is referred to as **Phase II**.

In Missouri, stormwater discharge permits are issued by the Missouri Department of Natural Resources (MDNR). The City is considered a Phase II municipal separate storm sewer system (MS4) and will be covered under a general permit for stormwater discharges from MS4s. As per the MDNR's regulation, the main requirement of this general permit will be for West Plains to develop and implement six stormwater management programs, or minimum control measures. One of these six measures is **construction site stormwater runoff control**.

In short, the City must develop and enforce a stormwater management program that is considered a Phase II MS4 and protects state waters from pollution, contamination, and/or degradation.



*Control of construction site erosion in West Plains is mandated by federal and state law.*



## Section 1. Introduction

### **Projects Requiring an ESC Permit**

#### **1.4**

**1.4.1 Projects that Require an ESC Permit.** West Plains requires that an ESC Permit be obtained prior to the start of the following land-disturbing activities within the City:

#### **Projects Requiring a Standard ESC Permit**

- ◆ Any project that disturbs 1.0 acre or more of land.
- ◆ Installation of utility lines in excess of 1,000 linear feet.
- ◆ Any clearing, grubbing, grading, or filling operations located within 100 feet of a drainageway.
- ◆ Fill or excavation of 50 or more cubic yards of material, not related to building of a detached single family residential unit.
- ◆ Any project that the Stormwater Coordinator determines to have a potential impact to the health, safety, and welfare of people and/or the environment regardless of the size of the project.

**1.4.2 Projects that Do Not Require an ESC Permit.** Some types of projects, listed below, are automatically exempt from the ESC Permit Program.

#### **Projects that Do Not Require an ESC Permit**

- ◆ Land-disturbance activity as described in 10 CSR 20-6.200.(1)(B)8, where MDNR water quality standards are not exceeded.
- ◆ Sites that disturb less than 1.0 acre of total land area that are not part of a common plan or sale and that do not cause any violations of water quality standards and are not otherwise designated by the MDNR as requiring a permit where water quality standards are not exceeded.
- ◆ Agricultural stormwater discharges and irrigation return flows. Animal Feeding Operations (AFO) are not included in the agricultural exemption.

Projects that do not need an ESC Permit are not free from the obligation to control erosion and sediment.

**Important!** Projects that do not need an ESC Permit are not free from the obligation to control erosion and sediment.

**1.4.3 Projects Covered Under Other Permits.** ESC 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 projects in which a 404 Permit has been obtained from the U.S. Army Corps of Engineers®, which can be required when work is on or near a drainageway or wetland. See section 2.7 for more information.

*West Plains ESC Permits are required even for projects covered under a state permit.*

## Section 1. Introduction

### Who Obtains an ESC Permit?

#### 1.5

Typically, ESC Permits are signed by both the project owner and the contractor. Prior to issuance of an ESC Permit, the owner and the contractor are referred to as “applicants”. After the permit is issued, both are considered “permittee(s).”

A permittee is defined as “any person who is issued an ESC Permit by the City”. The permittee(s) shall be legally responsible for compliance with the ESC Permit. If an applicant is a corporation, a manager or officer of the corporation or other authorized person must sign the permit as the Permittee.

Permittee(s) (owners and contractors) undertaking land-disturbing activities are responsible for meeting all of the requirements of the City’s ESC Permit Program. This manual, the *Stormwater Management Erosion and Sediment Manual Volume I*, here after called the *ESC Manual* is one of two City manuals covering ESC Permit requirements. This manual is used by a design engineer to develop the ESC Plan, but also covers the entire ESC Permit process. The other manual *ESC Field Manual* is used by the contractor and ESC Manager after the ESC Plan has been accepted by the City. Failure to meet the requirements of the ESC Permit may lead to enforcement action, as described in Section 5.8.

**Important!** Failure to meet the requirements of an ESC Permit may lead to enforcement action against the permittee(s).

### What Steps are Included in the ESC Permit Process?

#### 1.6

The 20 steps involved in the West Plains ESC Permit process for the ESC Permit is shown in Figure 1-1. Figure 1-1 shows approximate schedules for City reviews, and identifies portions of Sections 2 through 6 of the *ESC Manual* to reference for information on each step of the ESC Permit process.

***Each page of Sections 2 through 6 of the ESC Manual provides a header (appearing at the top right side of the page) identifying the permit step being addressed. An overview page at the beginning of each section summarizes the ESC Permit steps covered in the section and relates each subsection to one of the ESC Permit steps.***

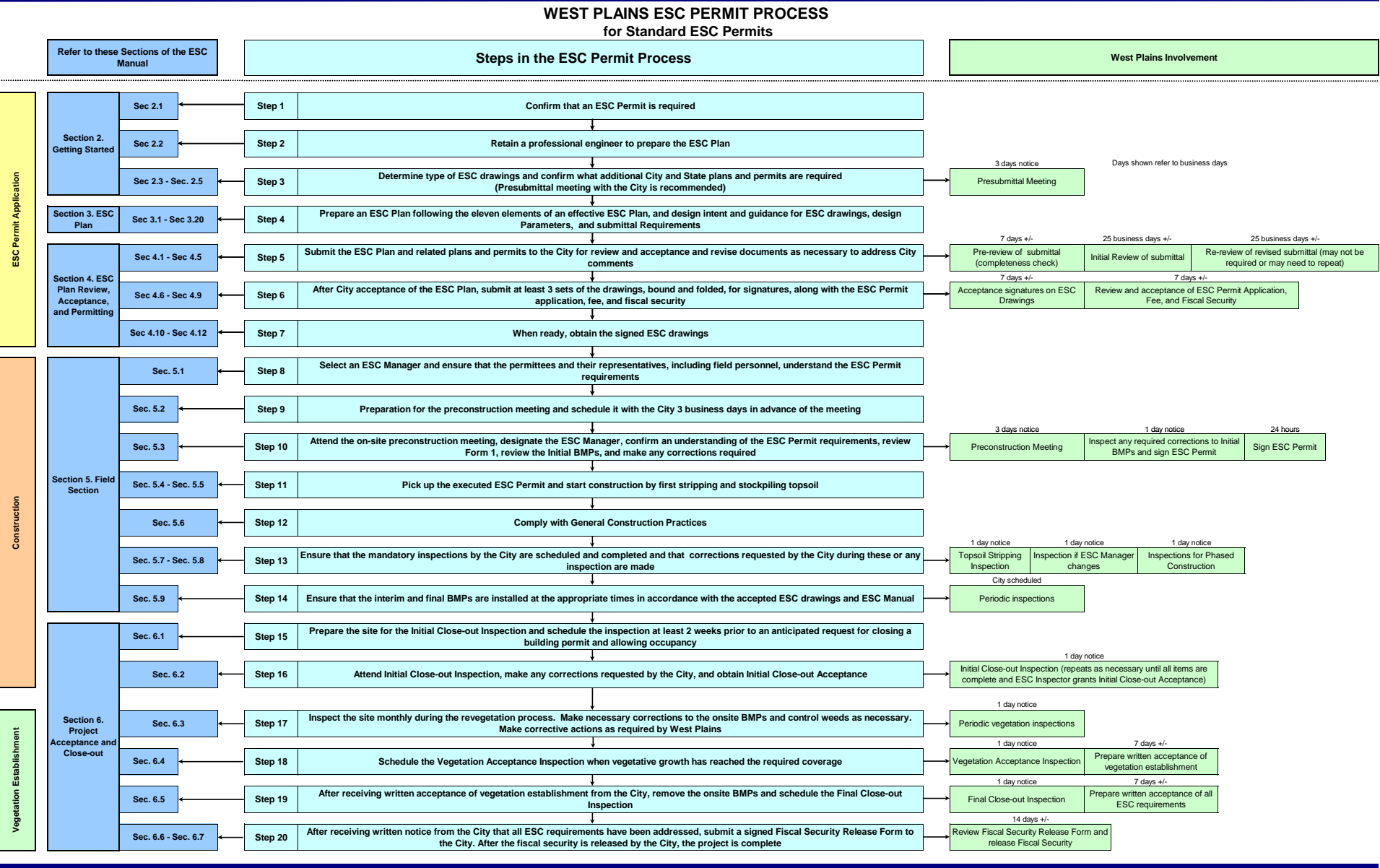
Although the ESC Permit process is organized into the distinct steps shown in the flowcharts, the process as a whole is intended to be dynamic, responding to individual site conditions to provide effective erosion and sediment control during construction.



Information

***The ESC Permit process is a dynamic, not static, process. The permittee(s) is responsible for adapting the original ESC Plan so as to effectively reduce erosion and sediment and comply with any modifications to the ESC Plan required by West Plains.***

Figure 1.1





## Section 1. Introduction

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### ***Authorization of the ESC Manual***

#### **1.7**

The *ESC Manual* is authorized by the West Plains Land Disturbance Ordinance.

**1.7.1 Jurisdiction.** The ESC Permit Program shall apply to all land within the City of West Plains.

**1.7.2 Amendments and Revisions.** These policies and criteria may be amended and revised as new technology is developed and experience is gained. The Engineering Department may amend or revise the manual at any time; therefore, it is important to make sure that the current version is always being followed.

**1.7.3 Enforcement Responsibility.** The City of West Plains, acting through the Engineering Department, shall enforce the provisions of the *ESC Manual*.

**1.7.4 Review and Acceptance.** The City will review all ESC Plan submittals for general compliance with these criteria contained herein. An acceptance by the City does not relieve the permittee(s) or design engineer from the responsibility of ensuring that calculations, plans, specifications, construction, and as-built drawings are in compliance with the criteria contained herein. Additionally, acceptance by West Plains does not alleviate the permittee(s) or design engineer from complying with all other applicable federal, state, and local regulations.

**1.7.5 Interpretation.** In the interpretation and application of the provisions of this *ESC 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 City. The *ESC Manual* shall therefore be regarded as remedial and shall be liberally construed to further its underlying purposes. Whenever a provision in these criteria or any provision in any law, ordinance, resolution, rule or regulation of any kind, contain any restrictions covering any of the same subject matter, **whichever are more restrictive or impose higher standards shall govern.**

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



## Section 1. Introduction

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### ***Authorization of the ESC Manual, continued***

In the event that there is a discrepancy in the interpretation of the *ESC Manual*, the Engineering Department shall have the final determination of the intent of the *ESC Manual*.

*The ESC Manual shall be considered minimum requirements and West Plains reserves the right to apply more stringent criteria. Additionally, the City reserves the right to change, modify, or alter these requirements at any time.*

**1.7.6 Relationship to Other Standards.** Differences are not considered conflicts. When differences arise, the more stringent requirements shall apply. If the federal or state government imposes stricter criteria, standards, or requirements, these shall be incorporated into the City's requirements after due process and public hearing(s) needed to modify City regulations, standards, and ordinances.

## Section 2. Getting Started

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### Overview of Section 2

#### 2.0

Section 2 addresses Steps 1 through 3 in the ESC Permit process.

#### **Step 1. Confirm that an ESC Permit is required.**

Section 2.1, **Projects that Require an ESC Permit**, identifies the kinds of projects that require an ESC Permit.

#### **Step 2. Retain a Professional Engineer to prepare the ESC Plan.**

Section 2.2, **Who Prepares ESC Plans?** ESC Plans 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.

#### **Step 3. Determine the type of ESC drawings and identify what additional City and State plans and permits are required for the project (presubmittal meeting with the City is recommended).**

Section 2.3, **Presubmittal Meeting**, points out that an efficient way to clarify ESC Permit requirements is to schedule a presubmittal meeting with the Stormwater Coordinator at the outset of the process. A presubmittal meeting, although optional, gives the Stormwater Coordinator an opportunity to understand the applicant's plans for the site and to offer guidance in developing an ESC Plan.

Section 2.4, **ESC Drawings**, discusses two types of ESC drawings and the submittal format. Depending on the size and nature of a construction project, either staged, or staged and phased drawings are required.

Section 2.5, **Other City Permits**, describes the related permits that may need to be submitted before or along with the development of an ESC Plan, including the following:

- ◆ Building Permit
- ◆ Stormwater Permit
- ◆ Stream Buffer Permit
- ◆ Sinkhole Permit

Section 2.6, **State Permitting**, discusses the following:

- ◆ State Land Disturbance Permit
- ◆ Open Burning Permit
- ◆ 401 Water Quality Certification

Section 2.7, **Federal Permitting**, including:

- ◆ Federal Emergency Management Agency map revisions
- ◆ U.S. Army Corps of Engineers Section 404 Permit



**Permit Step 1: Confirm that an ESC Permit is required.***Section 2.1 provides background information related to Step 1.***Projects that  
Require a  
Standard  
ESC Permit****2.1**

The first step in the process is to examine the information in Section 1.4 and 1.5 to confirm that an ESC Permit is required for the project. ESC Permits apply to most land disturbance activities in the City except for small (less than 1.0 acre) projects with negligible negative impact and most agricultural or emergency activities (exempt activities).

The West Plains Stormwater Coordinator within the Engineering Department can be contacted to clarify the ESC Permit requirements and to help interpret if the ESC Permit applies to a particular project. Contact information is provided in Appendix A.

**Important!** *If an ESC 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 3 and 5.*

**Permit Step 2: Retain a professional engineer to prepare the ESC Plan.***Section 2.2 discusses Step 2.***Who Prepares  
ESC Plans?****2.2**

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 strength calculations (for temporary stream crossings), and peak discharge estimates and hydraulic computations (for determination of flood elevations and velocities and for sizing conveyance facilities).

Because of these issues, West Plains requires that ESC Plans be prepared by or under the responsible charge of, and signed and stamped by, a professional engineer (PE) registered in the State of Missouri. For the purpose of this manual the PE is referred to as the design engineer. Non-PEs with experience in erosion and sediment control may assist in the development of an ESC Plan, but they must conduct their work under the supervision of the design engineer.

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



*ESC Plans are to be prepared under the responsible charge of a professional engineer.*

### Who Prepares ESC Plans? *continued*

The design engineer is responsible for preparing the ESC Plan in accordance with the requirements of this *ESC Manual* and is one of the key personnel who should attend the on-site preconstruction meeting at the start of the construction phase.



Information

**West Plains highly recommends that the Design Engineer attend the presubmittal meeting to reduce delays in the start of construction.**

**Step 3. Determine the type of ESC drawings and identify what additional City and State plans and permits are required for the project (presubmittal meeting with the City is recommended).**

*Sections 2.3 through 2.5 address Step 3.*

### Presubmittal Meeting

#### 2.3

Prior to preparing ESC Plans and other submittal documents for a proposed construction project, a presubmittal meeting with City staff is recommended. The purpose of the meeting is to confirm the type of ESC Plan appropriate for a specific development site. In 2011, proposed developments with 0.5 acre or more of impervious area will have to submit a Stormwater Management Concept Plan (SWMCP) and a Stormwater Management Design Plan (SWMDP) to address conveyance systems as well as the quantity and quality of stormwater. The meeting will help to clarify the ESC 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 City staff is recommended to clarify ESC Permit requirements.*

It is anticipated that the owner and/or the design engineer of the ESC Plan would attend the presubmittal meeting. The owner or owner's

representative shall bring the following information to the meeting:

#### **Information Needed at the 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 plans and permits to accompany ESC Plan.

## Types of ESC Drawings

### 2.4

Depending on the amount of area to be disturbed, one of the two types of ESC drawings will be applicable.

**2.4.1 Staged ESC Drawing.** For disturbed areas greater than 1.0 acre, separate ESC drawings are required for the initial, interim, and final stages of a project. This is to clarify, both to the design engineer and field personnel, 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.

**2.4.2 Staged and Phased ESC Drawing.** Grading operations shall not take place all at one time. Instead, the site shall be divided into separate grading phases each disturbing 40 acres or less. During construction, each grading phase shall be approved by the ESC Inspector. Additional information on drawing requirements for these stages is provided in Section 3.

### 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 where the projects are platted in numerous individual filings but are part of a larger common plan of development or sale. For design and construction purposes, the projects are typically submitted to the City as separate projects and are reviewed accordingly. However, for purposes of erosion and sediment control, when the individually platted projects are contiguous, and the grading operations could be occurring simultaneously, the City 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 .*

**Other City  
Plans and  
Permits****2.5**

ESC Plans shall be submitted along with the following related City plans and permit applications. These related plans and permits do not reflect all requirements for development in West Plains, but rather describe plans and permits that shall be considered when proceeding through the ESC Permit process.

**2.5.1 Complete Submittal Package.** The ESC Plan shall be submitted concurrently with, or included within, the construction plans required for a building permit, when applicable. If the land disturbance is near a stream or sinkhole, those permits may be required. Land-disturbance activities for a development that will have 0.5 acre or more of impervious area require a stormwater permit. Submittals for a stormwater permit require a concept plan and then a design plan. If a stormwater permit is required for the project, the concept plan should be developed and approved before applying for any of the other permits. This will ensure that the City approves the overall stormwater management concepts temporary and permanent for the development before final design documents are developed.

**2.5.2 Building Permit.** If the proposed development includes the building of a structure, a building permit is generally required. The permit application can be obtained from the West Plains website at [www.westplains.net](http://www.westplains.net). Under Departments, click the Building Official to view the building permit. Any questions regarding the building permits may be directed to the Building Official.

**2.5.3 Stormwater Permit.** Proposed development with 0.5 acre or more of impervious area will have to obtain a stormwater permit. The requirements and guidance for obtaining the permit are located in the current version of the *Stormwater Management Manual Volume II*. This permit addresses stormwater conveyance systems as well as the quantity and quality of stormwater.

**2.5.4 Stream Buffer Permit.** Activities that affect the natural existence of vegetation near the edge of drainageways are published in the most current version of the *Stormwater Management Manual Volume II* and will require a permit. Activities can be performed in this area, but they will be regulated and restricted. Guidance and requirements can be found in the manual.

**2.5.5 Sinkhole Permit.** Land disturbance or development within the drainage area of a sinkhole requires a sinkhole permit. Activities can be performed in this drainage area, but they will be regulated and restricted. Guidance and requirements for receiving a permit from the City are located in the current version of the *Stormwater Management Manual Volume II*.



**State Permitting****2.6**

In addition to the permitting requirements of West Plains, the State of Missouri requires permits for land-clearing and earthmoving activities. The applicants or the design engineer shall contact the MDNR for specific state permitting information for their specific project. Contact information for MDNR is provided in Appendix A and permitting forms can be found at <http://www.dnr.mo.gov/forms/>.

Information on some of the MDNR permit applications that may be applicable include the following (this is not to be considered an exhaustive or current list; therefore, applicants are advised to contact the State).

**2.6.1 State Land Disturbance Permit.** Currently the State requires persons performing land-disturbance activities equal to or greater than 1.0 acre obtain both a City and State permit. After the City has fully developed their own program, the State may only require a City permit. The application forms for a state land disturbance permit are shown below.

**Form O.** Application for land disturbance permit for disturbance areas less than 5.0 acres.

**Form E.** Application for general permit for disturbance areas greater than 5.0 acres. It should accompany Form G.

**Form G.** Application for stormwater permit for disturbance areas greater than 5.0 acres. It should accompany Form E.

After completing the application for the state land disturbance permit and then receiving the permit, the City requirements fall inline with state requirements. The State requires a stormwater pollution prevention plan (SWPPP), which is fulfilled by the development of the City ESC drawings, requirements for updating ESC drawings, performing site inspections, and keeping inspection reports log.

**2.6.2 Open Burning Permit.** Open burning of tree trunks, tree limbs and vegetation from land-clearing operations may require a permit; consult with City Fire Department to determine if a permit is required. Materials such as tires or used oil may not be used to start the fires or be burned in the fires. Some conditions may require the use of an air curtain destructor to increase burning efficiency and reduce air contaminant emissions.

**2.6.3 401 Water Quality Certification.** Excavation activity associated with a dredge and fill project in "Waters of the United States" that require a Federal 404 Permit from the U.S. Army Corps of Engineers may also require this State certification to ensure water quality is not degraded. During the process of obtaining a 404 permit, it will be determined if this certification is required.

### **Federal Permitting**

#### **2.7**

Applicants are also responsible for complying with all applicable federal permitting requirements. This may include, but is not limited to, the FEMA map revision process and the U.S. Army Corps of Engineers Section 404 Permit.

**2.7.1 FEMA Map Revisions.** Projects that impact the regulatory floodplain may need to obtain an elevation certificate or a no-rise certificate. Additional information is located in the most current version of the *Stormwater Management Manual Volume II*.

**2.7.2 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. The U.S. Army Corps of Engineers-Little Rock District should be contacted by the applicant for additional information on the requirements. The contact information for the district is located in Appendix A.

## Section 3. Preparing an ESC Plan

### Overview of Section 3

#### 3.0

Section 3 is oriented toward the design engineer of the ESC Plan and addresses Step 4 in the ESC Permit process.

#### **Step 4. Prepare an ESC Plan following the Eleven Elements of an Effective ESC Plan, Design Intent and Guidance, Design Parameters, and Preliminary Submittal Requirements for ESC Plan .**

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

Section 3.2, **Eleven Elements of an Effective ESC Plan**, presents a systematic approach to select BMPs for an ESC Plan. The Eleven Elements are described in Sections 3.4 through 3.13.

##### **Section Highlight – Eleven Elements of an Effective ESC Plan**

These eleven elements provide design engineers with a step-by-step approach for selecting BMPs to include on an ESC Plan.

Section 3.14, **Design Intent and Guidance for ESC Drawings**, addresses design methods to determine stormwater volumes and flowrates, storage requirements for ponding BMPs, and methods of stabilizing concentrated flow.

Section 3.15, **Design Parameters**, identifies the design parameters to be specified for BMPs on the ESC Plan and provides specific criteria for standard BMPs.

##### **Section Highlight – Standard BMP Drawings**

A set of ESC Plan General Notes and Details, included in Appendix B, has been prepared to establish a consistent approach to BMP implementation in the City.

Sections 3.16 and 3.17, **Submittal Requirements for Preliminary Acceptance of ESC Plan**. These requirements include: ESC Drawing Requirements, and sealed and signed checklist included in Appendix D, probable BMP cost worksheet in Appendix F, and sensitive area downstream attachment if required .

##### **Section Highlight – Example ESC Drawings**

Several example sets of staged ESC drawings have been prepared to illustrate the selection and depiction of erosion and sediment control BMPs. See Section 2.4 for the two types of ESC drawings.

Section 3.18, **BMP Cost Issues**, discusses cost issues associated with the installation and maintenance of BMPs.

Section 3.19, **Variances**, provides guidance for requesting variances to the criteria presented in the ESC Manual.

**Permit Step 4: Prepare an ESC Plan following the Eleven Elements of an Effective ESC Plan, Design Intent and Guidance, Design Parameters, and Preliminary Submittal Requirements for ESC Plan .**  
 Sections 3.1 through 3.19 discuss Step 4.

## Principles of Erosion and Sedimentation

*Once vegetation is removed, erosion proceeds unchecked.*

### 3.1

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

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

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

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

**Raindrop Erosion.** Raindrops detach soil particles. These detached particles are then vulnerable to stormwater runoff or snowmelt.



*Sheet erosion.*



*Raindrop erosion.*

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



### ***Principles of Erosion and Sedimentation, continued***



*Gully erosion.*



*Channel erosion.*

**Rill Erosion.** As the flow changes from a shallow sheet to 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.** Gullies occur as the flow in rills comes 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.

Controlling erosion at its early stages is the most effective way to manage construction site erosion and sedimentation. Therefore, an effective ESC 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 non-eroding and stable.

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



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

### ***Principles of Erosion and Sedimentation, continued***



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

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



*The burden of cleaning up deposited sediments can be substantial.*

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

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



*Sedimentation can impair aquatic habitat in downstream receiving waters.*

### Eleven Elements of an Effective ESC Plan

#### 3.2

This section describes a systematic approach to control erosion and sediment on a construction site. Eleven elements of an effective ESC Plan are summarized here. West Plains requires that each of these elements be addressed in an ESC Plan.

#### **Eleven Elements of an Effective ESC Plan:**

1. *Preserve and/or Stabilize Drainageways and Ditches.*
2. *Avoid the Clearing and Grading of Sensitive Areas.*
3. *Balance Earthwork On Site.*
4. *Limit the Size of Grading Phases to Reduce Soil Exposure.*
5. *Stabilize Exposed Soils in a Timely Manner.*
6. *Implement Effective Perimeter Controls.*
7. *Use of Sedimentation Facilities.*
8. *Protect Steep Slopes.*
9. *Protect Inlets, Storm Sewers, and Culverts.*
10. *Provide Access and General Construction Controls.*
11. *Identify and Protect Sensitive Areas Downstream of the Site.*



Information

**Example ESC drawing shown in Appendix C are provided as a guide, but since each site is different, are not to be considered all-inclusive.**

These eleven 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 eleven elements are designed to reduce the amount and duration of erosion and trap most sediment that does erode prior to leaving the site.

A set of example ESC drawings (shown in Appendix C) have been prepared in accordance with the eleven elements that apply to illustrate the concepts discussed herein and depict the information that shall be shown on the ESC drawings. Figure 3-1 relates the eleven elements to the example ESC drawings.

#### **The following information has been included in the ESC Manual to assist the design engineer in developing an effective ESC Plan:**

- *Sections 3.3 through 3.13 describe the eleven elements of an effective ESC Plan that shall be addressed when preparing an ESC Plan.*
- *Section 3.14 addresses design intent and guidance for the development of an ESC Plan.*
- *Section 3.15 identifies the design parameters to be specified and specific criteria for BMPs.*
- *Sections 3.16 and 3.17 describe submittal requirements.*
- *Appendix B contains a copy of the ESC Plan General Notes and Details that shall be attached to all construction drawings.*
- *Appendix C provides example ESC drawings.*
- *Appendix D provides a detailed checklist that shall be followed when preparing ESC Plan.*



**Element 1. Preserve and Stabilize Drainageways**

**Figure 3-1. Eleven Elements of an Effective ESC Plan**

**Element 6. Implement Effective Perimeter Controls**

**Element 7. Divert all Stormwater Through a Sediment Trap or Basin**

**Element 2. Avoid the Clearing and Grading of Sensitive Areas**

**Element 10. Provide Access and General Construction Controls**

**Element 8. Protect Steep Slopes**

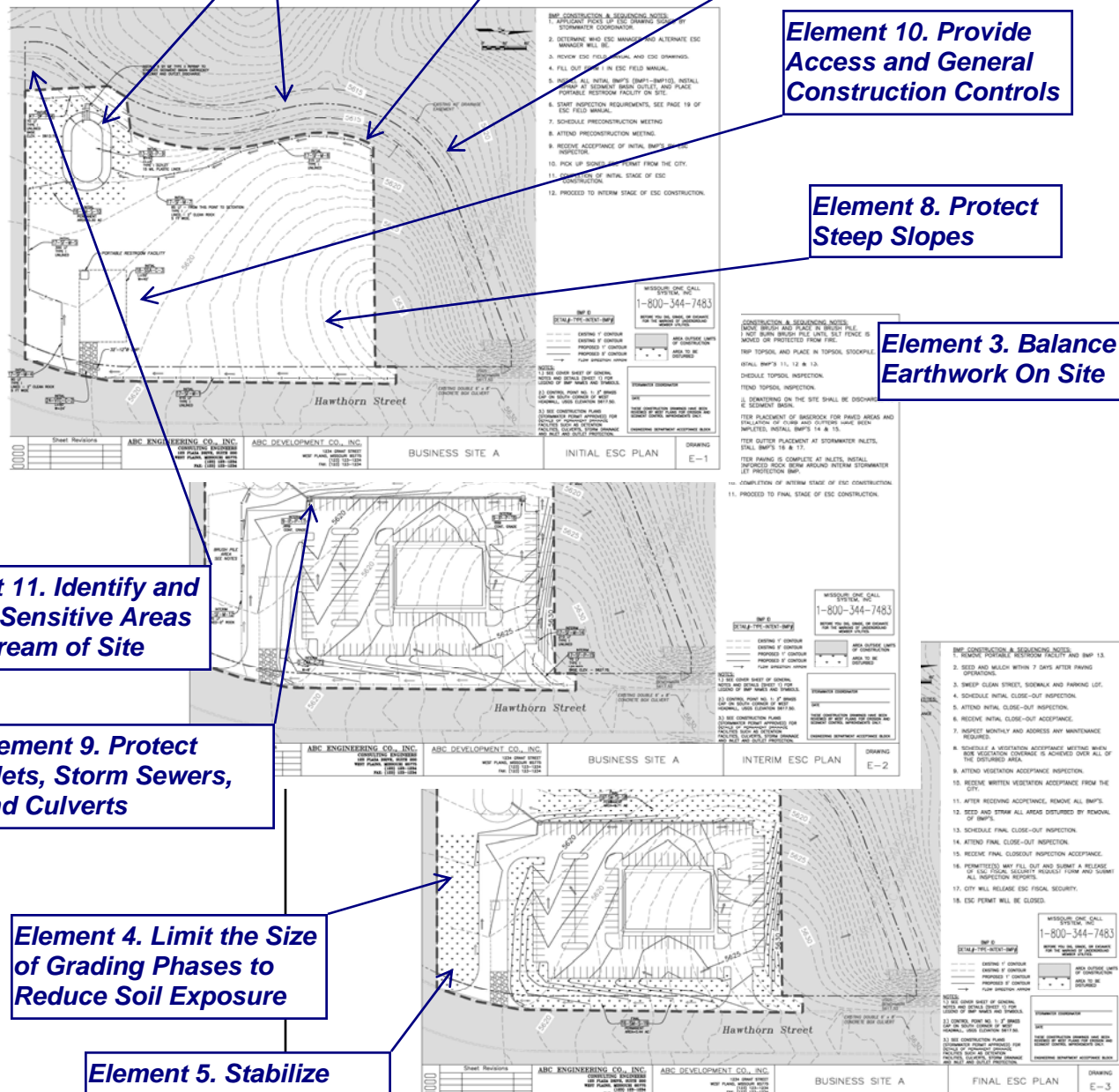
**Element 3. Balance Earthwork On Site**

**Element 11. Identify and Protect Sensitive Areas Downstream of Site**

**Element 9. Protect Inlets, Storm Sewers, and Culverts**

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

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



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

### Element 1. Preserve and Stabilize Drainageways

#### 3.3

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 West Plains.*

construction activities be designed to reduce any adverse impacts to drainageways, and compliance with City, state, and federal permitting processes be ensured (see Sections 2.5, 2.6, and 2.7).

A **drainageway** is any natural or artificial watercourse including, but not limited to, streams, rivers, creeks, ditches, channels, canals, waterways, gullies, ravines, or washes in which water flows in a definite direction or course, either continuously or intermittently. This includes any area adjacent to it that is subject to inundation by reason of overflow or floodwater and meets any of the following conditions:

- Provides for conveyance of stormwater runoff from an upstream property or development,
- Defined as “waters of the United States” by the U.S. Army Corps of Engineers,
- Supports riparian area or sensitive habitat,
- Tributary area equal to or greater than 20 acres,
- Alternation or filling will change the manner in which runoff is discharged onto a downstream property and potentially results in a negative impact to that downstream property.

**3.3.1 Federal Regulations in Drainageways.** Existing drainageways shall not be filled or dredged within the limits of the stream without verifying with the U.S. Army Corps of Engineers (USACE) that it is not regulated by them. If so, they will probably require a 404 permit (see Section 2.7.2). Appendix A has contact information for the USACE district that covers the West Plains area. It should be noted that it can only be determined by the USACE if a drainageway requires a 404 permit.



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

**3.3.2 Stream Buffer.** Major drainage-ways within the city limits of West Plains have a stream buffer that is regulated by the City. The stream buffer begins at the edge of the stream bank and extends out perpendicular from the centerline of the channel. Detailed information on the streams and reaches that are regulated by the City are located in the most current version of the *Stormwater Management Manual Volume II*.

**Important!** *City-regulated stream buffers must be delineated on the ESC drawings. Stream names and the reaches that are regulated by the City are located in the Stormwater Management Manual Volume II with restrictions, requirements, and guidance for performing activities*

All stream buffers that are regulated by the City that exist on the site must be delineated on the ESC drawings. Limits of construction shall be clearly shown on the ESC drawings to indicate the exact limits of grading adjacent to a stream buffer. Construction fence (CF) should be installed on the stream buffer delineation. Coordinates or other information shall be provided to establish the location of the fence.

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



Crossing drainageways containing a regulated stream buffer with construction equipment requires a **temporary stream crossing (TSC)**. TSCs shall be limited to one per 2,000 linear feet of drainageway unless otherwise approved by the City.

Additional design information for TSCs is shown in Section 3.16.25 and design details in ESC Plan General Notes in Details in Appendix B.

**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.



Any activity in the stream buffer that affects the natural existence of vegetation requires a stream buffer permit from the City. The stream buffer permit is designed to allow some activity to occur within the buffer area, but the activities are controlled to minimize the impact on the

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

environment. The following practices and activities are restricted within the stream buffer area:

- Clearing of existing vegetation.
- Soil disturbance by grading, stripping, or other practices.
- Filling or dumping of any material including, but not limited to, yard waste and demolition debris.
- Drainage by ditching, underdrains, or other systems.
- Use, storage, or application of pesticides.
- Storage or operation of motorized vehicles, except for maintenance and emergency.
- Development to include, but not limited to, structures, roads, bridges, paths, parking lots, outfalls of treated sewer, outfalls of stormwater, and utilities.
- Removing or cutting vegetation, except for maintenance of existing vegetation.

The following activities within the stream buffer do not require a stream buffer permit:

- Water quality monitoring and stream gauging.
- With the verbal approval of the West Plains Stormwater Coordinator, individual trees within the stream buffer that are in danger of falling, causing damage to dwellings or other structures, or causing blockage of the stream may be removed.
- With the verbal approval of the West Plains Stormwater Coordinator, timber cutting necessary to preserve the forest from extensive pest infestation, disease infestation, or threat from fire may be performed.

Even if the drainageways on the site are not regulated with a stream buffer, construction activities in or around the drainageway should be minimized.

**3.3.3 Disturbance or Creation of Small Drainageways or Ditches that are not within a City Regulated Stream Buffer.** It may be impossible, or undesirable, to avoid all construction in existing ditches and small drainageways that only drain a small amount of upland area off the site. Many development projects require existing topography to change considerably. The existing ditches and small drainageways may be moved, resized, or piped to accept the development. Requirements and guidance for these permanent stormwater conveyance systems, if the site will have 0.5 acre or more of impervious area, require a stormwater permit (see section 2.7.2). Information on requirements and guidance for the stormwater permit is located in the current version of the *Stormwater Management Manual Volume II*.



Information

*A ditch is defined as an open channel, existing or man-made, that transports stormwater but is small enough that it doesn't meet the requirements on pg. 3-7 to be considered a drainageway.*

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

Any ditch or small drainageway, temporary or permanent, needs to convey peak flowrates from a 2-year storm frequency and remain stable. This means it has the capacity to handle stormwater runoff that statically has a 50 percent probability of occurring in any given year, while remaining stable even prior to the establishment of permanent vegetation. Permanent ditches and drainageways will need to meet the requirements of the *Stormwater Management Manual Volume II* after construction is complete. Most will require some form of stabilization during the construction phase to include ditch checks or some type of liner. Ditch checks will slow down the velocity of the stormwater to reduce erosion and promote sedimentation. The ditch check should be in place until the channel has been permanently stabilized to handle stormwater flows. Sizing criteria for ditch checks is provided in Section 3.15.8.

Other forms of erosion control other than ditch checks are allowed in ditches and small drainageways. These other methods are ditch liners. Common ditch liners include rolled erosion control products (RECP), plastic liner, and rock liners. Design information for these are provided in Sections 3.14.2, 3.15.12, 3.15.16, and Table 3-3.

Most sites will require temporary ditches (diversion ditches) or some other type of conveyance BMP at upslope and downslope perimeters, at the top of steep slopes, and downstream of slope drains to reduce the flow of stormwater over disturbed unprotected areas. The design engineer should determine if a permanent ditch will be required, if so it must be sized according to *Stormwater Management Manual Volume II*, if not it may be more appropriate to install some other type of conveyance BMP that will not require filling the temporary ditch after the site is stabilized.

As soon as possible after construction site grading is complete, all drainageways shall be permanently stabilized.

**Element 2.  
Avoid the Clearing  
and Grading of  
Sensitive Areas****3.4**

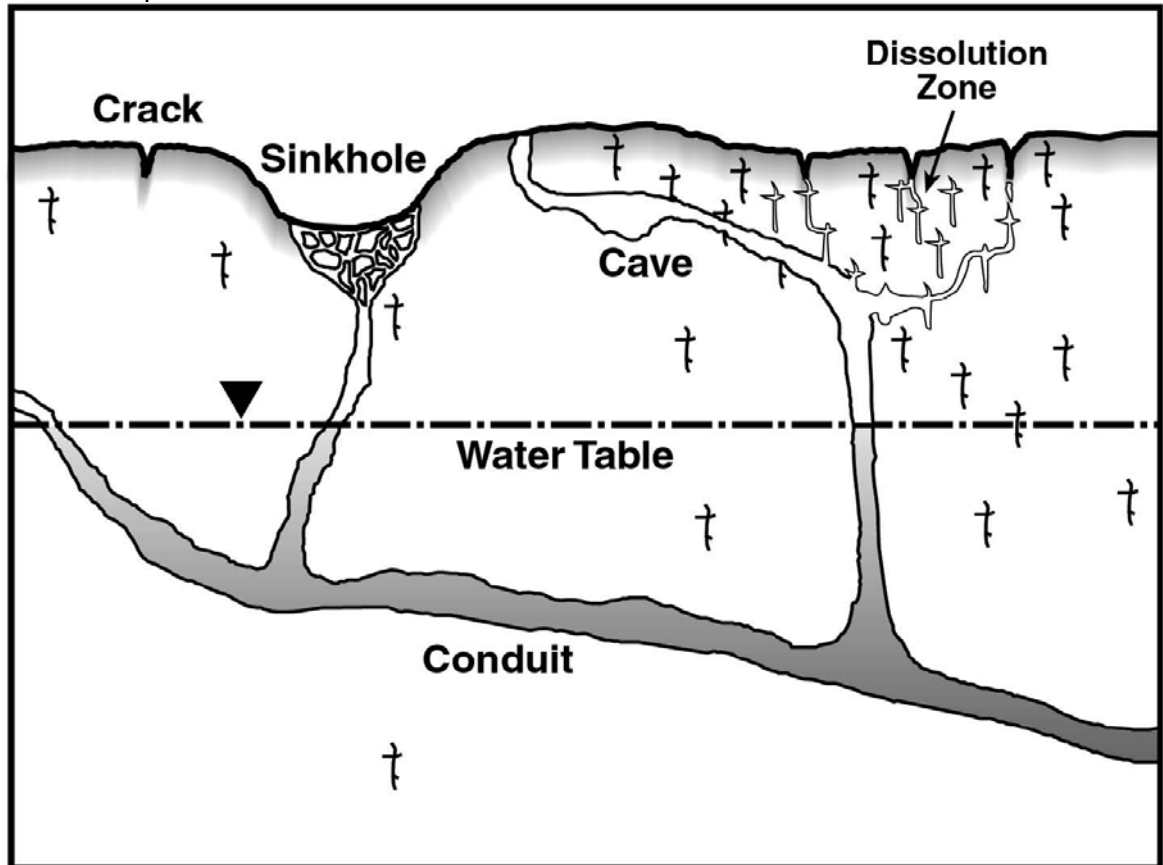
In addition to drainageways, other sensitive resources may exist on a site. These could include:

- Sinkholes.
- Losing streams.
- Caves.
- Wetlands.
- Mature timber stands.
- Steep slopes to be undisturbed.
- Potential stormwater infiltration areas.

No person shall engage in land disturbance or development within the drainage area of a sinkhole without first securing a sinkhole permit from the City. The permit application, guidance, and requirements are located in the current version of the *Stormwater Management Manual Volume II*. It is unlawful for any person to place, dump, or deposit trash, debris,

**Element 2.**  
**Avoid the Clearing**  
**and Grading of**  
**Sensitive Areas,**  
*continued*

rubbish, brush, leaves, grass clippings, yard waste, or similar materials within a sinkhole. Specific land uses and/or activities that are designated as potential water pollution hazards will have set back distances from the drainage area of a sinkhole.



*Sinkholes and caves can directly recharge groundwater*

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 ESC drawings shall clearly show limits of construction and shall call out **construction fence (CF)** or other approved means to protect resources that are to be preserved.

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

**3.5**

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 ESC drawings. To reduce impacts on

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

#### **Variances**

**Important!**

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

City roadways, development projects are required to balance earthwork quantities on-site. This takes effort on the part of the design engineer to develop a grading plan, check earthwork quantities, and raise or lower portions of the site as necessary to achieve a balance between cut and fill material. This process will generally require several iterations, each time refining critical site slopes and design grades. The balance requirement can be waived.

In the event that it is impractical to balance earthwork quantities, a variance shall be requested during the review of the ESC drawings (see Section 3.19). At a minimum, the variance shall address the following:

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

If the variance is accepted, ESC drawings shall be prepared for the import or export site in accordance with this manual.

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

#### **3.6**

For sites where the total disturbed area will exceed 40 acres, grading operations shall not take place all at one time. Instead, the site shall be divided into separate grading phases each disturbing 40 acres or less. All sites shall be evaluated for grading phasing no matter the size of the disturbed area. Over-excavation, stockpiling, and replacement of soils may be used, if necessary as approved by West Plains. During construction, each grading phase shall be accepted by the ESC Inspector prior to starting work on the next phase. Seeding and mulching shall be completed within 5 days of the ESC Inspector's acceptance of the phase or a Stop Work Order shall be issued (see Section 5.8.3).

### **Element 5. Stabilize Exposed Soils in a Timely Manner**

#### **3.7**

All areas disturbed by construction shall be stabilized as soon as possible to reduce the duration of soil exposure and the potential amount of erosion. Unless otherwise approved, West Plains requires that disturbed areas be seeded and mulched, or permanently landscaped, within 30 days from the start of land disturbance activities or within 15 days of the substantial completion of grading. Many sites may not be able to complete all stabilization within the time frame because the building foundation, sidewalks, parking lots, and site utilities all need to be installed prior to completing all stabilization. If the permittee is not able to complete the stabilization within the required time frames, then a

**Important!**

**Disturbed areas must be seeded and mulched, or permanently landscaped, within 30 days from the start of land disturbance activities or within 15 days of the substantial completion of grading.**

**If the permittee cannot meet this requirement, they must complete a schedule of completion of stabilization as an attachment to Form 1 located in the ESC Field Manual.**



**Important!****Topsoil Preservation.**

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

**Element 6.  
Implement Effective  
Perimeter Controls**

schedule of completion of stabilization with detailed steps in a phased format must be developed. This schedule will not be shown on the ESC drawings, but must be determined by the ESC Manager and presented at the preconstruction meeting as an attachment to Form 1 (see Section 5.2.2 and Section 5.3.2).

Topsoil stripping, stockpiling, and re-spreading in areas to be vegetated shall be a mandatory practice. Adequate “footprints” for topsoil stockpiles shall be shown on the ESC drawings assuming stockpile slopes are no steeper than 3 to 1.

After a minimum of 4 inches of topsoil is re-spread on the site the installation of final stabilization BMPs should be completed. Applicable BMPs for final stabilization consist of **seeding and mulching (SM)**, **rolled erosion control products (RECP)**, and **hydraulic erosion control (HEC)**. Design information for final stabilization method is shown in Section 3.15.16 and 3.15.20.

**3.8**

**3.8.1 Upslope Perimeters.** The design engineer should examine the upslope topography and determine whether stormwater will enter the land disturbance area from upslope areas. This can be determined by a site visit and reviewing topography maps of upslope areas. The Engineering Department has maps available in electronic and hard copies with 2 foot contours, estimated property lines, existing structures, and estimated location of some existing utilities. Most sites will have to convey upslope stormwater runoff around or through the site. The stormwa-



*Example of upslope stormwater after a storm. When trying to stabilize this backyard, it may not have been realized that stormwater upslope and off-site would have to be controlled.*

ter could be concentrated flow in the form of a drainageway or a ditch, or it could be sheetflow.



*Example of concentrated flow in the form of a small ditch being developed in the low spot.*



*Example of sheet flow (note: no formed channel traveling as a sheet of water)*



Information

**Stable conveyance BMP** is a BMP used to move water and remain stable up to a 2-yr storm.

Both forms generate a significant amount of stormwater. Design engineers should estimate the flowrate and volume of stormwater from upslope area using the method presented in Table 3-1. With this information, the design engineer should determine if the stormwater should be ponded uphill of the disturbed area or conveyed around or through the land disturbance area. Most sites should capture upslope stormwater in a conveyance BMP to move it around or through the site. This BMP should be stabilized to ensure it does not erode. Methods of temporary stabilization are presented in Section 3.14.2. If the upslope stormwater



### Element 6. Implement Effective Perimeter Controls

A **temporary slope drain (TSD)** is a small culvert or plastic liner that conveys runoff down a slope or channel bank to reduce the occurrence of rill and gully erosion.

A **diversion ditch (DD)** is a small earth channel used to divert and convey runoff. Design engineers should ensure the ditch has proper capacity and is stabilized.

**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. The Manual presents three types of silt fence. For allowable ponding heights of 12", 24", and 36".



is conveyed down a disturbed slope greater or equal to 4:1, the design engineer should consider using temporary slope drains (TSD).



*Example of slope drains and diversion ditch at the top of a slope to move stormwater to the bottom of the hill in a stabilized manner.*

If the design engineer decides to pond the sheet flow stormwater upslope of the land disturbance instead of moving the stormwater through or around the site, the design engineer should consider one of the following ponding BMPs: **silt fence (SF)** or a **ponding berm (PB)**. These ponding BMPs have limited storage capacity, which is explained further in the next Section, and design methods to determine capacity are shown in Section 3.14.1. Upslope stormwater is not required to run through a sedimentation facility or ponded on-site. The intent is to make sure upslope stormwater does not generate additional erosion within the disturbed area.

**Sec 3.8.2 Downslope Perimeters.** Downslope perimeters of the land disturbance site are the most important areas to control because this is typically the location that sediment will leave the site.

All disturbed sheet flow areas should run through a sediment facility or ponded behind a BMP prior to leaving the site or entering an undisturbed drainageway or ditch (see Section 3.15.17 and Section 3.15.19 for more information on sediment facilities).

Ponding BMPs have limited capacity to handle large amounts of stormwater. These ponding BMPs are designed to hold back the sediment contaminated stormwater until the sediment can settle out and the

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

stormwater can slowly leach through the BMP and the ground. These act in the same principle as the sedimentation facilities in Section 3.9 without the capabilities of handling any large amount of stormwater. They are also most efficient in ponding stormwater when installed level, on a contour, and run uphill on the ends to contain as much stormwater as possible. Once overtopped or breached, the ponding BMPs' effectiveness in removing sediment from the stormwater is greatly reduced. Section 3.14.1 shows an example of estimating the capacity of a ponding BMP.



*Example of silt fence ponding water*

*Example of tri-dike, a proprietary BMP, being overtopped by stormwater. This would be an example of the BMPs ponding capacity being inadequate for the storm. Once the BMP is overtopped, its ability to improve the stormwater quality is limited.*



**Construction fence (CF)** is also recommended around the perimeter if the adjacent area is developed or consists of a public use area. The use of construction fence will discourage vehicle access over the top of a BMPs and encourage the use of the construction entrance.

### Element 7. The use of Sedimentation Facilities



Information

*If the drainage area has 10 acres or more of land Disturbance, ponding BMP will not be acceptable and a sediment basin is required.*

#### 3.9

Runoff from all disturbed drainage areas shall be treated in a sedimentation facility unless downslope perimeter ponding BMPs can contain a 2-year 24-hour storm volume. For example, if a **silt fence (SF)** or any other ponding BMP can pond the volume of stormwater behind it while containing built up of sediment prior to maintenance, there will be no need to run the stormwater through a sedimentation facility. Methods for estimating ponding requirements behind ponding BMPs are located in Section 3.14.1. **If the drainage area has 10 acres or more of land Disturbance, ponding BMP will not be acceptable and a sediment basin is required.**

In the case that a sedimentation facility is used, runoff from disturbed areas less than 1.0 acre may be treated by a **sediment trap (ST)**. Land disturbance areas greater than 1.0 area requires a **sediment basin (SB)**. Design guidance for sediment trap and sediment basins is located in Section 3.15.17 and Section 3.15.19.

Any permanent detention or water quality facilities shall incorporate a sediment basin during the construction phase of the project. Requirements for permanent detention basins are located in *Stormwater Management Manual Volume II*.

If the downstream area is considered sensitive by element eleven in Section 3.13.1, then the design engineer should consider and may be required to use flocculants to enhance the settling of the sediment in the sedimentation facilities and ponding BMPs, see Section 3.15.29.

A stable conveyance path shall be designed and shown downstream of the outlet and spillway of a sedimentation facility basin. Conveyance paths shall consist of a stabilized **diversion ditch (DD)** (see section 3.14.2 and 3.15.12 for design guidance of diversion ditches) or some other stable conveyance BMP.

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



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





### Element 8. Protect Steep Slopes



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

#### 3.10

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 5 feet vertically.

**3.10.1 Proposed Slopes Shall be No Steeper than 3 to 1.** Slopes steeper than 3 to 1 are difficult to vegetate and maintain. Long term rill and gully erosion are likely on such slopes. Approved permanent stabilization shall be required to control grades on all sites that cannot be graded at a 3 to 1 slope. Retaining walls may be necessary to control grades on a site. Slopes steeper than 4 to 1 shall be protected with **rolled erosion control product (RECP)**, see Section 3.15.16.

**3.10.2 Runoff Shall be Diverted Away from Steep Slopes.** A stable conveyance BMP like a permanent or temporary **diversion ditch (DD)** shall be depicted above all steep slopes on the site that may receive concentrated or sheet flows. **Temporary slope drain (TSD)** may be used until a permanent diversion ditch is stabilized with vegetation. 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 Stormwater Coordinator.

**3.10.3 Terracing Shall be Incorporated into the Grading of Steep Slopes.** Grading of new steep slopes shall incorporate **terracing (TER)** when slopes are between 3 to 1 and 4 to 1 that are greater than 15 feet in height. Terracing breaks up the flow of incidental runoff down slopes and reduces the development of rill and gully erosion. Design criteria is provided in Section 3.15.26.

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



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

#### 3.11

The entrances to storm sewer inlets shall be protected to reduce the inflow of sediment. Likewise, storm sewer outfalls and culvert outlets

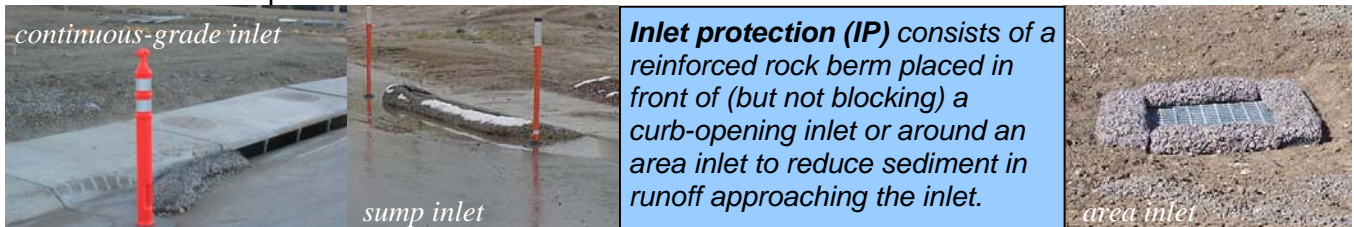


## Information

*Standard BMP is a BMP that is included in Table 3-4 on page 3-31 and in ESC Plan General Notes and Details in Appendix B. Non-standard is any BMP other than BMPs that have been approved by the Stormwater Coordinator and added to the ESC Plan General Notes and Details for that specific site.*

shall be protected against scour and erosion. The design engineer may use standard or non-standard BMPs for protection. Standard BMPs are BMPs shown in the ESC Plan General Notes and Details in Appendix B and presented in this manual in Section 3.15. Non-standard BMPs are any BMP that is not presented in this manual. There are many proprietary non-standard BMPs available for **inlet protection (IP)**, if the design engineer chooses to use a non-standard BMP they must following the requirements in Section 3.15.14.

All storm sewer inlets on a site shall be provided with **inlet protection (IP)**. The ESC drawing shall specify whether area, sump, or continuous grade inlet protection is to be used in a particular location. Standard inlet protection include the half Y-shaped continuous grade inlet protection that is intended to trap sediment upstream of an inlet on a continuous grade street without causing any bypass of flow around the inlet. Sump and area inlet protection is also designed to maintain inlet capacity after runoff flows over the wire-enclosed rock.



All disturbed sheet flow areas should be treated by running through a sediment facility or ponded behind a BMP with the proper amount of storage as presented in Section 3.14.1 prior to leaving the site. Most inlet protection does not provide sufficient volume of storage for ponding. When storage is not available at the inlet the stormwater must run through a sediment facility or ponded behind a BMP with proper storage prior to leaving the site which can occur prior to entering the inlet or after.

All culvert inlets on a site shall be provided with a **reinforced rock berm (RRB)** or another BMP to slow down the water prior to entering the culvert.

**A reinforced rock berm (RRB) can be placed in front of a culvert to reduce sediment in the runoff approaching the culvert.**



Storm sewer outfalls and culvert outlets shall be permanently protected against erosion with a riprap apron or other approved means. Riprap shall be installed at the same time as construction of the storm sewer outfall or culvert. In addition, **rolled erosion control products (RECP)** should be considered in the area disturbed by the construction of the storm sewer outfall or culvert.

**Element 10.**  
**Provide Access**  
**and General**  
**Construction**  
**Controls,**

**3.12**

**3.12.1 Limits of Construction (LOC).** Limits of construction shall be shown on ESC 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 City for utility work, all stockpiles of excavated materials shall be placed on the uphill side of the trench within the limits of construction.

**3.12.2 Construction Fence (CF).** Construction fence or **construction markers (CM)** shall be shown throughout the site to delineate all limits of construction (along all perimeters of the site, along all stream corridors to be preserved, and around any other preservation zones). Construction fence installation notes as found in Appendix B require that construction fence or other means defining all limits of construction shall be installed as the very first step in the construction phase, prior to any other work or disturbance on the site. This is critical to avoiding unwanted disturbance beyond the limits of construction.

**3.12.3 Vehicle Tracking Control (VTC).** Vehicle tracking control shall be provided at all entrance/exit points at the site. The number of access points shall be minimized. A location shall be selected that accounts for the safety of the traveling public and avoids disturbance of trees, desirable vegetation, and low, wet areas. Steep grades (greater than eight percent) shall be avoided.

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



**3.12.4 Stabilized Staging Area (SSA).** A stabilized staging area shall be provided near the main access point and connected to the vehicle tracking control.

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



**3.12.5 Concrete Washout Area (CWA).** A concrete washout area is used to contain wash water and discarded portions of concrete, grout, mortar, stucco, drywall mud, and paint, see Section 3.15.9 for design parameters.

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

**3.12.6 Stockpile Areas.** All stockpile areas shall be shown on the ESC drawing. As discussed in Section 3.8, topsoil stripping, stockpiling, and re-spreading in areas to be vegetated shall be a mandatory practice called for in all ESC drawings. Adequate “footprints” for topsoil stockpiles, stockpiles of excess excavated material, and stockpiles for imported materials shall be shown assuming stockpile slopes are no steeper than 3 to 1. Stockpiles shall not be shown outside the limits of construction.

**3.12.7 Temporary Access Roads.** All temporary access roads shall be shown on the ESC drawing.

**Element 11.**  
**Identify and**  
**Protect Sensitive**  
**Areas Down-**  
**stream of the**  
**Site.**

**3.13**

**Identify and Protect Sensitive Areas Downstream of the Site.** The ESC permittee should identify and protect sensitive areas downstream of the site. The design engineer should identify all possible downstream sensitive areas. This may include: sinkholes, caves, wetlands, losing streams, ponds, lakes, and any other locations that would be impacted by sediment leaving the site. If sensitive areas are identified downstream by the design engineer, it will be noted on the Required Checklist for Preliminary Acceptance of ESC Plan in Appendix D. In this case, an attachment to the checklist will be required. This attachment will include an estimated cost to bring the downstream sensitive area back to its original condition prior to the damage. This estimated cost will be included in the opinion of probable cost submitted in the ESC Plan. For example, if a pond is located downstream, the design engineer should estimate the cost required to bring the pond back to its original condition prior to being contaminated with pollutants leaving the land disturbance site. The most common pollutant leaving the site of land disturbance would be sediment. In that case, the estimate would include dredging the pond and possibly restocking it with fish. This attachment will also include any special methods used to ensure that sediment does not leave the site. This may include using flocculants, see Section 3.15.29, and/or other methods.

**3.14**

**Design Intent and Guidance for ESC Drawings.** When it rains on a site, the stormwater infiltrates into the ground and then begins flowing over the surface downhill and perpendicular to the contours. As the stormwater moves over the surface of land disturbance area, it begins to dislodge and transport sediment through sheet flow and concentrated flow. A large portion of the site will produce sheet flow during a storm event and any ditches or drainageway will capture the sheet flow and transport it as concentrated flow.

**The overall goal of the ESC design is to capture and contain the sheet flow and prevent channel erosion in concentrated flow paths.** The sheet flow erosion can be managed by ponding it behind BMPs or

**Design Intent  
and Guidance**

running through a sedimentation facility to allow settling of the sediment in the stormwater. Concentrated flow areas like ditches and drainage-ways need to be temporarily stabilized to prevent channel erosion.

**3.14.1 Sheet Flow Areas.** If sheet flow stormwater is slowed down and ponded on the site the majority of the sediment would be contained on the site. Table 3-1 presents estimated stormwater volumes and flowrates. The volumes and flowrates were estimated by using the Soils Conservation Service (SCS) Method with a 2-year storm frequency with a duration of 24 hours with average site conditions. All stormwater not flowing to sedimentation facilities will need to be ponded by on-site BMPs. The ponding will allow sedimentation to settle out and stay on-site. The design engineer can choose any BMPs that is capable of ponding the stormwater volume in the Table 3-1 without being over-topped or breached.

**Table 3-1. Estimated Two Year Stormwater Volumes and Flowrates**

Contributing Area		Stormwater Volume	Stormwater Flowrate
Ac	Ft <sup>2</sup>	Ft <sup>3</sup>	Ft <sup>3</sup> /Sec (Q <sub>i</sub> )
0.1	4,356	835	0.2
0.25	10,890	2,088	0.5
0.5	21,780	4,175	1
1	43,560	8,350	2
2	87,120	16,701	4
3	130,681	25,051	6
4	174,241	33,402	8
5	217,801	41,752	10
6	261,361	50,103	12
7	304,921	58,453	14
8	348,481	66,804	17
9	392,042	75,154	19
10	435,602	83,505	21
11	479,162	91,855	23
12	522,722	100,206	25
13	566,282	108,556	27
14	609,842	116,907	29
15	653,403	125,257	31

The ponding BMPs should have a low percolation rate. The percolation rate of the BMP will be much lower than the published rate with clean water due to the fact that the sediment will begin to clog the perforations soon after stormwater begins to pond behind it. This reduction in the percolation rate will maximize the ponding time. For calculation sake, it is assumed that the percolation rate is slow enough that it is ignored over the 24 hours of the design storm. The sediment transported in the stormwater will not require storage area because it is assumed that by the time the majority of the sediment has settled out of the stormwater, the stormwater will have percolated through the BMP and the ground. Though ponding depth needs to be available prior to a storm, this will



**Design Intent  
and Guidance  
continued**

require sediment removal to ensure that the ponding depth is always available for stormwater ponding. The design engineer needs to ensure that the ponding BMP will contain the stormwater volume. This will require the BMP to run on the same elevation and the ends of the BMP to run uphill for a short distance to enable containment of the stormwater volume. **Design storm for ponding BMPs will have a direct runoff of 0.2 ft.** The following procedure is one method of determining ponding ability of a BMP.

**Information**

*The ponding BMP method presented here determines the contributing distance upslope of the BMP that can be contained. Most design engineers will use AutoCAD with a civil engineering package to develop and design ESC drawings. This will enable them to create surface models to determine earthwork quantities rapidly between existing and proposed grades (contours). This same approach can be used to determine available ponding volume behind a BMP. Surface 1 would be existing and/or proposed grade and surface 2 would be the allowable ponding elevation. This available ponding volume would be compared to the required ponding volume shown in Table 3-1 as stormwater volume.*

**Ponding BMP Method**

$$\text{back water distance (ft)} = \frac{\text{pond depth (ft)}}{\text{uphill slope (dec. form)}}$$

$$\text{back water volume (ft}^3\text{)} = \text{backwater distance (ft)} * \text{pond depth (ft)} * 1 \text{ ft of fence} * 0.5$$

$$\text{allowable contributing length (ft)} = \frac{\text{back water volume (ft}^3\text{)}}{1 \text{ ft of fence} * \text{direct runoff (ft)}}$$

The sample problem below demonstrates the ponding requirement with silt fence. Three different types of silt fences are shown in Appendix B, ESC Plan General Notes and Details, and in Section 3.15.21. Type I, II, and III silt fence will have an acceptable ponding depth of 12, 18, and 36 inches respectively.

**Ponding BMP Sample Problem**

**Determine the allowable contributing length per foot of Type II Silt Fence with the slope of 5% uphill of the fence. Allowable ponding depth of Type II Silt Fence is 18 inches.**

$$\text{back water distance (ft)} = \frac{\text{pond depth (ft)}}{\text{uphill slope (dec. form)}}$$

$$\text{back water distance (ft)} = \frac{1.5 \text{ ft}}{0.05}$$

$$\text{back water distance (ft)} = 30 \text{ ft}$$

$$\text{back water volume (ft}^3\text{)} = \text{back water distance (ft)} * \text{pond depth (ft)} * 1 \text{ ft of fence} * 0.5$$

$$\text{back water volume (ft}^3\text{)} = 30 \text{ (ft)} * 1.5 \text{ (ft)} * 1 \text{ ft of fence} * 0.5$$

$$\text{back water volume (ft}^3\text{)} = 22.5 \text{ ft}^3$$

$$\text{allowable contributing length (ft)} = \frac{\text{back water volume (ft}^3\text{)}}{1 \text{ ft of fence} * \text{direct runoff (ft)}}$$

$$\text{allowable contributing length (ft)} = \frac{22.5 \text{ (ft}^3\text{)}}{1 \text{ ft of fence} * 0.2 \text{ (ft)}}$$

$$\text{allowable contributing length (ft)} = 112.5 \text{ ft}$$

**Design Intent  
and Guidance  
continued**

Standard BMPs from Table 3-4 that will require this analyses are the following: **silt fence (SF-P)**, **ponding berm (PB-P)**, **reinforced rock berm (RRB-P)**, **sediment retention fiber roll (SRFR-P)**, or any other BMP that can pond the stormwater; for example, a proprietary dike shown on the bottom of page 3-16. Each BMP that is shown on an ESC drawing will have a BMP **ID** which is defined in Section 3.15.2. The third part of the **ID** will be the BMP intent, see Section 3.15.5. The **P** symbolizes that the BMP is intended to pond the stormwater. All ponding BMPs must have the **P** shown in the **ID** on the ESC drawings.

**Important!**

***All stormwater on disturbed areas must go through a sediment basin or trap depending on the contributing area size except stormwater that has been ponded by ponding BMPs prior to leaving the site.***

**3.14.2 Concentrated Flow Areas.** Concentrated flow areas like ditches and drainageways or any other BMP used to move stormwater should be stable. This includes all ditches and drainageways proposed and existing except existing ditches and drainageways that will not to be disturbed. Any BMPs that are designed to move water as concentrated flow will also need to be analyzed. Standard BMPs from Table 3-4 that will require this analysis are the following: **diversion berm (DB-M)**, **diversion ditch (DD-M)**, **reinforce rock berm (RRB-M)**, **silt fence (SF-M)**, **sediment retention fiber roll (SRFR-M)**, or any other BMP that can collect and move stormwater. The BMP intent will be an **M**. The **M** symbolizes the that BMP is intended to move the stormwater. Some BMPs maybe used to move stormwater for a specific distance and then pond. The drawings should identify this point as M/P as the BMP intent at this point.

The **reinforced rock berm (RRB-M)**, **silt fence (SF-M)**, **sediment retention fiber roll (SRFR-M)**, or any other conveyance BMP that can collect and move stormwater must also be stable. For example assume a silt fence was used to move the stormwater (by not placing it on the same elevation throughout), the design engineer would need to make sure erosion would not occur at the toe of the fence by reducing the slope, placing a ditch check, or lining the channel.



*Example of silt fence moving stormwater and unstable at the toe of the fence*

In order to ensure that they are stable, the flowrate must be determined by Table 3-1 or estimated by other means. The flowrate from the table should be determined by estimating the contributing area flowing to the concentrated flow area at the most downstream point, or broken up in to segments, if the design engineer feels the estimated flowrate is too conservative for the upstream reaches of the concentrated flow path. Once the flowrate is determined for a reach, the flow area (cross section) should be estimated; Table 3-3 shows typical cross section properties for conveyance BMPs. If the design engineer is determining the flow areas for BMPs, then the design engineer will be able to create a desired flow area and possibly a desired slope to reduce erosion. If the design channel is not stable the design engineer can reduce the slope and/or increase the water to channel interface (increase wetted perimeter) by making the channel wider. If channel stability is still an issue then ditch checks or a channel liner will be required.

A method of channel design or analyses to determine stormwater capacity and stability is shown below.

### ***Channel Design or Assessment Method***

**STEP 1** Determine contributing area in  $ft^2$  or acres

**STEP 2** Determine flowrate in  $\frac{ft^3}{sec}$  from Table 3 – 1,  $Q_i$

**STEP 3** Determine channel type from Table 3 – 2

Determine channel slope ( $S$ ) in decimal form and estimate depth of flow ( $d_i$ ) in ft

Calculate area ( $A$ ) in  $ft^2$ , wetted perimeter ( $WP$ ) in ft.

hydraulic radius ( $R$ ) in ft, and top width ( $T$ ) in ft from Table 3 – 2

**STEP 4** Determine  $n$  from Table 3 – 4, use 0.02 for soil channel (unlined channel)

**STEP 5** Calculate  $Q = \frac{1.49}{n} * A * R^{\frac{2}{3}} * S^{\frac{1}{2}}$

**STEP 6** Is flowrate  $Q$  in Step 5 within ten percent of flowrate  $Q_i$  in Step 2, if yes go to step 11, if not go to step 7

**STEP 7** Second iteration of the new depth estimate

$$d_{i+1} = d_i * \left(\frac{Q_r}{Q}\right)^{0.4}$$

**STEP 8** Determine new  $A$ ,  $R$ , and  $T$

**STEP 9** Calculate  $Q = \frac{1.49}{n} * A * R^{\frac{2}{3}} * S^{\frac{1}{2}}$

**STEP 10** Is flowrate  $Q$  in Step 9 within ten percent of flowrate  $Q_i$  in Step 2, if yes go to step 11, if not go to step 7

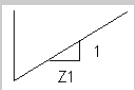
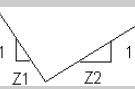


**Channel Design or Assessment Method, cont.**

**STEP 11** Calculate Shear Stress ( $\tau$ ) at depth ( $d$ ) in  $\frac{lb}{ft^2}$ ,  $\tau = 62.4 \cdot d \cdot S$

if  $\tau$  is > permissible shear stress in Table 3 – 3 erosion will occur

if erosion will occur consider ditch checks, increasing wetted perimeter, reducing slope, or a liner with a permissible shear stress greater than  $\tau$  to ensure no erosion occurs

**Table 3-2. Cross Section Values (Steps 3 & 8)**

Channel Type	Section	Area A	Wetted Perimeter WP	Hydraulic Radius R	Top Width T
I		$\frac{z_1 \cdot d^2}{2}$	$d(1 + \sqrt{z_1^2 + 1})$	$\frac{z_1 \cdot d}{2(1 + \sqrt{z_1^2 + 1})}$	$z_1 \cdot d$
II		$d^2 \left( \frac{z_1 + z_2}{2} \right)$	$d(\sqrt{z_1^2 + 1} + \sqrt{z_2^2 + 1})$	$\frac{d(z_1 + z_2)}{2(\sqrt{z_1^2 + 1} + \sqrt{z_2^2 + 1})}$	$d(z_1 + z_2)$
III		$z_1 \cdot d^2$	$2d\sqrt{z_1^2 + 1}$	$\frac{z_1 \cdot d}{2\sqrt{z_1^2 + 1}}$	$2z_1 \cdot d$
IV		$d(w + z_1 \cdot d)$	$w + 2d\sqrt{z_1^2 + 1}$	$\frac{d(w + z_1 \cdot d)}{w + 2d\sqrt{z_1^2 + 1}}$	$w + 2z_1 \cdot d$

Note: 1. d is the depth of water in the channel in feet  
2. T is the width at the water surface in feet

**Table 3-3. Estimated n values & Permissible Shear (Steps 4 & 11)**

Liner Type	n value			Permissible Shear lb/ft <sup>2</sup>
	Depth 0-6 in.	Depth 7 in. - 2 ft.	Depth 2 ft. or greater	
Plastic sheeting or woven fabric	0.01	0.01	0.01	Good for any flowrate
Concrete	0.015	0.013	0.013	Good for any flowrate
Uncompacted soil	0.02	0.02	0.02	0.2
Compacted soil	0.02	0.02	0.02	0.4
grass	0.03	0.03	0.03	1
Erosion Control Blanket (ECB)	0.066	0.035	0.028	2
Turf Reinforcement Mat (TRM)	0.066	0.035	0.028	6
1" clean rock	0.044	0.033	0.03	0.4
2" clean rock	0.066	0.041	0.034	0.8
3" clean rock	0.085	0.055	0.034	1.5
Type 2 Riprap (avg. 6")	0.104	0.069	0.035	2.4
Type 3 Riprap (avg. 12")	—	0.078	0.040	4.8

Table values estimated from Fifield, 2004 & HEC No. 15, Third Edition



A sample problem for channel design or analyses is shown below.

### **Stable Channel Sample Problem**

**Determine the flowrate and maximum shear stress for concentrate flow contained by a diversion berm with a 1:2 side slope and uphill ground slope of 1:20 with contributing area of 3 acre flowing on a 2% slope.**

**STEP 1** 3 acres

**STEP 2**  $Q_r = 6 \text{ ft}^3/\text{sec}$

**STEP 3** Type II channel (see Table 3 – 2)

Channel slope ( $S$ ) =  $0.02 \frac{\text{ft}}{\text{ft}}$  in decimal form

Estimate depth ( $d_i$ ) of flow (Guess 0.5 ft)

Calculate area ( $A$ ) =  $\frac{d_i^2 * (z_1 + z_2)}{2}$

$$A = \frac{(0.5 \text{ ft})^2 * (2 + 20)}{2}$$

$$A = 2.75 \text{ ft}^2$$

$$WP = d * \left( \sqrt{z_1^2 + 1} + \sqrt{z_2^2 + 1} \right)$$

$$WP = 0.5 \text{ ft} * \left( \sqrt{(2)^2 + 1} + \sqrt{(20)^2 + 1} \right)$$

$$WP = 11.13 \text{ ft}$$

$$R = \frac{A}{WP}$$

$$R = \frac{2.75 \text{ ft}^2}{11.13 \text{ ft}}$$

$$R = 0.24 \text{ ft}$$

$$T = d_i * (z_1 + z_2)$$

$$T = 0.5 \text{ ft} * (2 + 20)$$

$$T = 11.00 \text{ ft}$$

**STEP 4**  $n = 0.02$  for soil (see Table 3 – 3)

$$\text{STEP 5 } Q = \frac{1.49}{0.02} * 2.75 \text{ ft}^2 * (0.24 \text{ ft})^{\frac{2}{3}} * \left( 0.02 \frac{\text{ft}}{\text{ft}} \right)^{\frac{1}{2}}$$

$$Q = 11.19 \text{ ft}^3/\text{sec}$$

**Stable Channel Sample Problem, cont.**

**STEP 6** Is flowrate  $Q$  in Step 5 within ten percent of flowrate  $Q_i$  in Step 2, if yes go to step 11, if not go to step 7

$$6 \frac{ft^3}{sec} * 0.10 = 0.6 \frac{ft^3}{sec}$$

$$\text{Range equals } 5.7 \frac{ft^3}{sec} \text{ to } 6.3 \frac{ft^3}{sec}$$

$$11.19 \frac{ft^3}{sec} \text{ is not within range}$$

**STEP 7** Second iteration of the new depth estimate

$$d_{i+1} = d_i * \left( \frac{Q_r}{Q} \right)^{0.4}$$

$$d_{i+1} = 0.5 \text{ ft} * \left( \frac{6}{11.19} \right)^{0.4}$$

$$d_{i+1} = 0.38 \text{ ft}$$

$$\text{STEP 8 } A = \frac{(0.38 \text{ ft})^2 * (2 + 20)}{2}$$

$$A = 1.59 \text{ ft}^2$$

$$WP = 0.38 \text{ ft} * \left( \sqrt{(2)^2 + 1} + \sqrt{(20)^2 + 1} \right)$$

$$WP = 8.46 \text{ ft}$$

$$R = \frac{A}{WP}$$

$$R = \frac{1.59 \text{ ft}^2}{8.46 \text{ ft}}$$

$$R = 0.19 \text{ ft}$$

$$T = d_i * (z_1 + z_2)$$

$$T = 0.38 \text{ ft} * (2 + 20)$$

$$T = 8.36 \text{ ft}$$

$$\text{STEP 9 } Q = \frac{1.49}{0.02} * 1.59 \text{ ft}^2 * (0.19 \text{ ft})^{\frac{2}{3}} * \left( 0.02 \frac{ft}{ft} \right)^{\frac{1}{2}}$$

$$Q = 5.5 \text{ ft}^3/\text{sec}$$

**Stable Channel Sample Problem, cont.**

**STEP 10** Is flowrate  $Q$  in Step 9 within ten percent of flowrate  $Q_i$  in Step 2, if yes go to step 11, if not go to step 7

Range equals  $5.4 \frac{ft^3}{sec}$  to  $6.6 \frac{ft^3}{sec}$

$5.5 \frac{ft^3}{sec}$  is within range

**STEP 11** Calculate Shear Stress ( $\tau$ ) at depth ( $d$ ) in  $\frac{lb}{ft^2}$ ,  $\tau = 62.4 * d * S$

if  $\tau$  is  $>$  permissible shear stress in Table 3 – 3 erosion will occur

if erosion will occur consider ditch checks, increasing wetted perimeter, reducing slope, or a liner with a permissible shear stress greater than  $\tau$  to ensure no erosion occurs

see Table 3 – 3, Section 3.15.8, 3.15.12, and 3.15.16

$$\tau = 62.4 \text{ lb/ft}^3 * (0.38 \text{ ft}) * 0.02 \text{ ft/ft}$$

$$\tau = 0.47 \text{ lb/ft}^2$$

$$0.47 \frac{lb}{ft^2} > 0.40 \frac{lb}{ft^2} \text{ (permissible shear stress of compacted soil from Table 3 – 3)}$$

Therefore channel is not stable

See ditch check or channel liner sample problems to stabilize

At the end of the problem above, the diversion berm is not stable; therefore, the design engineer must consider methods of stabilization or re-design such as changing the slope or size of the channel. The problem is continued below using a rock liner for stabilizing the channel. The design engineer may chose to place ditch checks in the channel instead of a liner. This example is continued using ditch checks as a form of stabilization in Section 3.15.8.

**Stable Channel Rock Liner Sample Problem**

**Continuation of stable channel sample problem using 2" clean rock liner after determining that the channel was not stable unlined ( $d$ ,  $S$ ,  $A$ ,  $WP$ ,  $R$ , and  $T$  will be the same as step 3 in proceeding problem).**

**STEP 4**  $n = 0.066$  for 2" clean rock @ 0.50 ft. water depth (see Table 3 – 3)

$$\text{STEP 5 } Q = \frac{1.49}{0.066} * 2.75 \text{ ft}^2 * (0.24 \text{ ft})^{\frac{2}{3}} * \left(0.02 \frac{\text{ft}}{\text{ft}}\right)^{\frac{1}{2}} \quad Q = 6.27 \text{ ft}^3/\text{sec}$$

**STEP 6** Is flowrate  $Q$  in Step 5 within ten percent of flowrate  $Q_i$  in Step 2, if yes go to step 11, if not go to step 7

$6.27 \frac{ft^3}{sec}$  is within range

$$\text{STEP 11 Calculate Shear Stress } (\tau) \text{ at depth } (d) \text{ in } \frac{lb}{ft^2}, \tau = 62.4 * d * S \quad \tau = 0.62 \text{ lb/ft}^2$$

$$0.62 \frac{lb}{ft^2} \leq 0.80 \frac{lb}{ft^2} \text{ (permissible shear stress of 2" clean rock from Table 3 – 3)} \quad \text{Therefore channel is stable}$$

### 3.15

#### **Required Format and Information to be Included in ESC Drawings.**

Section 3.14 covers the design intent to capture and contain the sheet flow to settle as much of the sediment from the stormwater as possible and prevent channel erosion in concentrated flow paths. The section also presents some design methodology to pond the sheet flow for settlement and ensure concentrated flows are stable to minimize erosion. This section will cover format and required information to be included in the ESC drawings.

**3.15.1 Using Standard and Nonstandard BMPs in ESC Drawings.** The Engineering Department requires that all ESC drawings be sealed by a professional engineer in the state of Missouri and recognizes that the design responsibility falls on the engineer that develops the ESC Plans. Therefore this manual does not dictate what the design engineer should use to control erosion and sedimentation on the site, but should be considered a guidance document on City requirements and a design aid.

When preparing ESC drawings, the design engineer should consider using standard BMPs shown in Table 3-4. A complete set of details for these BMPs (the ESC Plan General Notes and Details - see Appendix B) has been prepared to illustrate these BMPs. Construction details and notes provide direction to the permittee(s) regarding installation and maintenance requirements for each BMP. ESC drawings submitted to the City shall include a set of the ESC Plan General Notes and Details with only the BMP details used in the ESC drawings.

The City also recognizes that there will be new advances in the development of BMPs that may prove effective, or even out-perform controls currently accepted. If the design engineer wants the City of West Plains to consider the use of a non-standard BMP, then information on the BMP must be submitted to the Stormwater Coordinator for review and approval prior to including the BMP into the ESC drawings. If approved, the non-standard BMP may be included in the drawings with details for the proper installation and maintenance. If West Plains finds the non-standard BMP to be ineffective after installation, it shall be replaced at the owner's expense with a City approved BMP.



Table 3-4. Standard BMPs

No.	BMP	ID	Used For	Initial Stage	Interim Stage	Final Stage
1	Check Dam	CD-SM	Stabilize concentrated flow areas			
2	Concrete Washout Area	CWA—C	Construction			
3	Construction Fence	CF-C	Construction			
4	Construction Markers	CM-C	Construction			
5	Dewatering	DW-P	Ponding stormwater			
6	Diversion Berm	DB-M	Capture and move stormwater			
7	Diversion Ditch	DD-M	Capture and move stormwater			
8	Ponding Berm	PB-P	Ponding stormwater			
9	Inlet Protection	IP-P	Ponding stormwater			
10	Reinforced Rock Berm	RRB-P/M/SM	Ponding stormwater/ capture and move stormwater / stabilize moving stormwater			
11	RRB for Culvert Protection	RRB-SM	Stabilize moving stormwater			
12	Rolled Erosion Control Products	RECP-SM/S	Stabilize moving stormwater / stabilize prior to vegetation			
13	Sediment Basin	SB-P	Ponding stormwater			
14	Sediment Retention Fiber Roll	SRFR-P/M/SMS	Ponding stormwater/ capture and move stormwater / stabilize moving stormwater / stabilize prior to vegetation			
15	Sediment Trap	ST-P	Ponding stormwater			
16	Seeding and Mulching	SM-S	Stabilize prior to vegetation			
17	Silt Fence	SF-P/M	Ponding stormwater/ capture and move stormwater			
18	Stabilized Staging Area	SSA-C	Construction			
19	Surface Roughening	SR-S	Stabilize prior to vegetation			
20	Temporary Slope Drain	TSD-S	Stabilize prior to vegetation			
21	Temporary Stream Crossing	TSC-C	Construction			
22	Terracing	TER-S	Stabilize prior to vegetation and after			
23	Vehicle Tracking Control	VTC-C	Construction			
24	VTC with Wheel Wash	WW-C	Construction			
25	Flocculants	F-P	Enhance settling of sediment			

**Standard ESC  
Plan Drawing  
Requirements,  
continued**

**3.15.2 Labeling BMP on ESC Drawings.** All BMPs standard and non-standard will have a symbol, BMP ID, and design parameters at the BMP placement location on the plan-view ESC drawings. The symbol of each type of BMP is shown on a BMP legend on cover sheet of ESC Plan General Notes and Details. This BMP ID will include: Detail Number-Type of BMP-Intent of BMP-BMP number. Section 3.15.1 to 3.15.4 will explain each part of the BMP ID. Section 3.15.8 to 3.15.29 includes the required design parameters to be specified on the plan-view ESC drawings. These design parameters will assist in specifying product information and providing construction details specific to that BMP. Appendix C shows example ESC drawings.

**3.15.3 Detail Number on BMP.** The detail number is the first of four parts of the BMP ID. The number corresponds to the detail number of the specific type of BMP shown in the details ESC Plan General Notes and Details included in the ESC drawings. The standard BMP detail numbers in Table 3-4 are shown in the first column (under the column heading No.). Any non-standard BMPs used in the ESC drawing should also have detail numbers with corresponding details included in ESC Plan General Notes and Details.

**3.15.4 Type of BMP.** The second of four parts of the BMP ID states the type of BMP. To take less space on the drawing, BMPs are called out on an ESC drawing using the two or three letter identifier which is shown with the BMP symbol on the BMP Legend. This legend is on the Cover Sheet of ESC Plan General Notes and Details.

**3.15.5 Intent of BMP.** The third of four parts of the BMP ID states the intent of the specific BMP. The same type of BMP can be used to perform different tasks, for example, a silt fence placed on the same elevation throughout and then brought to a higher elevation at the ends could be used to pond stormwater. That same silt fence put on different elevation throughout would move (convey) stormwater. Some different uses of BMPs on a site are described below:

- Concentrated Flow BMPs are used to move stormwater. Principles used in design for all concentrated flow BMPs, to include standard and non-standard, are covered in Section 3.14.2. If a BMP is used for this intent, an **M** is used within the BMP ID. The **M** states it is used for moving water.
- Concentrated Flow Stabilization BMPs are used to slow the speed of the stormwater or be a liner in ditches and drainageways to ensure erosion is minimized. Principles used in design for all concentrated flow BMPs, to include standard and non-standard, are covered in Section 3.14.2. A BMP used for this intent has an **SM** within the BMP ID. The **SM** states that it is used for stabilizing moving stormwater from erosion.

**BMPs to Address  
Erosion and  
Sediment**

- Ponding BMPs are used to collect stormwater from sheet flow area and pond it to allow the sediment to settle out. Principles of design for all sheet flow BMPs, to include standard and non-standard, are covered in Section 3.14.1. This intent for a BMP has a **P** placed in the BMP ID. The **P** states that it is used for ponding water.
- Sheet Flow Stabilization BMPs are used for temporary or final stabilization of sheet flow areas. For final stabilization applications, it would be placed after all earthmoving has occurred in a specific area and topsoil has been applied; then the BMP would be applied to reduce erosion until vegetation has been established. In some cases, it may remain and assist the vegetation in stabilizing the soil. For this intent of a BMP an **S** is included in the BMP ID. The **S** states that it is used for stabilization of sheet flow areas.
- Construction BMPs are used to ensure that sediment does not leave the site but is not specific to ponding stormwater, stabilizing concentrated flow area, or providing final stabilization of an area. This intent of a BMP places a **C** within the BMP ID to denote that it is a construction BMP.

**3.15.6 BMP Number.** The BMP number is the fourth and final part of the BMP ID. This number corresponds to the specific number for each and all BMPs shown on the plan-view ESC drawings. This allows all BMPs on the site to have a corresponding number to enable it to be called out in construction sequencing, deficiencies in installation, damage, or required maintenance to BMP on the site. This numbering will be used during the construction and inspection to single out a specific BMP on the site.

**3.15.7 Stages of Construction in Plan Sheets of the ESC drawings.** BMPs may apply to one or more of the following construction phases. All BMPs shall be indicated in the ESC 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, moved, or removed.

- Initial Stage. This plan sheet shall provide erosion and sediment controls for the initial clearing, grubbing and grading of a project. The layout and design of the initial BMPs should be based off the existing topography at the limits of construction (LOC). The initial ESC plans should include BMPs for perimeter control to ensure sediment does not leave the site to the maximum extent possible. The initial BMPs will be placed at the same time and prior to on-site pre-construction meeting and the signing of the ESC permit application, step 10 in the ESC Permit process shown in Figure 1-1 and covered in Section 5.3.

**Standard ESC  
Plan Drawing  
Requirements,  
continued**

- Interim Stage. This plan sheet shows BMPs to control grading, erosion and sediment during and after grading, site construction and site revegetation process. This plan sheet will include BMPs within the perimeter and any modifications to the perimeter BMPs due to the proposed grading. The interim BMPs will not all be placed at the same time. Therefore a schedule of installation will be within the construction notes on the plan sheet for each BMP number that is installed. The construction installation timing of the BMP in the notes should be triggered by the completion of something tangible on the site or before or after activity begins or ends.
- Final Stage. This plan sheet shows controls for final stabilization and completion of the site. The final BMPs may not all be placed at the same time. The interim BMPs will not all be placed at the same time. Therefore a schedule of installation will be within the construction notes on the plan sheet for each BMP number that is installed is required. The construction installation timing of the BMP in the notes should be triggered by the completion of something tangible on the site or before or after activity begins or ends. All final BMPs will be installed prior to initial close-out inspection, step 16 in the ESC Permit process shown in Figure 1-1 and covered in Section 6.2.

**3.15.8 Check Dam (CD-SM).**

This BMP, a **concentrated flow stabilization BMP (SM)**, is designed to slow down the stormwater in concentrated flow areas to prevent erosion and is an alternative to a liner. The potential application of this BMP typically occurs after the concentrated flow area is determined to be unstable (erosion will occur). Concentrated flow stability is explained in Section 3.15.2 (Concentrated Flow Areas). Ditch checks or proprietary dikes (see picture on page 3-16) that meet the design requirements used in the section could stabilize the channel. Another method to stabilize the channel would be to install a temporary or permanent liner.

Design parameters to be specified on the plan-view ESC drawings include the following items shown on the construction detail:

- Location of check dams
- Length (L) dimension.
- Check dam type: rock type or proprietary type (proprietary require brand name and model number and rock type require size of rock: 1", 2", 3" clean rock, or Type I or II riprap
- Height (H) dimension.
- Tail length (TL) dimension.
- Tail length and type for proprietary products if required when TL is not integral to the product: rock type, 15 mil plastic, RECP, or fabric (RECP and fabric require brand name and model number)
- Spacing (S) dimension.



The ditch check design method is based on channel properties and the drainage area contributing stormwater runoff to channel. The upstream contributing area is used to determine the flowrate by using Table 3-1. The first step of the process requires the design engineer to complete the ditch design and assessment procedure on Section 3.15.2 in order to determine the normal depth ( $d_i$ ) in the channel without a ditch check. The method of determining the design parameters is shown below.

### ***Ditch Check Design Method***

**STEP 1** Determine ditch properties without a check dam using Section 3.14.2 (**CHANNEL DESIGN OR ASSESSMENT**)

**STEP 2** Determine minimum height of wier =  $H = 2 * \text{depth of flow } (d_i)$

*Note: When using proprietary products for ditch check the minimum height of the product must equal or exceed twice the depth of flow in the channel without the ditch check. This is the minimum height but it may be increased to increase the spacing between ditch checks.*

**STEP 3** Determine the ditch check spacing (SP)

$$SP = \frac{H}{\text{Channel Slope } (S) \text{ in decimal}} + 2 * H + TL$$

*Note: Spacing is equal to distance between the crest of the upstream ditch check and the crest of the downstream ditch check. The minimum tail length (TL) is H but may be increased to increase the distance between the crest of the upstream and downstream ditch checks.*

**STEP 4** Determine rock size for ditch check by calculating

$$\text{Shear Stress } (\tau) \text{ at depth } (d_i) \text{ in } \frac{\text{lb}}{\text{ft}^2}, \tau = 62.4 * d * S$$

$\tau \leq$  Permissible shear stress of chosen rock type in Table 3 – 3 for the ditch check

*Note: Ditch checks may use 1, 2, 3" clean rock, or Type 2 or Type 3 rock ditch liner from Table 3 – 3.*

*The shear stress calculated in Step 4 must be less than the permissible shear stress of the chosen rock type for the ditch check.*

The stable channel sample problem starting on page 3-26 ends with the determination that the channel is unstable. The following example stabilizes the channel with ditch checks.

### ***Ditch Check Sample Problem***

***Continuation of stable channel sample problem using ditch check after determining that the channel was not stable unlined (d, S, A, WP, R, and T will be the same as step 3 of the problem).***

***STEP 1*** Channel type II from Table 3 – 2

channel slope ( $S$ ) = 0.02, depth of flow ( $d_i$ ) = 0.38 ft,

Area ( $A$ ) = 1.59 ft<sup>2</sup>, wetted perimeter ( $WP$ ) = 8.46 ft,

hydraulic radius ( $R$ ) = 0.19 ft, and top width ( $T$ ) = 8.36 ft

***STEP 2***  $2 * 0.38 \text{ ft} = 0.76 \text{ ft}$

***STEP 3***  $SP = \frac{0.38 \text{ ft}}{0.02 \text{ ft/ft}} + 2 * 0.38 + 0.38 = 20.14 \text{ ft}$

*Note: To increase the spacing, increase TL or H, or both.*

***STEP 4*** Determine rock size for ditch check by calculating

Shear Stress ( $\tau$ ) at depth ( $d_i$ ) in  $\frac{\text{lb}}{\text{ft}^2}$ ,  $\tau = 62.4 * d * S$

$\tau = 62.4 \text{ lb/ft}^3 * (0.38 \text{ ft}) * 0.02 \text{ ft/ft}$

$\tau = 0.47 \text{ lb/ft}^2$

$0.47 \frac{\text{lb}}{\text{ft}^2} \leq 0.80 \frac{\text{lb}}{\text{ft}^2}$  (permissible shear stress of 2" clean rock from Table 3 – 3)

Therefore use 2" clean rock

**3.15.9 Concrete Washout Area (CWA-C).** This BMP is considered a **construction BMP (C)**. This BMP should be located at one or more locations near areas of concrete work, and shall be specified on the plan-view ESC drawings. The use of vehicle tracking control in conjunction with a concrete washout area is mandatory. The minimum dimension of the concrete washout area is 8 foot by 8 foot. The design engineer should consider the maximum amount wash water that would be placed in it within a one week period in order to properly size it. It should be assumed that 7 gallons of water will be required to clean a concrete truck chute and 50 gallons to clean a hopper of concrete pump truck.

Design parameters to be specified on the plan-view ESC drawings include the following items shown on the construction detail:

- Location concrete washout area
- Width (W) dimension.
- Length (L) dimension

**3.15.10 Construction Fence (CF-C) and Construction Markers (CM-C).** Design parameters to be specified on the plan-view ESC 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 to restrict access to stream buffers or other sensitive areas or when it is necessary to control the location of vehicles entering the site for example placing construction fence to discourage vehicle access except at vehicle tracking control locations. 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 but may not always be necessary.

**3.15.11 Dewatering (DW-C).** Many sites require digging pits, trenching, or cross drainageways. These areas typically fill with water and require dewatering to complete the construction. In these situations the contractor must pump this water to a settling basin or a sediment bag. Dewatering design parameters to be specified on the plan-view ESC drawings include the following items:

- The location of all proposed dewatering operations.
- The description of any anticipated dewatering methods.
- The anticipated volume of water to be discharged in gallons per minute.
- The anticipated maximum flow discharged from dewatering activities in gallons per minute.
- Size of sediment basin or sediment bag to be pumping into.

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

The discharge from dewatering operations is to be directed into a sediment basin that has been constructed on the site or sediment bag.

When pumping the stormwater into the sediment basin, the City may require the contractor to interject a flocculant to enhance the settling ability of the sediment in the stormwater. See Section 3.15.29 for information on flocculants.

**3.15.12 Diversion Berm (DB-M) or Diversion Ditch (DD-M).**

A diversion berm is mounded soil that is machine compacted to capture and moves stormwater. A diversion ditch is cut into the ground to perform the same purpose as the berm. Design parameters to be specified on the plan-view ESC drawings include the following items:

- Location of the diversion berm or diversion ditch
- Lining of diversion ditch or berm if required for stabilization (rolled erosion control product RECP, rock type, 15 mil plastic, fabric, or other liner type). See Table 3-3.
- Length
- Channel type (II, III, or IV). See Table 3-2. Type I is not acceptable for this BMP. Type I will be used to model water flow against a vertical BMP.
- Side slopes (looking downstream, left & right side slope ratio)
- Height (H) and bottom width (BW) if type IV channel.
- Top width (T)
- If the ditch lining is RECP, it should be stated if it is a erosion control blanket (ECB) or a turf reinforced mat (TRM), and the brand and model number stated for all RECPs and fabrics. (design engineer should supply data to the City during review that specifies the permissible shear stress of the RECP)
- If the ditch lining is rock, it should state rock type: 1", 2", 3" clean rock, or Type I or II riprap.

A diversion ditch or berm is considered a **concentrated flow BMP (M)**. These BMPs are used to move stormwater and can be installed at the top of disturbed slopes and other sensitive areas to protect them from upstream runoff. They can also be placed along long slopes to reduce slope length as well as along the perimeter of construction areas to divert stormwater to sediment basin or sediment trap basin. The designer should size the ditch or berm to handle the peak flowrate of a 2-year storm. Section 3.14.2 includes an acceptable method. This method covers designing a stable channel. If the channel is not stable, ditch checks or a liner will be required. If a stone liner is chosen to stabilize the channel the stone type must be specified. The available stone types are shown in Table 3-3 and should be determined based off the shear stress in the channel being less than the permissible shear stress of rock type or any other type of liner.

The height dimension "H" must be greater than or equal to the normal depth " $d_i$ " calculated using the manning's equation as shown in Section 3.14.2 for a channel without ditch checks. If ditch checks are placed in the channel the minimum ditch or berm height must exceed 1.5H of the check dam, see detail 1A and 1B in ESC Plan General Notes and Details shown in Appendix B.



Side slopes of the berm or ditch should not be greater than 2 to 1 horizontal to vertical ratio.

**3.15.13 Ponding Berm (PB-P).** Design parameters to be specified on the plan-view ESC drawings include the following items:

- Location of the ponding berm.
- Side slopes (berm side slope ratio and then side slope ratio flowing towards the berm)
- Height (H)
- Elevation at toe of berm

A ponding berm is a **ponding BMP (P)** and is used to pond stormwater. Section 3.14.1 can be used to estimate required height of the berm. In order to determine the height the design engineer must determine the, contributing area and allowable storage area. The designer should size the storage behind the berm to handle the volume of a 2-year 24-hour storm. Section 3.14.1 presents an acceptable method.

**3.15.14 Inlet Protection (IP-P).** Inlet protection shall be shown on the plan-view ESC drawings at all street and area inlets. The ESC drawing shall indicate the type of inlet protection, either sump or continuous-grade for curb-opening inlets, or area inlet protection. This BMP is not considered a ponding BMP, and requires ponding BMP upslope or downslope or the stormwater must enter sedimentation facility before leaving the site.

**3.15.15 Reinforced Rock Berm (RRB-SM/P/M).** Design parameters to be specified on the plan-view ESC drawings include the following items:

- Location
- Length (L) dimensions.
- If lined state type (rock type, 15 mil plastic, fabric or other liner type). See Table 3-3. Note: only applies for RRB-M
- If lined state top width (T) dimension.
- If the ditch lining is fabric, it should state the brand and model number
- If the ditch lining is rock, it should state rock type: 1", 2", 3" clean rock, or Type I or II riprap.
- If used for ponding, state ground elevation at base.

The height of the BMP is assumed to be 10 inches but must be verified after placement. This BMP can be used as a **concentrated flow stabilization BMP (SM)** as a ditch check, **ponding BMP (P)**, or a **concentrated flow BMP (M)**. If used as concentrated flow stabilization BMP procedure shown for a ditch check can be used, see Section 3.15.8.

When used as a ponding BMP, like a downhill perimeter control on a rock ledge, the design procedure for a ponding BMP in Section 3.15.1 can be used.

*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.*



If used as a concentrated flow BMPs to capture and move stormwater, it will not be placed on the same elevation throughout its length. When used to move stormwater, it should act as a stable channel an acceptable design method is present in Section 3.15.2 as the channel design or assessment method. If the channel is not stable, it must be stabilized. A rock liner on the uphill side of the berm maybe suitable method of stabilization. The rock type must be determine from Table 3-3 based off the shear stress.

**3.15.16 Rolled Erosion Control Products (RECP-S/SM).** Design parameters to be specified on the plan-view ESC drawings include the following items shown on the construction detail:

- Type of blanket (ECB) or mat (TRM)  
(brand, model number and permissible shear stress if a **RECP-SM**)
- Area (A) in square yards.
- Dimensions or location information.

This group covers all types of rolled erosion control products. These products are manufactured mulch materials used to protect disturbed soils from erosion and are used as **sheet flow stabilization BMP (S)** or **concentrated flow stabilization BMP (SM)**. Specific types of this BMP are more suited for **S** or **SM** application. The RECP types vary on how susceptible to photo-degradation processes and durability to resist shear stresses from flowing water. Most sheet flow stabilization applications are used as mulch for sloped areas were it would be hard to keep straw and other forms of mulch on the slope until vegetation is established. Section 3.11.1 states that all slopes greater than 4 to1 will require a RECP. Slopes greater than 3 to1 will require an approved grade control structure, like a retaining wall.

RECPs are also used as concentrated flow stabilization BMPs (SM). This type of RECP varies from a temporary blanket that is used to prevent erosion in channels until vegetation is established, erosion control blanket, to a long term blanket that helps reinforce the vegetation after it is established, which is called a turf reinforcement blanket. These blankets are design based on runoff velocities or shear stress. Table 3-3 has allowable shear stress for erosion control blanket and turf reinforcement blanket. The design engineer can use Section 3.14.1 and 3.14.2 to estimate flowrates and determine channel velocities or shear stress to aid in determining the most suitable RECP for the channel erosion protection.

RECP should be designed and installed in accordance with the manufacturers' recommendations and specifications. Table 3-3 has allowable shear stresses, but the design engineer should use data for specific brand and model number specified in the plans and specifications.

Additional information on RECPs can be found through the Erosion Control Technology Council (ECTC) website at [www.ectc.org](http://www.ectc.org) or producers of RECP. Two producers of RECP products that have design information available on their websites are the following: North American Green at [www.nagreen.com](http://www.nagreen.com) and Western Excelsior at [www.westernexcelsior.com](http://www.westernexcelsior.com).

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

- Location.
- Bottom width (W)
- Outlet structure (Type I or II), size of skimmer if type II outlet.
- Spillway crest length (CL) .
- Spillway liner (15 mil plastic or fabric)

The sediment basin design shown on the ESC Drawing Standard notes and Details provided in Appendix B shall be used for any disturbed drainage area greater than 1.0 acre. For drainage areas ranging from 1.0 to 5.0 acres, either a riser pipe or faircloth skimmer may be used for the outlet structure. For drainage areas of 5.0 acres or greater, a faircloth skimmer must be used for the outlet.

Sizing guidance for sediment basin design can be found in Table 3-5 below.

**Table 3-5 Minimum Requirements for Standard Sediment Basin**

Upstream Drainage Area (acres)	Basin Bottom Width (W), (ft)	Spillway Crest Length (CL), (ft)	Outlet Type I Hole Diameter (HD), (in)	Outlet Type II Skimmer Size (in)	Outlet Type II Skimmer Orifice Diameter (in)
1	24	2	7/16	2.5	2.2
2	34	4	5/8	3.0	2.7
3	42	6	3/4	4.0	3.0
4	49	8	7/8	4.0	3.2
5	54	10	1	4.0	3.7
6	59	12		5.0	4.0
7	64	14		5.0	4.2
8	69	16		5.0	4.5
9	73	18		5.0	4.8
10	77	20		5.0	5.0
11	81	22		6.0	5.0
12	84	24		6.0	5.2
13	88	26		6.0	5.4
14	91	28		6.0	5.6
15	94	30		6.0	5.7

Note: Use general rounding rules to determine whole acres.

Depths should be as shown in the ESC Plan General Notes and Details. Sediment basins with drainage areas larger than 15 acres should be designed to meet the needs on the site. Additional information on the faircloth skimmer can be found at [www.fairclothskimmer.com](http://www.fairclothskimmer.com).

The basin widths in Table 3-5 were calculated by using a 2-year 24-hour design storm. The rational method was used to calculate the peak discharge draining to the basin based from the upstream drainage area. The required sediment basin area was then calculated by dividing the flow rate by the settling velocity. A particle settling velocity of 2 inches per hour was used for design. Based upon Stokes' Law, this corresponds to settling out a particle with a diameter of .007 millimeters. This design particle size ensures that most silts and sands will settle out in the sediment basin. For sizing the faircloth skimmer, a basin drain time of 2 days was used. Permanent detention and water quality facilities shall be used as temporary sediment basins during construction. Sediment basins that have an upstream drainage area greater than five acres require a faircloth skimmer or an approved equal. Due to the high cost of skimmer and the fact that they are reusable the City will rent them out to contractors at a reasonable price so the contractor does not have to purchase one.

*A sediment retention fiber roll (SRFR) 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.*

**3.15.18 Sediment Retention Fiber Roll (SRFR-P/SM/S/M).** Design parameters to be specified on the plan-view ESC drawings shall include the following items:

- Location of the sediment control log.
- Length (L) of the sediment control log.
- Depth (D) dimensions (Typical diameters: 9, 12, and 20 inch).
- If lined state type (stone type, 15 mil plastic, fabric or other liner type). See Table 3-3. Note: only applies for SRFR-M
- If lined state top width (T).
- If used for ponding, state elevation at base.

This BMP can be used as a **ponding BMP (P)**, **concentrated flow stabilization BMP (SM)**, **sheet flow stabilization BMP (S)**, or **concentrated flow BMP (M)**.

When used as a ponding BMP, like a downhill perimeter control, the design procedure ponding BMP in Section 3.14.1 can be used.

If used as a concentrated flow stabilization BMP, in a diversion ditch or small drainageway, the ditch check design procedure in Section 3.16.8 could be used. Additional information on stabilization of concentrated flow areas is shown in Section 3.14.2. The design engineer could also consider reinforced rock berms or ditch checks for this application.

When used as a sheet flow stabilization, it typically used in-place or in combination with a **RECP** on slopes see Section 3.11.1. Typical sediment control log spacing on a hillside is shown in Table 3.6.



**Table 3.6 Sediment Retention Fiber Roll Spacing on a Slope**

Slope	Spacing (L), (slope length in ft.)
6:1 or Flatter	50
6:1 to 4:1	25
Steeper than 4:1 to 2:1	15
Steeper than 2:1 to 1:1	10
Steeper than 1:1	5

If used as a concentrated flow BMPs to capture and move stormwater, it will not be placed on the same elevation throughout its length. When used to move stormwater, it should act as a stable channel. An acceptable design method is present in Section 3.14.2 as the channel design or assessment method. If the channel is not stable, it must be stabilized. A rock liner on the uphill side of the berm maybe suitable method of stabilization. The rock type must be determine from Table 3-3 based off the shear stress.

Sediment control logs should be designed and installed in accordance with the manufacturers' recommendations and specifications and should supersede the guidance in this manual.

**3.15.19 Sediment Trap (ST-P).** Design parameters to be specified on the plan-view ESC drawings include the following items:

- Location.
- Length.

Sediment traps may be used for upstream disturbed areas less than 1.0 acre. It is recommended that all disturbed areas drain to either a sediment trap or sediment basin. Table 3-7 gives the minimum requirements for the sizing of sediment traps based upon the drainage area. These dimensions are based upon a 2-year 24-hour storm. The trap should also have a minimum depth of 3 feet.

**Table 3.7 Minimum Requirements for Standard Sediment Trap**

Upstream Drainage Area (ac)	Trap Bottom Width (W), (ft)	Trap Length (L), (ft)
0.5	6	25
1	6	50

Note: Use general rounding rules to determine whole acres.

**3.15.20 Seeding and Mulching (SM-S).** Design parameters to be specified on the plan-view ESC drawings include the following items:

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

Unless otherwise approved by the City, a permanent seed mix with fescue and/or Kentucky blue grass is required. It is recommended that the design engineer be familiar with contractor requirements for seeding and mulching, documented in the ESC Plans General Notes and Details (see Appendix B). Some of the main requirements include the following:

- Existing topsoil (soil considered organic) shall be stripped (unless otherwise approved) from areas to be disturbed. The stripped topsoil shall be stockpiled during grading operations, and then replaced to a depth of at least 4 inches in all areas to be seeded. If quantities of on-site topsoil are inadequate to provide a replaced depth of 4 inches, the permittee(s) will have to import topsoil or condition the soil as approved by West Plains stormwater coordinator. Topsoil shall be thoroughly loosened and pulverized with no dirt clods greater than 2 inches in diameter prior to seeding and mulching.
- Straw mulch shall be applied at 2 tons per acre. It is recommended that straw be tacked with a tackifier or netted to prevent straw from blowing away prior to revegetation. The ESC Manager shall monitor the site weekly and reapply straw if any bare spots with no mulch appear prior to revegetation. Revegetation is considered complete when there is no bare areas larger than 4 square feet (2 feet by 2 feet or equivalent). The site shall be free of eroded areas. Inspections (monthly) and reseeding operations are required twice per year until a satisfactory stand of grass as denoted above is achieved.

Application rates of seed should follow seed manufacturers recommendations. Hydraulic seeding and mulching is an alternative that may be used in West Plains. Due to the large variation in type and application between hydraulic seeding and mulches, these methods must be approved by the City and follow manufacturers' recommendations.

The ESC Permit shall be active until Initial Close-out Acceptance is granted. Seeding and mulching operations must be undertaken when an ESC Permit expires and no renewal is granted.

**3.15.21 Silt Fence (SF-P/ M).** Design parameters to be specified on the plan-view ESC drawings include the following items:

- Location.
- Length (L).
- Type( I, II, or III)
- If lined state type (fabric or rock type from table 1). See Table 3-3. Note: only applies for SF-M
- If lined state top width (T)
- If used for ponding, state ground elevation at base.

This BMP can be used as a **ponding BMP (P)** or a **concentrated flow BMP (M)**. The design procedure ponding BMP in Section 3.14.1 can be used. Silt fence should be placed on the contour (same elevation) and then run up hill on the ends, to capture approaching sheet flow and pond it when used as a ponding BMP. Type I, II, and III have the following allowable ponding heights respectively 12", 18", and 36". See details A, B, and C on sheet 10 of the ESC Plan General Notes and Details.

If used as a concentrated flow BMP to capture and move stormwater it will not be placed on the same elevation throughout its length. When used to move stormwater it should act as a stable channel. An acceptable design method is present in Section 3.14.2 as the channel design or assessment method. If the channel is not stable it must be stabilized. A rock or a fabric liner on the uphill side of the silt fence is a suitable method of stabilization. The rock type must be determined from Table 3-3 based off the shear stress. See Details D and E on sheet 10 of the ESC Plan General Notes and Details.

**3.15.22 Temporary Slope Drain (TSD-M).** Design parameters to be specified on the plan-view ESC drawings include the following items:

- Type of slope drain (pipe, riprap lined, plastic lined, or other liner).
- Location and length (L) in linear feet.
- Diameter of pipe "D" dimension and/or size stone from Table 3-3.

Temporary slope drain is typically flexible tubing or rigid conduit extending from the top to the bottom of an exposed slope to protect it from upstream runoff. A ponding berm is typical used in conjunction with slope drain at the top of the slope to capture stormwater. The slope drain penetrates through the ponding berm to move the stormwater to the bottom of the slope. The berm should be twice the height of the diameter of the drain pipe. A picture of a slope drain is shown on page 3-15. 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. It should extend to a stable area or outlet. The design engineer can use Table 3-1 to estimate flowrate, and then use Table 3.8 below to determine pipe size.

**Table 3.8 Capacities of Slope Drains**

Diameter (inches)	Flowrate (cfs),
18	7
24	15
30	25
36	40

**3.15.23 Stabilized Staging Area (SSA-C).** Design parameters to be specified on the plan-view ESC drawings include the following:

- Location of staging area.
- Length
- Width

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

**3.15.24 Surface Roughening (SR-S).** 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 ESC drawing.

**3.15.25 Temporary Stream Crossing (SC-C).** Design parameters to be specified on the plan-view ESC 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. The culvert should handle a 2-year return period event the same as the ford. If there is construction below the normal high water of a defined channel, a permit will need to be obtained from the U.S. Army Corps of Engineers prior to City approval.

**3.15.26 Terracing (TER-S).** Design parameters to be specified on the plan-view ESC drawings include the following items:



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

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

**3.15.27 Vehicle Tracking Control (VTC-C).** Design parameters to be specified on the plan-view ESC drawings include following items:

- Location.
- Width (W) and Length (L).

A location shall be selected that avoids disturbance of trees, desirable vegetation, and low, wet areas. Slopes greater than 8 percent shall be avoided. No ramps of dirt, gravel, asphalt, wood, or other materials are allowed in the curb section.

**3.15.28 Vehicle Tracking Control with Wheel Wash (WW-C).** Vehicle tracking control with wheel wash does not need to be specified. It shall be used only if specifically required by the ESC Inspector, typically, only if vehicle tracking onto public streets becomes a major problem. Design parameters are the same as vehicle tracking control.

**3.15.29 Flocculants (F-P).** Fine suspended sediment, such as clay, in stormwater requires hours and some cases days to completely settle out of the stormwater. Flocculants can be applied to increase the settleability of the sediment in the stormwater. Common methods of application include: Floc bags placed in concentrated flow areas upstream of sedimentation facilities, spray applied to the surface of sedimentation facilities when containing stormwater, or land applied by spraying or distributing in granular form. The two current flocculants available are anionic polyacrylamide (Anionic PAM) and chitosan. Currently, the MDNR only allows chitosan. When using these product application rates, recommendations by the manufacturer should be followed. Toxicity data from the manufacturer should verify that using the product at recommended application rate poses no threat to aquatic life. The contractor should handle the product per methods state in the material safety data sheets (MSDS). The City may require the contractor to use flocculants when downstream areas are considered sensitive, see Section 3.14.1.

Design parameters to be specified on the plan-view ESC drawings include the following:

- Type of flocculant
- Method of application
- Rate of application
- Location of application



## Information

Preliminary submittal will include ESC drawings, ESC report, Signed Checklists for Development and Design and Drawings and Report contents.

**3.16****Submittal Requirements for Preliminary Acceptance of ESC Plan.**

The following section covers the required submittal for preliminary acceptance of an ESC Plan. Details of the process are explain in Section 4.1 through 4.6. This preliminary submittal will include ESC drawings, Signed Required Checklist for Preliminary Acceptance of ESC Plan (Appendix D), probable BMP cost worksheet (example in Appendix F), and sensitive area downstream attachment if required.

All ESC drawings, shall be prepared on 22" by 34" or 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 ESC drawings is provided in Appendix C.

As discussed in Section 2.2, ESC drawings shall be sealed and signed by the design engineer. Only the drawing sets submitted for final acceptance need to be signed and stamped (See Section 4.6) so the drawings submitted for preliminary acceptance should not be signed and sealed.

Appendix D summarizes is a Required Checklist for Preliminary Acceptance of ESC Plan . This checklist must be filled out, sealed, signed by the design engineer, and submitted for preliminary acceptance of the ESC Plan.

**3.17**

**Submittal Requirements for Permanent Drainage Facilities.** A stormwater permit is required when 0.5 acre or more of impervious area is created during development or redevelopment. In order to receive the stormwater permit planning documents and construction drawings shall be submitted to the Engineering Department for approval on permanent drainage or water quality facilities. The design of permanent drainage facilities shall be accepted prior to issuing an ESC Permit. Detailed requirements and guidance will be given in Volume II of the Stormwater Management Manual in 2011.

**3.18**

**BMP Cost.** Costs associated with erosion and sediment control BMPs include the following:

1. Installation of the BMPs indicated on the initial, interim, and final ESC drawings according to the number, types, dimensions, and quantities called for.
2. Provision of ESC Manager (see Section 5.1 for a description of the ESC Manager role) to supervise, inspect, and interface with West Plains on the project's ESC drawing.
3. Installation of additional BMPs that the permittee(s) consider appropriate or that are called for by the ESC Inspector to address actual site conditions. (As stated in Section 1.6, the ESC Permit process is a dynamic, not static, process; the permittee(s) are responsible for

adapting the original ESC Drawing as necessary to effectively reduce erosion and sediment, and must comply with any modifications to the plan required by the ESC Inspector.)

4. Maintenance costs for BMPs. Maintenance costs will vary based on many factors, including the magnitude and number of storm events occurring during the project.

Permittee(s) are required to provide an opinion of probable cost associated with implementing the ESC drawing.

### 3.19

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

**3.19.1 Variance Submittal Requirements.** Any request for a variance shall be in a separate letter addressed to the Stormwater Coordinator. 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 *ESC 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 West Plains prior to installation. Such practices must be thoroughly described and detailed.

**3.19.2 Staff vs. Administrative Variances.** Some variances may be minor in nature; these staff variances may be granted by the West Plains Stormwater Coordinator. A minimum amount of supporting documentation will be required for such variances. More complicated variances will require a more extensive review. These administrative variances shall be reviewed by the City Engineer.

## Section 4. Acceptance of ESC Plan and Applying for Permit

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### Overview of Section 4

#### 4.0

Section 4 addresses Steps 5 through 7 in the ESC Permit process.

**Permit Step 5: Submit the ESC Plan and related plans and permits to the City for review and acceptance, and revise documents as necessary to address City comments.**

Section 4.1, **Submittal of the ESC Plan**, describes procedures for submitting an ESC Plan.

Section 4.2, **Completeness Check**, states that ESC Plans will be checked for a basic level of completeness and returned if incomplete without receiving a detailed review.

Section 4.3, **Detailed Review by City Staff**, discusses the City's review of ESC Plans based on the criteria presented in Section 3.

Section 4.4, **Review Schedule**, summarizes typical review schedules.

Section 4.5, **Revisions to Plan Based on City Comments**, discusses the design engineer's revisions to the ESC Plan based on the City's comments.

**Permit Step 6: After City acceptance of the ESC Plan, submit at least 3 sets of the drawings, bound and folded, for signatures, along with the ESC Permit application, fee, and fiscal security.**

Section 4.6, **Preliminary Acceptance of the ESC Plan**, describes submittal requirements for multiple sets of ESC drawings to obtain the signature of the Stormwater Coordinator.

Section 4.7, **Applying for an ESC Permit**, discusses filling out the ESC Permit Application Form.

Section 4.8, **Permit Fees**, covers procedures for paying permit fees.

Section 4.9, **Posting Fiscal Security**, discusses acceptable forms and amounts of fiscal security.

**Permit Step 7: When ready, obtain the signed ESC drawings.**

Section 4.10, **Final Acceptance of ESC Plan**, describes the City signing process for multiple sets of ESC drawings.

Section 4.11, **Duration of ESC Permits**, discusses the duration of ESC Permits and the need to renew ESC Permits prior to expiration.

Section 4.12, **Transfer of ESC Permits**, describes procedures for transferring an ESC Permit if the permittee(s) changes during the life of an ESC Permit.

**Permit Step 5: Submit the ESC Plan and related plans and permits to the City for review and acceptance and revise documents as necessary to address City comments.**  
Sections 4.1 through 4.5 discuss Step 5.

### Submittal of the ESC Plan

#### 4.1

After the ESC Plan has been prepared according to the requirements of Section 3, the drawings, checklist and all related plans and permits discussed in Section 2.5 shall be submitted to the Engineering Department.

The ESC Plan shall not be accompanied by the ESC Permit application form, fee, or fiscal security at this time. These documents shall be submitted only after the ESC Plan is reviewed and accepted.

### Completeness Check

#### 4.2

After the ESC Plan is submitted to the Engineering Department, the City shall, within approximately 1 week from the submittal date, pre-review the ESC Plan for completeness based on the submittal requirements described in Section 3. Any



*Within a week of submittal, ESC Plans will undergo a completeness check.*



Information

**Any incomplete submittal shall be returned to the design engineer. This process shall be repeated until a complete plan set is submitted to the Engineering Department. A detailed review will then start.**

submittal that does not reflect a basic level of completeness shall be returned to the design engineer. This process shall be repeated until a complete ESC Plan set is submitted to the Engineering Department. The review period of an ESC Plan shall not start until a complete ESC Plan set is submitted.

### Detailed Review by City Staff

#### 4.3

The ESC Plan will be reviewed with an eye toward the effectiveness of the overall plan. The appropriateness, timing, and placement of the proposed erosion and sediment controls will be reviewed.

After review, written comments will be provided to the applicant.



*After passing the completeness check, ESC Plans will receive a detailed review by City staff.*



**Review  
Schedule****4.4**

Approximate review periods are indicated on the ESC Permit process flow chart shown in Section 1.

Typically, written review comments will be provided by the Engineering Department within 25 business days of receiving ESC Plans. Written comments on resubmittals are also provided within 25 business days of receiving the revised plans and the summary of how previous comments were addressed.

The length of time required to achieve final City acceptance is directly related to the level of accuracy of the plan, concurrence with West Plains design and construction criteria and standards, and the thoroughness of addressing written review comments.

**Revisions to  
Plan Based on  
City Comments****4.5**

ESC Plan review comments are to be addressed by the applicant and the revised ESC Plan resubmitted to the City for a follow-up review.

The applicant shall submit a letter or memorandum with the revised ESC Plan summarizing how each review comment was addressed.

If review comments are not addressed, the ESC Plan will not be accepted, and written comments will again be provided to the applicant. This cycle will be repeated as many times as necessary for the applicant to fully address the City's review comments to the satisfaction of City staff.

*Applicants are encouraged to call or meet with City staff to discuss any questions they have regarding the City's review comments or the applicant's proposed responses prior to resubmitting the ESC Plan. This may help to resolve issues quickly and avoid multiple reviews and resubmittals.*



Information

**Additional review fees shall be charged for each resubmittal starting with the third resubmittal.**

**Permit Step 6: After Preliminary Acceptance of the ESC Plan, submit at least 3 sets of the ESC drawings, bound and folded, for signatures, along with the ESC Permit application, permit fee, and fiscal security. Sections 4.6 through 4.9 discuss Step 6.**

**Preliminary  
Acceptance of  
the ESC Plan****4.6**

When all ESC Plan review comments are addressed, the applicants will be notified by the City that the ESC Plan has been preliminarily accepted (final acceptance occurs when additional copies of the ESC drawings are submitted to the City and signed by the Stormwater Coordinator). The City will specify the number of copies of ESC drawings that shall be submitted for the Stormwater Coordinator's signature (typically at least three sets are requested).

***Preliminary Acceptance of the ESC Plan, continued***

Each set of ESC drawings shall be sealed and signed by a professional engineer registered in the State of Missouri, bound and stapled, and then folded to 9 inches by 12 inches. The folded ESC drawings shall be submitted to the City along with the ESC Permit application, permit fee, and fiscal security described in Sections 4.7 through 4.10.

*Once the Engineering Department has notified the applicants that the ESC Plan is accepted, the applicants shall submit the following documents to the City:*

- 1. Specified number of copies of ESC drawings sealed and signed by the Design engineer, bound and stapled, and folded to 9- by 12-inches (see Section 4.6).*
- 2. Completed ESC Permit application (see Section 4.7).*
- 3. Permit fees paid in accordance with Section 4.8.*
- 4. Fiscal Security provided in accordance with Section 4.9.*

***Applying for an ESC Permit***

**4.7**

Once the Engineering Department has notified the applicants that the ESC Plan is accepted, the applicants may apply for an ESC Permit. The ESC 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.

A copy of the ESC Permit application is provided in Appendix H.

***Permit Fees***

**4.8**

Permit fees are to be paid to the Utility Department. Fees may be paid by check or cash. Fees for an ESC Permit consist of a base fee and a per-acre charge and are collected to help offset the costs of administering the ESC program. These fees shall be paid with the submittal of the permit application and other documents shown in Section 4.6.

***Posting Fiscal Security***

**4.9**

West Plains requires that all projects requiring a ESC Permit that have a probable cost of installation of erosion and sediment control of 250 dollars or greater, post fiscal security. This insures the site can be stabilized by the City if the permittee does not fulfill the requirements of the permit within a specified time frame by the City. If the design engineer notes that sensitive areas exist downstream of the land disturbance on the Required Checklist for Preliminary Acceptance of ESC Plan, which is submitted as part of the ESC Plan, the City may require an additional fiscal security to insure that the area is protected. This will ensure the permittee's attempt to protect downstream sensitive areas to the maximum practical extent, which will reduce future litigations with downstream property owners, the City, and permittee's for land disturbance. See section 3.13 for additional information on protecting sensitive areas downstream of the land disturbance.

**Posting Fiscal  
Security,  
continued**

**4.9.1 Amount of Fiscal Security.** The amount of fiscal security for an ESC Permit is based on the probable cost of installing the erosion and sediment controls required on a site and protecting sensitive areas downstream, if required. A copy of a worksheet to be used for preparing the opinion of probable costs for erosion and sediment control is included in Appendix F. If the probable cost is less than 250 dollars, the fiscal security will not be required.

The probable cost worksheet shall be completely filled out and submitted as part of the ESC Plan (see Appendix D for ESC Plan acceptance requirements). The probable cost worksheet will be reviewed for acceptance by the City of West Plains.

**4.9.2 Form of Fiscal Security.** West Plains accepts an Irrevocable Letter of Credit (ILOC). A copy of an approved West Plains ILOC Form is located in Appendix I. The ILOC shall allow for the security to be held until final close-out acceptance. Information regarding the release of fiscal security is provided in Section 6.6.

Subdivisions in the City of West Plains require fiscal security in the form of surety bonds equaling the cost to construct the subdivision infrastructure. This requirement is located in the West Plain Code of Ordinances Chapter 82, Section 132. The amount of surety bond should not include the cost of installation of erosion and sediment controls. The cost of the erosion and sediment controls should be estimated using the probable cost worksheet included in Appendix F of this manual and secured with a ILOC prior to final acceptance of the ESC Plan for the subdivision.

**4.9.3 Expiration of Fiscal Security.** If the construction of the project and/or revegetation process takes longer than 2 years, the permittee shall extend the posted letter of credit a minimum of 14 days prior to the expiration date. Failure to extend the fiscal security, for a minimum of 1 additional year, prior to the 14-day deadline shall result in the City drawing upon the fiscal security.

**Permit Step 7: When ready, obtain the signed ESC drawings.**  
*Sections 4.10 through 4.12 discuss Step 7.*

***Final Acceptance  
of ESC Plan***

**4.10**

**Signed ESC drawings.** The ESC Plan will be considered accepted when the submitted copies of the ESC drawings are signed by the Stormwater Coordinator. Applicants will be notified by the City when the ESC drawings have been signed and are ready to be picked up. Typically, signed ESC drawings will be ready approximately 7 days after the ESC drawings are submitted.

West Plains will retain a set of signed ESC drawings. The number of drawings retained by the City is project-specific.

ESC Plans are considered valid for 2 years following the signature date. After this time, ESC Plans will need to be resubmitted to the City for re-review and re-acceptance.

***Duration of ESC  
Permits***

**4.11**

An ESC Permit is valid for 1 year from the date the permit is granted (the date the ESC Permit application form is signed by the Stormwater Coordinator). An ESC Permit shall be renewed prior to its expiration. The permittee(s) shall contact the City and start the renewal process at least 14 days prior to the original ESC Permit's expiration date.

Permittee(s) shall have a valid ESC Permit until final close-out.

***Transfer of ESC  
Permits***

**4.12**

If a project or portion of a project is sold to a new owner, or if the contractor that is identified on the ESC Permit is replaced by a different contractor, the ESC Permit shall be transferred to the new owner and/or contractor using a specific transfer procedure. The transfer shall require a new ESC Permit application form, payment of a transfer fee, new fiscal security (if new owner), and another preconstruction meeting on-site (the preconstruction meeting is discussed in Section 5.3). Failure to transfer the ESC Permit if the owner or contractor changes will result in issuance of a Stop Work Order, per Section 5.8.3.



## Section 5. Field Section

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### Overview of Section 5

#### 5.0

Section 5 is oriented primarily toward construction field personnel and addresses Steps 8 through 14 in the ESC Permit process.

**Step 8. Select an ESC Manager and ensure that the permittees and their representatives, including field personnel, understand the ESC Permit requirements.**

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

#### **Section Highlight – Implementing the ESC Plan is a Dynamic Process**

Implementing the ESC Plan is a dynamic, not static, process. The permittee(s) is responsible for adapting the original ESC Plan so as to effectively reduce erosion and sediment and comply with any modifications to the plan as required by West Plains.

**Step 9. Preparation for the Preconstruction Meeting.**

Section 5.2, **Preparation for the Preconstruction Meeting**, describes the requirements of the permittee(s) prior to the preconstruction meeting, including selecting the ESC Manager, review of the ESC Plan, review of the ESC Field Manual, completion of Form 1, and the initial BMPs should be installed. Other than the installation of the initial BMPs, no other construction shall start prior to the preconstruction meeting.

**Step 10. Attend the on-site Preconstruction Meeting.**

Section 5.3, **Preconstruction Meeting**, designate the ESC Manager, confirm an understanding of the ESC Permit requirements, review Form 1, review the initial BMPs, and make any corrections required.

**Step 11. Pick up the executed ESC Permit and start construction by first stripping and stockpiling topsoil.**

Section 5.4, **The Executed ESC Permit**, provides guidance for picking up the ESC Permit from the City, the duration that the ESC Permit is valid, and procedures for transferring the ESC Permit.

Section 5.5, **Start of Construction**, summarizes the procedures to be completed at the start of construction.



**Overview of  
Section 5 ,  
continued**

**Step 12. Ensure that General Construction Requirements are complied with.**

Section 5.6, **General Construction Practices**, states practices that contractors should follow to reduce the environmental impact on the site.

**Step 13. Ensure that the mandatory inspections by the City are scheduled and completed and that corrections requested by the City during these or any inspections are made.**

Section 5.7, **City ESC Inspection Process**, discusses inspections related to the City ESC Permitting Program and identifies steps in the construction process that require mandatory inspections and acceptance before work may proceed.

Section 5.8, **Violations and Enforcement**, provides a description of the three levels of violations and the associated Stop Work Order.

**Section Highlight – Stop Work Order**

Permittee(s) committing any Level I Violations listed in Section 5.8.2 will receive a Stop Work Order and have the ESC 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.
- ◆ Reapply for an ESC Permit and pay the ESC Permit fee at the West Plains Utility Office.
- ◆ Schedule a site inspection with the ESC Inspector through the Engineering Department.
- ◆ Obtain a new ESC Permit after approval of the corrected work from an ESC Inspector.



**Step 14. Ensure that the interim and final BMPs are installed at the appropriate times in accordance with the accepted ESC drawings and ESC Manual.**

Section 5.9, **Installation of Interim and Final BMPs**, discusses the general schedule for installing interim and final BMPs.

**Permit Step 8: Select an ESC Manager and ensure that the permittee(s) and their representatives, including field personnel, understand the ESC Permit requirements.**

*Section 5.1 discusses Step 8.*

## **The ESC Manager**

### **5.1**

**5.1.1 Responsibilities of the ESC Manager.** As the permittee(s)' focus shifts from applying for the ESC Permit to constructing the project, the first task is to select an ESC Manager. The ESC Manager is the permittee(s)' contact person with the City for all matters pertaining to the ESC Plan and Permit. The ESC 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 ESC Permit. However, the permittee(s) shall remain the legally responsible party. The ESC Manager shall respond to requests made by the West Plains staff and have any deficiencies in the work corrected.

The ESC Manager is responsible for performing weekly inspections, as well as, inspections no later than 48 hours after a half-inch or more of rainfall in 24 hours until the final BMPs are installed. After the installation of the final BMPs, monthly inspections must be performed until the close of the permit. All inspection reports are to be kept on-site and in a location accessible to a City inspector. In the event that inspection logs are not present, a Level III Violation will be issued.

The ESC Manager and alternate ESC Manager shall be named at the on-site preconstruction meeting discussed in Section 5.3.

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

**5.1.3 Availability of the ESC Manager.** The ESC Manager shall be present at the project site a majority of the time and (along with the alternate ESC Manager) shall provide the City with a 24-hour emergency contact number. In the event the ESC Manager (or alternate ESC Manager) is not on-site, and cannot be reached during any level of violation (see Section 5.8), a Stop Work Order shall be issued.

**5.1.4 Changing the ESC Manager or Alternate.** Notification in writing shall be provided to the City if the ESC Manager or alternate leaves the company or the permittee(s) intend to change personnel. A field meeting with the ESC Inspector and new ESC Manager or alternate shall be scheduled within 7 days of the change to discuss site conditions and responsibilities of the ESC Manager.



**Preparation for the  
Preconstruction  
Meeting**

**5.1.5 Documents that Shall Remain On-Site.** A copy of the ESC drawings, inspection logs, and any project permits shall remain on the site at all times. Once the ESC Permit is obtained, it shall remain on site at all times as well. In the event the required documents are not on-site, a Level III Violation (see Section 5.8) will be issued.

**Permit Step 9: Prepare for preconstruction meeting**  
*Section 5.2 discusses Step 9.*

**5.2**

**5.2.1 Review of the ESC drawings and ESC Field Manual.** Prior to the preconstruction meeting, the ESC Manager shall thoroughly review the ESC drawings and ESC Field Manual. It is the ESC Manager's responsibility to understand all of the requirements of the ESC Permit process as laid out in these documents.

**5.2.2 Fill out Form 1.** Prior to the preconstruction meeting, the ESC Manager and owner/owner's representative shall fill out and sign Form 1 in the back of the ESC Field Manual. This form includes designating responsible parties and states that all final stabilization must occur within 30 days from the starting of earthmoving activities or within 15 days of substantial completion of grading. If these time frames cannot be met, the ESC Manager must present a schedule of completion of stabilization as an attachment to Form 1. This schedule of completion of stabilization must present detailed steps of stabilization in a phased format.

**5.2.3 Installation of Initial BMPs.** The Initial BMPs shown on the ESC drawings shall be installed prior to the on-site preconstruction meeting. The initial BMPs are shown on the Initial BMPs Drawing for ESC Plans.

No formal notification needs to be given to the City to install the initial BMPs, after receiving the signed ESC drawings; however, all of the requirements of the ESC Plan shall be complied with.

**Important!**

*If the permittee(s) begin work on the site (other than installing the Initial BMPs) prior to obtaining an approved ESC Permit, the City will issue a Stop Work Order and assess a fee of three times the ESC Permit fee.*

If the permittee(s) think that modifications to initial BMPs shown on the ESC drawings should be made to provide for a more effective plan, the permittee(s) shall contact the design engineer and West Plains Stormwater Coordinator (see contact information in Appendix A) to obtain acceptance of the proposed modifications prior to installing the BMPs.

**5.2.2 Construction Shall Not Start.** Other than the installation of the initial BMPs shown on the ESC Plan, no stripping operations, haul road grading, or other construction shall occur.

### ***Preparation for the Preconstruction Meeting, continued***

**5.2.3 Scheduling the Preconstruction Meeting.** The permittee(s) shall contact the West Plains Engineering Department (see contact information in Appendix A) to schedule the on-site preconstruction meeting. A 3-day notice (business days, not including Saturdays and Sundays) shall be provided to schedule the meeting.

For instance, if the call to the City takes place before 3:30 pm on a Monday, the preconstruction meeting can be scheduled for Thursday. If the call to the City takes place before 3:30 pm on a Thursday, the preconstruction meeting will be scheduled for the following Tuesday.

***Permit Step 10: Attend the on-site preconstruction meeting, designate the ESC Manager, confirm an understanding of the ESC Permit requirements, review the initial BMPs, and make any corrections required. Section 5.3 discusses Step 10.***

### ***Preconstruction Meeting***

#### **5.3**

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

1. **Owner or Owner's Representative** (the contractor may **NOT** be the owner's representative).
2. **General Contractor.**
3. **ESC Manager and Alternate ESC 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 City or the permittee(s) determine that modifications to the ESC Plan are necessary).

**5.3.2 General Meeting Agenda.** The following agenda items are addressed at the preconstruction meeting.

1. **Introductions.** Introductions of all attendees, including the ESC Manager and alternate ESC Manager, will take place.

**Important!** *If one of the mandatory attendees does not attend the preconstruction meeting, if the accepted ESC Plans are not in the ESC Manager's possession, or if the installation of the Initial BMPs is not approved by the ESC Inspector, the meeting shall be rescheduled and the applicant will be assessed a \$50.00 reinspection fee. The fee shall be paid at the West Plains Engineering office prior to scheduling another preconstruction meeting.*

**Preconstruction Meeting, continued**

2. **Contact Information.** Attendees will exchange contact information.
3. **Field Review of ESC drawings.** The ESC drawings for all stages and phases will be reviewed to confirm the attendees' understanding of the ESC Plan and to discuss any modifications to the plan. If modifications to the ESC 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 Stormwater Coordinator. Limits of construction and topsoil stripping limits shall be confirmed.
4. **Acceptance of Form 1.** Form 1 will be reviewed to ensure that it is filled out and signed. Form 1 states that if all final stabilization will not occur within 30 days from the start of earthmoving activities or within 15 days of substantial completion of grading, a schedule of completion of stabilization is required and will be reviewed to ensure that it presents detailed steps of stabilization in a phased format.
5. **Inspection of Initial BMPs.** A visual inspection of all of the initial BMPs that have been installed will take place. The ESC Inspector will confirm if any corrections are required.
6. **Acceptance of Initial BMPs and Form 1.** If the initial BMPs and Form 1 are accepted by the ESC Inspector, as is or with minor corrections, the ESC Inspector will inform the permittee(s), sign the ESC Permit application, and submit the ESC Permit application to the Engineering Department for processing. **Construction shall not start until an executed ESC Permit is obtained from the City as described in Section 5.4.**

**5.3.3 Corrections to the BMPs or Major Revisions to Schedule.** If the ESC Inspector determines that significant modifications or corrections to the BMPs are necessary, the ESC Inspector will inform the permittee(s) that such corrections shall be made, that a follow-up inspection shall be scheduled with the City, and that acceptance of the corrected BMPs by the ESC Inspector shall take place prior to the signing of the ESC Permit or prior to any additional inspections. If schedule completion of stabilization is required and major revisions are needed to the schedule, the ESC Manager will be required to submit a revised schedule prior to the inspector signing ESC Permit application. Modifications to the ESC drawings will, in most cases, require acceptance of the design engineer who sealed and signed the ESC drawings. The re-inspection requires a 1-day notice (by 3:30 pm the weekday prior to the inspection) and shall be scheduled with the Engineering Department (contact information is listed in Appendix A).

**Permit Step 11: Pick up the executed ESC Permit and start construction by first stripping and stockpiling topsoil.**  
*Section 5.4 and Section 5.5 discuss Step 11.*

## 5.4

**5.4.1 Pick Up the Executed ESC Permit.** West Plains will execute the ESC Permit generally within 24 hours after the signing of the ESC Permit application by the ESC inspector (either at the preconstruction meeting or at a follow-up inspection). Once the permittee(s) picks up the exe-



### ***The Executed ESC Permit***

cuted ESC Permit, construction can start.

**5.4.2 Duration of ESC Permit.** An ESC Permit is valid for 1 year from the date the ESC Permit is granted (the date the ESC Permit is executed). An ESC Permit shall be renewed prior to its expiration. The permittee(s) shall contact the City and start the renewal process at least 14 days prior to the original ESC Permit's expiration date. Permittee(s) shall have a valid ESC Permit until final close-out acceptance (after revegetation is established).

**5.4.3 Transfer of an ESC Permit.** If a project or portion of a project is sold to a new owner, or if the contractor that is identified on the ESC Permit is replaced by a different contractor, the ESC Permit shall be transferred to the new owner and/or contractor using a specific transfer procedure. The transfer shall require a new ESC Permit application, payment of a transfer fee, new fiscal security (if new owner), and an additional preconstruction meeting on-site (the preconstruction meeting is discussed in Section 5.4). Failure to transfer the ESC Permit, if the owner or contractor changes, will result in issuance of a Stop Work Order per Section 5.8.3.

### ***Start of Construction***

## **5.5**

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

Topsoil stripping and replacement is critical to the successful reestablishment of vegetation after a project is constructed. Topsoil shall be stripped to a depth of 6 inches unless otherwise accepted by the ESC Inspector. Woody material in the area to be stripped shall be removed prior to stripping, but grasses shall be left in the topsoil layer to be stripped. Before burning material on-site, the West Plains Fire Department should be contacted and an MDNR burn permit may be required. Wood material may also be chipped and used on-site as a mulch and possible erosion and sediment control if construction details are included in the ESC drawings and approved by the Stormwater Coordinator.

**5.5.2 Topsoil Stockpiles.** Topsoil stockpiles (as well as stockpiles of excess excavated material that may be generated later) shall have side slopes no steeper than 3 (horizontal) to 1 (vertical) and be placed in the area indicated on the ESC drawings.

**5.5.3 Topsoil Inspection.** The permittee(s) shall call the Engineering Department (see contact information in Appendix A) to schedule an inspection after the topsoil is stripped and stockpiled. Failure to strip,

**General  
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Practices**

stockpile, and obtain an inspection from the ESC Inspector shall result in the issuance of a Stop Work Order (see Section 5.10). If inadequate quantities of topsoil have been stockpiled (sufficient to replace at least 4 inches of topsoil in all areas to receive vegetation), the permittee(s) shall import an adequate quantity of topsoil to the site. The Stop Work Order shall remain in place until adequate, acceptable topsoil is imported to the site.

**Permit Step 12: Ensure General Construction Practices are complied with.**  
Section 5.6 discusses Step 12.

**5.6**

**5.6.1 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.<sup>1</sup> 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. 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, power tools, and general equipment maintenance. Specific petroleum pollutants include gasoline, diesel oil, kerosene, lubricating oils, and grease. Asphalt paving can also be particularly harmful since it releases various oils for a considerable amount of time after application.

**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 during land clearing and structure installation. Other wastes include wood and paper from packaging and building materials, scrap metals, sanitary wastes, rubber, plastic, 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.

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Construction  
Practices,  
continued**

**5.6.2 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 and 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.

**5.6.3 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.



*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**

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

**5.6.12 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.



**5.6.13 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, 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.

**5.6.14 Spills Response.** All hazardous wastes that are transported, stored, or used for maintenance, cleaning, or repair shall be managed according to the provisions of the Missouri Hazardous Waste Laws and Regulations. It is required by state law that spills of a petroleum product in excess of 50 gallons be reported to the MDNR. Federal law requires the responsible party to report any release of oil if it reaches or threatens a sewer, lake, creek, stream, river, groundwater, wetland, or area like a road ditch that drains into one of the above. Failure to report and clean up any spill shall result in issuance of a Stop Work Order. Spills released onto soil should be dug up and properly disposed of, while spills on pavement should be absorbed with sawdust, kitty litter, or another product designed for that purpose.



**Permit Step 13: Ensure that the mandatory inspections by the City are scheduled and completed and that corrections requested by the City during these or any inspections are made.**

*Section 5.7 and Section 5.8 discuss Step 13.*

### **ESC Inspection Process**

**City Ordinance Chapter 94 Division 2 – Land Disturbance**, allows agents of the City to enter the project site and conduct regular inspections to ensure compliance with City regulations.

## **5.7**

**5.7.1 ESC Inspections.** During the construction phase, erosion and sediment controls will be inspected regularly by the ESC Manager. The ESC Manager 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. The site must be inspected at least once per 7 calendar days, as well as, no later than 48 hours after a rainfall event of 1.5 inch or more of rainfall in 24 hours.

It is the responsibility of the ESC Manager to ensure that regular inspections are performed, the site is maintained, and all records are kept. The City will perform quality assurance by performing random inspections in addition to mandatory City inspections to ensure the ESC Manager is performing the required quality control inspections. During these quality assurance inspections the City inspector will also perform his/her own inspection of the ESC BMPs. If sediment appears to be leaving the site or the City takes stormwater samples that read greater than 280 nephelometric turbidity units (NTUs) in the stormwater sample that has been taken when less than 3.51 inches of rainfall in a 24-hour period, the City will require the ESC Manager to request a revision to the ESC drawing by the design engineer.

If problems are found on the site, they must be corrected within 48 hours. It is recommended that inspections are performed on Wednesday each week so that problems can be fixed by Friday of the same week.

**5.7.2 Mandatory City Inspections.** The permittee(s) shall call the Engineering Department (contact information is shown in Appendix A) to schedule the following mandatory inspections:

1. Preconstruction meeting/inspection of initial BMPs.
2. Topsoil inspection after topsoil is stripped and stockpiled.
3. Anytime during construction when a new ESC Manager or alternate ESC Manager is chosen.
4. Initial close-out inspection.
5. Vegetation acceptance inspection.
6. Final close-out inspection



**ESC Inspection Process, continued**

7. Two years after final inspection, or when grass has reached the required vegetative cover in accordance with Section 6, prior to removal of on-site BMPs.
8. For staged and phased ESC Plans where more than 40 acres needs to be disturbed, and where work occurs in multiple grading phases.

All inspections shall be coordinated through the West Plains Engineering Department. All inspection requests need to be called into the Engineering Department by 3:30 pm the day before the inspection (3 business days prior to the inspection for the preconstruction meeting).

**Violations and Enforcement****5.8**

**5.8.1 Penalties and Enforcement.** Failure to comply with any term, condition, limit, deadline or other provision of the ESC Permit or failure to obtain an ESC Permit, constitutes a violation of the West Plains Land Disturbance Ordinance and may constitute a violation of state and federal laws as well.

In addition to any other legal or equitable remedies that the City may have for ESC Permit violations, the City may cease issuances of all building permit approvals and other permissions until such violation is corrected and the permittee(s) takes additional steps to ensure compliance with the ESC Permit.

**5.8.2 Levels of Violations.** West Plains classifies violations in three categories, depending on the severity of the violation. Enforcement action varies for each category. Level I Violations have the most severe impact on people and the environment, and Level III Violations have the least severe impact. It is important to note that if a Level II or Level III Violation is not resolved in the time required by the City, it may become a Level I or Level II Violation.

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

**Important!**

*Violations to the Clean Water Act shall be subject to civil penalties of up to \$32,500 per day.*

- *Clearing, grubbing, or grading without a West Plains ESC Permit.*
- *Failure to schedule a preconstruction meeting.*
- *Failure to be able to contact the ESC Manager or alternate ESC Manager during any level of violation.*
- *Failure to restrict operations to approved limits of construction.*
- *Failure to clean up the tracking of material onto roadways and adjacent paved areas.*
- *Exporting material to or importing material from a non-permitted site.*
- *Exporting/importing soil material without a variance.*
- *Failure to follow an approved phasing plan.*
- *Failure to correct Level II Violations per the directives of the ESC Inspector.*

**Violations and Enforcement, continued**

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

- *Tracking of material onto roadways and adjacent paved areas.*
- *Failure to make required plan revisions.*
- *Failure to perform BMP maintenance as directed by the West Plains ESC Inspector.*
- *Failure to correct Level III Violations per the directives of the ESC Inspector.*

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

- *Failure to provide routine maintenance for erosion and sediment controls.*
- *Installation of non-West Plains-accepted erosion and sediment control BMPs.*
- *Failure to provide temporary inlet protection within 48 hours of pouring of inlet.*
- *Failure to provide inlet protection within 48 hours of placement of asphalt or concrete pavement.*
- *Staging of equipment outside of the stabilized staging area.*
- *Failure to have accepted ESC Permit, ESC drawings, and inspection forms on-site.*
- *Failure to follow schedule of installation of BMPs in ESC drawings for interim and final BMPs.*



**5.8.3 Stop Work Orders.** The Stormwater Coordinator, or his/her designated representative, is authorized to order work to be stopped on any project that disturbs the land and is not in compliance with the requirements of the ESC Permit. **When a Stop Work Order is issued, the ESC Permit for that project is revoked.** In addition, the MDNR maybe 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

**Violations and Enforcement, continued**

permittee(s) shall inform the ESC Inspector of such activities. The permittee(s) shall do the following to reinstate an ESC Permit and resume work on the site:

1. Correct the deficient practices that precipitated the Stop Work Order.
2. Reapply for an ESC Permit and pay the permit fee at the West Plains Engineering Department.
3. Call the Engineering Department to schedule a site inspection.
4. Obtain a new ESC Permit after approval of the corrected work from an ESC Inspector.

***If a permittee works without an ESC Permit, a fee of three times the permit fee will be assessed. This fee shall apply each time the project is found to be working without, or prior to issuance of, an ESC Permit. The City will enforce the ESC Permit, ESC Plan, and Stop Work Order through any available means.***

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

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

- *Permittee(s) fails to properly install all initial BMPs prior to the scheduled preconstruction meeting.*
- *The required attendees fail to attend the scheduled preconstruction meeting.*
- *Permittee(s) fails to have the ESC drawings on-site during the preconstruction meeting.*
- *Permittee(s) receives a Stop Work Order (fee consists of new permit fee in this case).*
- *Permittee(s) fails to obtain vegetation acceptance from the City prior to requesting a final release of fiscal security.*
- *Permittee(s) removes any BMPs prior to receiving authorization by West Plains.*
- *ESC Inspector finds violations of ESC Permit requirements during routine inspections.*
- *Failure to cancel any inspection before 3:30 pm the day prior to a scheduled inspection in the event that a site is not ready for an inspection.*

***Permit Step 14: Ensure that the interim and final BMPs are installed at the appropriate times in accordance with the accepted ESC drawings and ESC Manual.***

*Section 5.11 discusses Step 14.*

***Installation of  
Interim and  
Final BMPs***

**5.9**

It is the responsibility of the ESC 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 ESC drawings

## Section 6. Project Acceptance and Close-Out

### Overview of Section 6

#### 6.0

#### **Permit Steps 15 through 20: Project Acceptance and Close-Out**

*Section 6 addresses the following steps in the ESC Permit process.*

**Step 15. Prepare the site for the initial close-out inspection and schedule the inspection at least two weeks prior to an anticipated request for closing a building permit and allowing occupancy.**

*Section 6.1, **Preparation for the Initial Close-Out Inspection**, describes the tasks the permittee(s) must complete prior to the close-out inspection.*

**Step 16. Attend initial close-out inspection, make any corrections requested by the City, and obtain initial close-out acceptance.**

*Section 6.2, **Initial Close-Out Acceptance**, discusses the requirements for the initial close-out inspection and acceptance.*

**Step 17. 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 West Plains.**

*Section 6.3, **Establishment of Vegetation**, describes procedures for accepting the establishment of permanent vegetation; it also provides a definition of the required vegetation coverage, free of noxious weeds.*

**Step 18. Schedule the vegetation acceptance inspection when vegetative growth has reached the required coverage.**

*Section 6.4, **Acceptance of Vegetation**, requires that once vegetation has reached the required coverage as defined in Section 6.3, a vegetation acceptance inspection should be scheduled.*

**Step 19. After receiving written acceptance of vegetation establishment from the City, remove the on-site BMPs and schedule the final close-out inspection.**

*Section 6.5, **Final Close-Out Inspection**, all on-site BMPs shall be removed and the final close-out inspection scheduled.*

**Step 20. After receiving written notice from the City that all ESC requirements have been addressed, submit a signed Fiscal Security Release Form to the City. After the fiscal security is released by the City, the project is complete.**

*Section 6.6, **Release of Fiscal Security**, discusses the procedures for releasing the project's fiscal security.*

*Section 6.7, **Revocation of Fiscal Security for Default by Permittee(s)**, procedures are described where the City revokes the developer's fiscal security and uses the funds to complete the ESC requirements.*



**Permit Step 15: Prepare the site for the initial close-out inspection and schedule the inspection at least two weeks prior to an anticipated request for closing a building permit and allowing occupancy.**  
*Section 6.1 discusses Step 15.*

**Preparation for Initial Close-out Inspection**

**6.1**

**6.1.1 Preparing for Inspection.** In preparation for the initial ESC acceptance inspection prior to the permittee(s) leaving the site, the ESC Manager shall undertake the following:

1. Clean all streets, sidewalks, and flowlines of sediment with a street sweeper or other approved means. **WASHING OF STREETS, SIDEWALKS, AND FLOWLINES IS IN DIRECT VIOLATION OF WEST PLAINS CRITERIA.** Clean all inlets, trickle channels, and all other drainage features.
2. Remove temporary erosion and sediment controls (if directed by approved ESC Plan or ESC Inspector) and install/maintain erosion and sediment control BMPs per the West Plains-approved final ESC Plan.
3. Ensure that all disturbed areas are seeded and mulched, or otherwise stabilized, per West Plains criteria.



**6.1.2 Scheduling the Inspection.**

Once all items are completed, the ESC Manager shall call the West Plains Engineering Department prior to 3:30 pm the day before the inspection and schedule an initial close-out acceptance inspection. To allow time for the resolution of issues, the initial close-out acceptance inspections should be scheduled a minimum of 2 weeks prior to a scheduled request for closing a building permit and allowing occupancy.

**Important!** *It is imperative that the items listed above are completed per this ESC 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 new building permits or the closing of existing building permits and allowing occupancy.*

### Initial Close-Out Acceptance

**Permit Step 16: Attend the initial close-out inspection, make any corrections requested by the City, and obtain initial close-out acceptance.**  
*Section 6.2 discusses Step 16.*

#### 6.2

**6.2.1 Attendees.** Representatives of the permittee(s), including the ESC Manager, shall attend the initial close-out inspection along with the ESC Inspector.

**6.2.2 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 seeding and mulching.
- **Inspection of Site Cleanup.** Cleanup of the site and adjoining streets is checked.
- **Discussion of Vegetation Requirements.** The required vegetation inspections and coverage are described.

**6.2.3 Corrections to Site.** The permittee(s) shall make any corrections to the site as requested by the City ESC Inspector. If the corrections are substantial, the ESC Inspector may require a follow-up inspection to be scheduled prior to issuing initial close-out acceptance.

**Permit Step 17: 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 West Plains.**  
*Section 6.3 discusses Step 17.*

### Establishment of Vegetation

#### 6.3

**6.3.1 Required Inspections and Maintenance.** The permittee(s) shall undertake the following inspections and maintenance operations. In addition, the ESC Inspector will make periodic inspections of the revegetation area.

***Inspection and maintenance requirements include the following:***

1. *Seeded and mulched areas shall be inspected monthly by the permittee(s) until a written acceptance of vegetation is received from the City. Repairs and reseeding and mulching shall be undertaken at least twice per year, or as requested by the ESC Inspector, for any areas failing to meet the required coverage.*
2. *Rill and gully erosion shall be filled with topsoil prior to reseeding. The reseeding method shall be approved by the City.*
3. *Noxious weeds shall be controlled in a manner approved by the West Plains Stormwater Coordinator.*

**6.3.2 Required Vegetation Coverage.** Required vegetation coverage is defined as follows:

***Required coverage for vegetative 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 by 2 feet or equivalent.*
- 3. Free of eroded areas.*
- 4. Free from infestation of noxious weeds.*



*Full vegetation coverage is required prior to release of fiscal security.*

**Permit Step 18: Schedule the vegetation acceptance inspection when vegetative growth has reached the required coverage.**

*Section 6.4 discusses Step 18.*

### **Acceptance of Vegetation**

#### **6.4**

**6.4.1 Vegetation Acceptance Inspection.** Once vegetation has reached the required coverage as defined in Section 6.3.2, the permittee(s) shall call the Engineering Department (contact information is shown in Appendix A) to schedule a vegetation acceptance inspection.

**6.4.2 Written Acceptance.** The ESC 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 ESC 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.

**Permit Step 19: After receiving written acceptance of vegetation establishment from the City, remove the on-site BMPs and schedule the final close-out inspection.**

*Section 6.5 discusses Step 19.*

### **Final Close-Out Inspection**

#### **6.5**

**6.5.1 Removal of On-site BMPs.** After obtaining written acceptance of the vegetation coverage, the remaining on-site BMPs shall be removed and properly disposed. The site shall be cleaned up and any areas disturbed as a result of the BMP removal shall be seeded and mulched. The final close-out inspection shall then be scheduled with the City.

**6.5.2 Final Close-out Inspection.** The ESC 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 ESC Inspector may require that a follow-up inspection be scheduled with the City.

**Permit Step 20: After receiving written notice from the City that all ESC requirements have been addressed, submit a signed Fiscal Security Release Form to the City. After the fiscal security is released by the City, the project is complete.**  
*Section 6.6 and Section 6.7 discuss Step 20.*

### **Release of Fiscal Security**

#### **6.6**

Once final close-out acceptance has been obtained, the permittee(s) may submit a copy of all ESC Manager Inspection Reports and a Release of Erosion and Sediment Control Fiscal Security Request Form to the West Plains Engineering Department. A copy of this form is included in Appendix J. After the Engineering Department has received a completed request form, it will be signed-off by the ESC Inspector and the project's fiscal security will be released.

### **Revocation of Fiscal Security for Default by Permittee(s)**

#### **6.7**

**6.7.1 Default by Permittee(s).** In the event that there is a default by the permittee(s) of any of the requirements of the ESC Permit, ESC Plan, and/or *ESC Manual*, remedies will be in accordance with the remedies identified in this *ESC Manual* and any other remedies provided by law.

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

#### **Default Conditions:**

- (a) *Permittee(s) fails to construct the improvements in substantial compliance with the ESC Plan and the other requirements of the ESC Permit;*
- (b) *Permittee(s) fails to complete construction of the ESC improvements by the completion date provided in schedule of completion in Form 1, the ESC Plan or Permit as the same may be extended;*
- (c) *Permittee(s) fails to cure any noncompliance specified in any written notice of noncompliance within the timeframe specified in the notice;*
- (d) *Permittee(s) otherwise breaches or fails to comply with any obligation of the ESC Permit;*
- (e) *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;*
- (f) *Permittee(s) fails to maintain in full force and effect a letter of credit in the amounts specified above or in the ESC Permit.*



**Revocation of  
Fiscal Security  
for Default by  
Permittee(s),  
continued**

**6.7.2 Notice of Default.** If the Stormwater Coordinator, or representative of the Stormwater Coordinator, gives notice that a default by the permittee(s) exists, and if the permittee(s) fails to cure such default within the time specified by the Stormwater Coordinator, the City shall be entitled to: (a) make a draw on the letter of credit for the amount reasonably determined by the City to be necessary to cure the default in a manner consistent with the approved ESC Plan up to the face amount of the letter of credit; and (b) sue the permittee(s) for recovery of any amount necessary to cure the default over and above the amount available under the letter of credit.

**6.7.3 City Right to Complete Improvements.** The City shall have the right to complete the ESC improvements in substantial accordance with the ESC Plan, the opinion of probable costs, and other requirements of this *ESC Manual*. It can do this either itself, by contract with a third party, or by assignment of its rights to a successor permittee(s) who has acquired the property by purchase, foreclosure, or otherwise. The City, any contractor under contract with the City, or any such successor permittee(s), their agents, subcontractors, and employees shall have the nonexclusive right to enter upon the subject property for the purpose of completing the ESC improvements.

**6.7.4 Use of Funds by City.** Any funds obtained by the City under a letter of credit, or recovered by the City from the permittee(s) by suit or otherwise, will be used by the City to pay the costs of completion of the ESC improvements substantially in accordance with the ESC Plan and the other requirements of this *ESC Manual*. The funds will also be used to pay the reasonable costs and expenses of the City in connection with the default by the permittee(s), including reasonable attorneys' fees, with the surplus, if any, to be returned to the permittee(s).

## Section 7. Acronyms and Glossary

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### **Acronyms**

Following is a list of acronyms used in this manual.

<b>BMP</b>	Best Management Practice
<b>CD</b>	Check Dam
<b>CF</b>	Construction Fence
<b>CFR</b>	Code of Federal Regulations
<b>CFS</b>	Cubic Feet Per Second
<b>CL</b>	Crest Length
<b>CM</b>	Construction Markers
<b>CWA</b>	Concrete Washout Area
<b>D</b>	Depth, Diameter
<b>DD</b>	Diversion Ditch
<b>DW</b>	Dewatering
<b>FEMA</b>	Federal Emergency Management Agency
<b>ESC</b>	Erosion and Sediment Control
<b>HD</b>	Hole Diameter
<b>ILOC</b>	Irrevocable Letter of Credit
<b>IP</b>	Inlet Protection
<b>L</b>	Length
<b>LOC</b>	Limits of Construction
<b>MDNR</b>	Missouri Department of Natural Resources
<b>MEP</b>	Maximum Extent Practicable
<b>MS4</b>	Municipal Separate Storm Sewer System
<b>NPDES</b>	National Pollutant Discharge Elimination System
<b>PE</b>	Professional Engineer
<b>RRB</b>	Reinforced Rock Berm
<b>RRC</b>	Reinforced Rock Berm for Culvert Protection
<b>RECP</b>	Rolled Erosion Control Product
<b>SB</b>	Sediment Basin
<b>SF</b>	Silt Fence
<b>SM</b>	Seeding and Mulching
<b>SR</b>	Surface Roughening
<b>SSA</b>	Stabilized Staging Area
<b>ST</b>	Sediment Trap
<b>SWMCP</b>	Stormwater Management Concept Plan
<b>SWMDP</b>	Stormwater Management Design Plan
<b>TER</b>	Terracing
<b>TSC</b>	Temporary Stream Crossing
<b>TSD</b>	Temporary Slope Drain
<b>VTC</b>	Vehicle Tracking Control
<b>WW</b>	Vehicle Tracking Control with Wheel Wash

### ***Glossary of Terms***

Following is a glossary of some of the terms used in this manual.

**Administrative Variance** refers to variances that are considered by the West Plains Engineering Department to be complicated and which will require a more extensive review. These administrative variances shall be reviewed by the City Engineer.

**Aggradation** refers to the deposition of sediment in a stream in a manner and extent that the bed elevation of the stream rises.

**Applicant(s)** refers to the owner and contractor who complete and sign the Erosion and Sediment Control (ESC) Permit application.

**Alternate Erosion and Sediment Control (ESC) Manager** refers to an on-site representative who serves, in the absence of the ESC Manager, as the permittee(s) contact person with the City and who is responsible for ongoing compliance with the ESC Permit.

**Best Management Practice (BMP)** refers in this manual to a measure implemented by a contractor to control construction site erosion or sediment.

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

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

**Construction** refers to the implementation of a proposed plan of improvements by a contractor that may include excavating, site grading, utility work, paving, building, and other activities that may contribute to the disturbance of land and elevated levels of erosion and sediment.

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

**Construction Markers (CM)** consist of wooden lath or other markers, with tops painted orange, spaced at 100-foot centers to delineate limits of construction. Construction markers may be used as an alternative to construction fence if approved by the City.

**Culvert Inlet Filter (CIF)** consists of a reinforced rock berm placed in front of a culvert to reduce sediment in runoff approaching the culvert.

**Degradation** refers to erosion of bed material from the bottom of a stream leading to a lowering of the channel invert.

### ***Glossary of Terms, continued***

**Design Engineer** refers to the professional engineer responsible for the development of the ESC Plan.

**Development** refers to the process of creating new residential, commercial, office, or other land uses through the process of construction.

**Dewatering (DW)** consists of a gravel filter provided on the suction end of a pump to reduce the pumping of sediment and a rip rap pad at the discharge end of the pump to provide erosion protection. Dewatering includes settling the discharge water in a small basin or sediment pond before releasing to receiving waters.

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

**Drainageway** is any natural or artificial watercourse, including but not limited to streams, rivers, creeks, ditches, channels. Canals, waterways, gullies, ravines, or washes in which water flows in a definite direction or course, either continuously or intermittently, including any area adjacent to it that is subject to inundation by reason of overflow or floodwater and meets any of the following conditions:

- Provides for conveyance of stormwater runoff from an upstream property or development,
- Defined as “waters of the United States” by the U.S. Army Corps of Engineers,
- Supports riparian area or sensitive habitat,
- Tributary area equal to or greater than 20 acres,
- Alteration or filling will change the manner in which runoff is discharged onto a downstream property and potentially results in a negative impact to that downstream property,

**Erosion** is the process by which the land surface is worn away by the action of wind, water, ice, and gravity.

**Export** means transporting material from a construction site to another location.

**Eutrophication** refers to the degradation in water quality of a lake or reservoir due to accelerated algal productivity, often a result of increased nutrient loading.

**Fiscal Security** refers to a irrevocable letter of credit that an owner submits to West Plains to be held as security during the construction process and to be drawn upon in the case of nonperformance on the part of the permittee(s).

**Erosion and Sediment Control (ESC) Drawings** refers to the illustra-

### ***Glossary of Terms, continued***

tive portion of the ESC Plan which show the location and extent of all erosion and sediment control BMPs as well as other associated information required by the *ESC Manual*.

**Erosion and Sediment Control (ESC) Inspector** refers to the City representative who visits construction sites to check for compliance with the ESC Permit.

**Erosion and Sediment Control (ESC) Manager** refers to an on-site representative who serves as the permittee(s) contact person with the City and who is responsible for ongoing compliance with the ESC Permit.

**Erosion and Sediment Control (ESC) Permit** refers to the permit obtained from West Plains Engineering prior to commencement of land-disturbing activities as defined in the West Plains *ESC Manual*.

**Erosion and Sediment Control (ESC) Permit Process** refers to the process applicants proceed through to obtain a permit to commence land-disturbing activities within West Plains.

**Erosion and Sediment Control (ESC) Permit Program** refers to the program developed and administered by West Plains to regulate land-disturbing activities within the unincorporated limits of West Plains.

**Erosion and Sediment Control (ESC) Plan** refers to the complete package of required information submitted to the West Plains Engineering Department for review and acceptance which include ESC drawings, ESC report, ESC Drawing and Report Checklist, and Option of Probable Cost Example Worksheet.

**Erosion and Sediment Control (ESC) Report** refers to the report required to be submitted with the ESC Plan that details all aspects of the ESC Plan.

**Import** means transporting material from an off-site area to the project site to be used as fill.

**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 entering the inlet.

**Level I Violations** are viewed by West Plains to pose an immediate serious risk to the health safety or welfare of people and/or the environment and result in an immediate issuance of a stop work order.

**Level II Violations** are viewed by West Plains to pose a moderate immediate risk to the health safety or welfare of people and/or the environment; however, if not immediately corrected, will pose a serious risk. Remediation for Level II Violations shall commence immediately after the permittees are notified of the violation(s).



### *Glossary of Terms, continued*

**Level III Violations** are viewed by West Plains to pose a low immediate risk to the health safety or welfare of people and/or the environment; however, if not corrected quickly, will pose a more serious risk. Level III Violations shall be corrected within 48 hours of inspection unless otherwise specified in writing by the ESC Inspector.

**Limits of Construction** refers to the area shown on the ESC Plan that delineates areas in which construction activities can take place including staging, storage, and stockpiling.

**Permittee(s)** refers to the owner and contractor whom obtains an ESC Permit.

**Professional Engineer** refers to an individual currently registered with the Missouri State Board of Registration as a professional engineer, practicing engineering in accordance with state law.

**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 as well as reducing flow velocities.

**Rolled Erosion Control Product (RECP)** is a fibrous blanket of straw, jute, excelsior, or coconut material trenched in and staked down over prepared, seeded soil. The matting reduces both wind and water erosion.

**Rivulet** refers to the onset of flow concentrations in small depressions or creases in the soil surface as flow transitions from sheet flow to rill flow.

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

**Sediment Control Log (SCL)** refers to a cylindrical bundle of excelsior, straw, or coconut designed to form a semi-porous filter, able to withstand overtopping, and promote sediment deposition on the upstream side and reducing flow velocities.

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

**Sedimentation** means the deposition of soil particles dislodged by erosion.

**Seeding and Mulching (SM)** consists of seeding disturbed areas with permanent grasses and spreading 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.

### *Glossary of Terms, continued*

**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.

**Stabilized Staging Area (SSA)** refers to 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.

**Stage of Construction** refers to the initial, interim, or the final stage of construction; BMPs are to be shown on the ESC Plan as being installed at one of these three stages.

**Standard BMPs** refers to any one of a number of BMPs that have been approved for use in the City and for which standard notes and details have been prepared. Any other BMP is considered nonstandard and must be approved by the Stormwater Coordinator.

**Staff Variance** refers to a variance that is considered by the West Plains Engineering Department to be minor in nature; these staff variances may be considered by the West Plains Engineering Department's Development Review Engineer and Development Review Manager.

**Stop Work Order** refers to a written notice provided by City's ESC Inspector that revokes an ESC Permit as a result of a priority violation; Contractors receiving a Stop Work Order shall cease construction operations until the problem is addressed and a signed Stop Work Order Release Form is obtained.

**Stormwater** means runoff generated as a result of a precipitation event.

**Stormwater Coordinator** refers to the person within the Engineering Department of the City of West Plains that has the authority and responsibility to manage, enforce, and regulate stream buffer activities within the City of West Plains.

**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.

### ***Glossary of Terms, continued***

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

**Temporary Stream Crossing (TSC)** refers to a 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. In either case, excavation of the existing channel banks is to be avoided and, in general, disturbance is to be kept to a minimum.

**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.

**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.

**Vehicle Tracking Control with Wheel Wash (WW)** consists of a gravel and riprap pad at the main entrance/exit point for the site with an adjacent washwater/sediment trap. If West Plains requires a permittee(s) 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.

## Section 8. Bibliography

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*Revisions and  
Updates to  
Manual*

This section is intended to provide a location for any revisions and updates to the information in the manual that may be made available by West Plains prior to the complete republishing of the manual.

Any revisions will be dated and will refer back to the section that they modify. It is suggested that revisions be kept in chronological order within this section.



## Appendices

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### *List of Appendices*

Appendix A	Contact List
Appendix B	ESC Plan General Notes and Details
Appendix C	Example ESC Drawings
Appendix D	Required Checklist for Preliminary Acceptance of ESC Plan
Appendix E	West Plains ESC Acceptance Block
Appendix F	Opinion of Probable Cost Example Spreadsheet
Appendix G	ESC Inspection Forms
Appendix H	ESC Permit Application
Appendix I	Irrevocable Letter of Credit Form
Appendix J	Release of Fiscal Security Request Form
Appendix K	ESC Permit Fees

*Appendix A*

**Contact List**

## **Contact Information**

(Information is subject to change)

West Plains Engineering Department  
Stormwater Coordinator  
City Hall  
P.O. Box 710  
West Plains, MO 65775-0710  
Phone: (417) 256-7176

Missouri Department of Natural Resources  
Howell County Satellite Office  
906 Springfield Road  
Willow Springs, MO 65793  
Phone and Fax: (417) 469-0025

Missouri Department of Natural Resources  
Southeast Regional Office  
2155 N. Westwood Blvd.  
Poplar Bluff, MO 63901  
Phone: (573) 840-9750  
Fax: (573) 840-9754

U.S. Army Corps of Engineers-Little Rock District  
CESWL-RO  
P.O. BOX 867  
Little Rock, AR  
72203-0867  
Phone: (501) 324-5295  
Fax: (501) 324-6013

Missouri Department of Natural Resources  
Division of Geology and Land Survey (DGLS)  
Environmental Geology Section  
P.O. BOX 250  
Rolla, MO 65402  
Phone: (573) 368-2161  
Fax: (573) 368-2111

*Appendix B*

**ESC Plan**

**General Notes and Details**

EROSION AND SEDIMENT CONTROL (ESC) GENERAL NOTES

1. THE WEST PLAINS STORMWATER COORDINATOR’S SIGNATURE AFFIXED TO THIS DOCUMENT INDICATES THE ENGINEERING DEPARTMENT HAS REVIEWED THE DOCUMENT AND FOUND IT IN GENERAL COMPLIANCE WITH THE WEST PLAINS REGULATIONS AND THE EROSION AND SEDIMENT CONTROL (ESC) MANUAL. THE WEST PLAINS ENGINEERING DEPARTMENT, THROUGH ACCEPTANCE OF THIS DOCUMENT, ASSUMES NO RESPONSIBILITY (OTHER THAN AS STATED ABOVE) FOR THE COMPLETENESS AND/OR ACCURACY OF THESE DOCUMENTS.
2. THE ADEQUACY OF THIS ESC PLAN LIES WITH THE ORIGINAL DESIGN ENGINEER.
3. THE ESC PLAN SHALL BE CONSIDERED VALID FOR TWO (2) YEARS FROM THE DATE OF ACCEPTANCE BY WEST PLAINS, AFTER WHICH TIME THE PLAN SHALL BE VOID AND WILL BE SUBJECT TO RE–REVIEW AND RE–ACCEPTANCE BY WEST PLAINS.
4. ALL MATERIALS AND WORKMANSHIP SHALL BE SUBJECT TO INSPECTION BY THE WEST PLAINS ENGINEERING DEPARTMENT. WEST PLAINS RESERVES THE RIGHT TO ACCEPT OR REJECT ANY SUCH MATERIALS AND WORKMANSHIP THAT DOES NOT CONFORM TO THE ESC MANUAL, ESC PLAN OR ESC PERMIT.
5. THE PLACEMENT OF EROSION AND SEDIMENT CONTROL BEST MANAGEMENT PRACTICES (BMPs) SHALL BE IN ACCORDANCE WITH THE WEST PLAINS – ACCEPTED ESC PLAN AND THE WEST PLAINS ESC MANUAL.
6. ALL STORMWATER LEAVING THE SITE SHALL PASS THROUGH AT LEAST ONE (1) EROSION AND SEDIMENT CONTROL BMP IF AT ALL POSSIBLE.
7. ANY VARIATION IN MATERIAL, TYPE OR LOCATION OF EROSION AND SEDIMENT CONTROL BMPs FROM THE WEST PLAINS – ACCEPTED ESC PLAN WILL REQUIRE APPROVAL FROM AN ACCOUNTABLE REPRESENTATIVE OF THE WEST PLAINS ENGINEERING DEPARTMENT.
8. AFTER THE ESC PLAN HAS BEEN ACCEPTED, THE ESC PERMIT APPLIED FOR, FEES AND FISCAL SECURITY SUBMITTED TO THE CITY, THE CONTRACTOR MAY INSTALL THE INITIAL–STAGE EROSION AND SEDIMENT CONTROL BMPs INDICATED ON THE ACCEPTED ESC PLAN.
9. 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.
10. AFTER INSTALLATION OF THE INITIAL–STAGE EROSION AND SEDIMENT CONTROL BMPs, THE PERMITTEE SHALL CALL THE WEST PLAINS ENGINEERING DEPARTMENT TO SCHEDULE A PRE–CONSTRUCTION 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 PRE–CONSTRUCTION MEETING.
11. THE OWNER OR OWNER’S REPRESENTATIVE, THE ESC MANAGER, THE GENERAL CONTRACTOR, AND THE GRADING SUBCONTRACTOR (IF DIFFERENT FROM THE GENERAL CONTRACTOR) MUST ATTEND THE PRE–CONSTRUCTION MEETING. IF ANY OF THE REQUIRED PARTICIPANTS FAIL TO ATTEND THE PRE–CONSTRUCTION MEETING, OR IF THE INSTALLATION OF THE INITIAL BMPs ARE NOT APPROVED BY THE WEST PLAINS ENGINEERING DEPARTMENT, THE APPLICANT WILL HAVE TO PAY A REINSPECTION FEE, ADDRESS ANY PROBLEMS WITH BMP INSTALLATION, AND CALL TO RESCHEDULE THE MEETING, WITH A CORRESPONDING DELAY IN THE START OF CONSTRUCTION. WEST PLAINS STRONGLY ENCOURAGES THE APPLICANT TO HAVE THE ENGINEER OF RECORD AT THE PRE–CONSTRUCTION MEETING. FAILURE OF THE ENGINEER OF RECORD TO ATTEND MAY RESULT IN A DELAY OF THE START OF CONSTRUCTION.
12. CONSTRUCTION SHALL NOT BEGIN UNTIL THE WEST PLAINS STORMWATER INSPECTOR APPROVES THE INSTALLATION OF THE INITIAL BMPs AND THE APPROVED ESC PERMIT IS PICKED UP FROM THE CITY 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.
13. THE ESC MANAGER SHALL STRICTLY ADHERE TO THE WEST PLAINS–APPROVED LIMITS OF CONSTRUCTION AT ALL TIMES. THE WEST PLAINS ENGINEERING DEPARTMENT MUST APPROVE ANY CHANGES TO THE LIMITS OF CONSTRUCTION AND, AT THE DISCRETION OF THE ENGINEERING DEPARTMENT, ADDITIONAL EROSION/SEDIMENT CONTROLS MAY BE REQUIRED IN ANY ADDITIONAL AREAS OF CONSTRUCTION.
14. THE MAXIMUM AREA OF CONSTRUCTION SHALL BE LIMITED TO 40 ACRES TO REDUCE THE AMOUNT OF LAND DISTURBED AT ANY ONE TIME. LARGER SITES SHALL BE DIVIDED INTO PHASES THAT ARE EACH 40 ACRES OR LESS IN SIZE. THESE PROJECTS SHALL CONDUCT GRADING ACTIVITIES IN ACCORDANCE WITH THE ACCEPTED ESC PLAN. BMP INSTALLATION AND APPROVAL BY WEST PLAINS AT THE START AND COMPLETION OF EACH PHASE SHALL BE CONDUCTED IN ACCORDANCE WITH THE PROCEDURES OUTLINED IN THE ESC MANUAL.
15. PRIOR TO ACTUAL CONSTRUCTION, THE PERMITTEE SHALL VERIFY THE LOCATION OF EXISTING UTILITIES.
16. 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.
17. THE ESC PERMIT SHALL BE VALID FOR A PERIOD OF ONE (1) YEAR.
18. A COPY OF THE ESC PERMIT, ESC FIELD MANUAL, ACCEPTED ESC DRAWINGS, AND INSPECTIONS SHALL BE ON SITE AT ALL TIMES.
19. THE ESC MANAGER SHALL BE RESPONSIBLE FOR ENSURING THAT THE SITE REMAINS IN COMPLIANCE WITH THE ESC PERMIT AND SHALL BE THE PERMITTEE’S CONTACT PERSON WITH THE CITY FOR ALL MATTERS PERTAINING TO THE ESC PERMIT. THE ESC MANAGER SHALL BE PRESENT AT THE SITE THE MAJORITY OF THE TIME AND SHALL BE AVAILABLE THROUGH A 24–HOUR CONTACT NUMBER. IN THE EVENT THAT THE CONTRACTOR’S ESC MANAGER IS NOT ON SITE AND CANNOT BE REACHED DURING A VIOLATION, THE ALTERNATE ESC MANAGER SHALL BE CONTACTED. IF NEITHER THE ESC MANAGER NOR ALTERNATE ESC MANAGER CAN BE CONTACTED DURING ANY VIOLATION, A STOP WORK ORDER SHALL BE ISSUED.
20. ALL CONSTRUCTION TRAFFIC MUST ENTER/EXIT THE SITE THROUGH THE WEST PLAINS–APPROVED ACCESS POINT. A VEHICLE TRACKING CONTROL PAD IS REQUIRED AT ALL ACCESS POINTS ON THE SITE. ADDITIONAL STABILIZED CONSTRUCTION ENTRANCES MAY BE ADDED WITH AUTHORIZATION FROM THE WEST PLAINS ENGINEERING DEPARTMENT.

21. THE ESC 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 WEST PLAINS STORMWATER COORDINATOR. STREET WASHING IS NOT ALLOWED. WEST PLAINS RESERVES THE RIGHT TO REQUIRE ADDITIONAL MEASURES TO ENSURE AREA STREETS ARE KEPT FREE OF SEDIMENT AND/OR CONSTRUCTION DEBRIS.
22. APPROVED EROSION AND SEDIMENT CONTROL BMPs SHALL BE MAINTAINED AND KEPT IN GOOD REPAIR FOR THE DURATION OF THIS PROJECT. AT A MINIMUM, THE ESC MANAGER SHALL INSPECT ALL BMPs IN ACCORDANCE WITH THE ACCEPTED ESC PLAN AND ESC MANUAL. ALL NECESSARY MAINTENANCE AND REPAIR ACTIVITIES SHALL BE COMPLETED WITHIN 48 HOURS FOR LEVEL III VIOLATIONS, AND IMMEDIATELY FOR LEVEL II VIOLATIONS, OR AS DIRECTED BY THE WEST PLAINS STORMWATER COORDINATOR. ACCUMULATED SEDIMENT AND CONSTRUCTION DEBRIS SHALL BE REMOVED AND PROPERLY DISPOSED.
23. STRAW BALES ARE NOT A WEST PLAINS ESC–ACCEPTED SEDIMENT CONTROL BMP. THEY ARE ONLY TO BE USED FOR CONCRETE WASHOUT AREAS.
24. TOPSOIL SHALL BE STRIPPED AND STOCKPILED IN THE LOCATION SHOWN ON THE ACCEPTED ESC PLAN. THE ESC MANAGER SHALL SCHEDULE AN INSPECTION WITH THE WEST PLAINS STORMWATER COORDINATOR AS SOON AS TOPSOIL STRIPPING IS COMPLETED. FAILURE TO SCHEDULE SUCH INSPECTION OR FAILURE TO STOCKPILE TOPSOIL SHALL RESULT IN ISSUANCE OF A STOP WORK ORDER. THE STOP WORK ORDER SHALL REMAIN IN PLACE UNTIL TOPSOIL IS STOCKPILED ON SITE OR APPROPRIATE SOIL AMENDMENTS ARE STOCKPILED ON SITE.
25. THE ACCEPTED ESC PLAN MAY REQUIRE CHANGES OR ALTERATIONS AFTER APPROVAL TO MEET CHANGING SITE OR PROJECT CONDITIONS OR TO ADDRESS INEFFICIENCIES IN DESIGN OR INSTALLATION. THE ESC MANAGER SHALL OBTAIN PRIOR APPROVAL FROM THE DESIGN ENGINEER AND WEST PLAINS ENGINEERING DEPARTMENT FOR ANY PROPOSED CHANGES.
26. NO PERMANENT EARTH SLOPES GREATER THAN 3:1 SHALL BE ALLOWED.
27. ANY SETTLEMENT OR SOIL ACCUMULATIONS BEYOND THE LIMITS OF CONSTRUCTION DUE TO GRADING OR EROSION SHALL BE REPAIRED IMMEDIATELY BY THE ESC MANAGER. THE ESC 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.
28. A WATER SOURCE SHALL BE AVAILABLE ON SITE DURING EARTHWORK 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 WEST PLAINS ENGINEERING DEPARTMENT.
29. IF SUBSTANCES SUCH AS OIL, DIESEL FUEL, HYDRAULIC FLUID, ANTIFREEZE, ETC. ARE SPILLED, LEAKED, OR RELEASED ONTO SOIL, THE SOIL SHALL BE DUG UP AND DISPOSED OF AT A LICENSED SANITARY LANDFILL (NOT A CONSTRUCTION/DEMOLITION DEBRIS LANDFILL). SPILLS ON PAVEMENT SHALL BE ABSORBED WITH SAWDUST, KITTY LITTER OR PRODUCT DESIGNED FOR THAT PURPOSE AND DISPOSED OF AT A LICENSED SANITARY LANDFILL. HAZARDOUS OR INDUSTRIAL WASTES SUCH AS MOST SOLVENTS, GASOLINE, OIL–BASED PAINTS, AND CEMENT CURING COMPOUNDS REQUIRE SPECIAL HANDLING. THESE MATERIALS WILL BE REMOVED FROM THE SITE AND RECYCLED OR DISPOSED OF IN ACCORDANCE WITH MODNR REQUIREMENTS.
30. STATE LAW REQUIRES THE PARTY RESPONSIBLE FOR A PETROLEUM PRODUCT SPILL IN EXCESS OF 50 GALLONS TO REPORT THE SPILL TO MODNR (537–634–2436) AS SOON AS PRACTICAL AFTER DISCOVERY. FEDERAL LAW REQUIRES THE RESPONSIBLE PARTY TO REPORT ANY RELEASE OF OIL IF IT REACHES OR THREATENS A SEWER, LAKE, CREEK, STREAM, RIVER, GROUNDWATER, WETLAND, OR ANY AREA THAT DRAINS TO ONE OF THE ABOVE.
31. 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 WEST PLAINS ESC PLAN.
- ALL PROJECTS SHALL BALANCE EARTHWORK QUANTITIES ON SITE. IN THE EVENT A VARIANCE IS GRANTED BY THE STORMWATER COORDINATOR TO ALLOW IMPORT OR EXPORT OF MATERIAL, THE PERMITTEE SHALL HAVE AN ESC PERMIT IN HAND FOR THE IMPORT OR EXPORT SITE PRIOR TO ANY TRANSPORTING OF EARTHEN MATERIAL. THE ESC MANAGER SHALL NOTIFY THE WEST PLAINS STORMWATER COORDINATOR OF THE LOCATION AND PERMIT NUMBERS OF BOTH THE EXPORTING AND IMPORTING SITES PRIOR TO ANY IMPORT/ EXPORT OPERATIONS.
32. 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.
33. ALL DEWATERING ON SITE SHALL BE COORDINATED WITH THE WEST PLAINS STORMWATER COORDINATOR AND BE FREE OF SEDIMENT.
34. 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 WEST PLAINS.
35. ALL DISTURBED AREAS SHALL BE SEEDED AND MULCHED IN ACCORDANCE WITH THE ESC MANUAL WITHIN THIRTY DAYS OF INITIAL EXPOSURE OR WITHIN FIFTEEN (15) DAYS OF SUBSTANTIAL COMPLETION (AS DEFINED BY WEST PLAINS) OF AN AREA, WHICHEVER IS LESS. THIS MAY REQUIRE MULTIPLE MOBILIZATIONS FOR SEEDING AND MULCHING. IF PERMITTEE CAN NOT MEET THIS REQUIREMENT THEY MUST COMPLETE A SCHEDULE OF COMPLETION OF STABILIZATION AS AN ATTACHMENT TO FORM 1 THAT WILL BE SUBMITTED TO THE CITY AT THE PRECONSTRUCTION MEETING.
35. A FINAL ESC INSPECTION SHALL BE CONDUCTED A MINIMUM OF TWO WEEKS PRIOR TO OCCUPANCY.

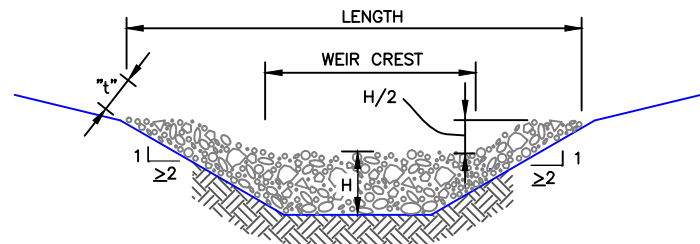
DETAIL SHEET		BMP LEGEND (TYPE–INTENT)	
NO.	NO.		
1	②		CD–SM CHECK DAM
2	②		CWA–C CONCRETE WASHOUT AREA
3	③		CF–C CONSTRUCTION FENCE
4	③		CM–C CONSTRUCTION MARKERS
5	③		DW–P DEWATERING
6	④		DB–M DIVERSION BERM
7	④		DD–M DIVERSION DITCH
8	④		PB–P PONDING BERM
9	⑤		IP–P INLET PROTECTION
10	⑥		RRB–P/M/SM REINFORCED ROCK BERM
11	⑥		RRB–SM RRB FOR CULVERT PROTECTION
12	⑦		RECP–SM/S ROLLED EROSION CONTROL PRODUCT
13	⑧		SB–P SEDIMENT BASIN
14	⑨		SRFR–P/M/SM/S SEDIMENT RETENTION FIBER ROLL
15	⑨		ST–P SEDIMENT TRAP
16	⑨		SM–S SEEDING AND MULCHING
17	⑩		SF–P/M SILT FENCE
18	⑪		SSA–C STABILIZED STAGING AREA
19	⑪		SR–S SURFACE ROUGHENING
20	⑪		TSD–S TEMPORARY SLOPE DRAIN
21	⑫		TSC–C TEMPORARY STREAM CROSSING
22	⑫		TER–S TERRACING
23	⑬		VTC–C VEHICLE TRACKING CONTROL
24	⑬		WW–C VTC WITH WHEEL WASH
			LOC LIMITS OF CONSTRUCTION
BMP ID			
DETAIL#–TYPE–INTENT–BMP#			

**BMP SYMBOL NOTE:**  
SOME BMP TYPES MAY HAVE MORE THAN ONE INTENT, HOWEVER EACH INDIVIDUAL BMP ON A SITE WILL HAVE ONLY ONE INTENT. FOR FURTHER EXPLANATION OF BMP ID SEE PAGES 22–24 OF ESC FIELD MANUAL.

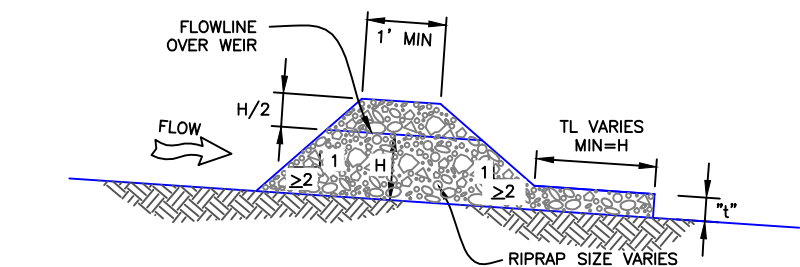
**BMP INTENT LIST:**  
C–CONSTRUCTION  
M–MOVING  
P–PONDING  
S–STABILIZE  
SM–STABILIZE MOVING (WATER)



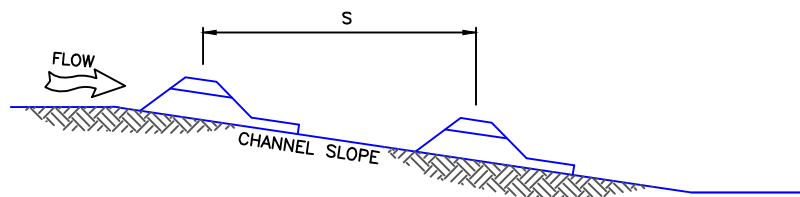




DETAIL A  
SCALE: NOT TO SCALE



DETAIL B  
SCALE: NOT TO SCALE



DETAIL C  
SCALE: NOT TO SCALE

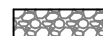
#### CHECK DAM INSTALLATION NOTES

- SEE PLAN VIEW FOR:
  - LOCATIONS OF CHECK DAMS
  - LENGTH (L)
  - CHECK DAM TYPE: ROCK TYPE OR PROPRIETARY TYPE (PROPRIETARY REQUIRE BRAND NAME AND MODEL NUMBER; ROCK TYPE REQUIRE SIZE OF ROCK: 1", 2", 3" CLEAN ROCK OR TYPE II OR III RIPRAP.
  - HEIGHT (H)
  - TAIL LENGTH (TL)
  - TAIL LENGTH AND TYPE FOR PROPRIETARY PRODUCTS IF REQUIRED WHEN TL IS NOT INTEGRAL TO THE PRODUCT: ROCK TYPE, 15 MIL PLASTIC, OR FABRIC (FABRIC REQUIRES BRAND NAME AND MODEL NUMBER)
  - SPACING (S)

- THE WEIR CREST MUST BE FLAT (SAME ELEVATION ACROSS ITS LENGTH).
- THE WEIR CREST SHOULD BE THE MAXIMUM LENGTH WHILE STILL ACHIEVING THE REQUIRED THICKNESS "t" AT THE ENDS OF THE WEIR CREST. SEE "DETAIL A" OF ROCK CHECK DAM ABOVE.
- ROCK UTILIZED FOR ROCK TYPE CHECK DAMS SHALL HAVE ONE OF THE TYPES SHOWN IN TABLE 1 AND WILL BE SPECIFIED IN PLAN VIEW. THE "t" DIMENSION SHALL EQUAL TWICE THE THICKNESS OF ROCK TYPE SIZE.

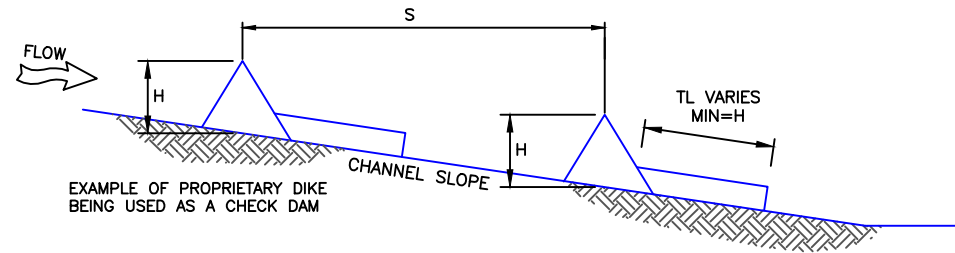
#### CHECK DAM MAINTENANCE NOTES

- THE ESC MANAGER SHALL INSPECT CHECK DAMS WEEKLY, 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 1/2 OF THE HEIGHT OF THE CREST OR 12" DEEP.
- CHECK DAMS ARE TO REMAIN IN PLACE UNTIL THE UPSTREAM DISTURBED AREA IS STABILIZED AND GRASS COVER IS APPROVED BY THE CITY.
- WHEN CHECK DAMS ARE REMOVED, EXCAVATIONS SHALL BE FILLED WITH SUITABLE COMPACTED BACK FILL. ANY DISTURBED AREA SHALL BE SEEDED AND MULCHED. THIS MAY ALSO REQUIRE ROLLED EROSION CONTROL PRODUCT (SEE DETAIL 12 SHEET 7).

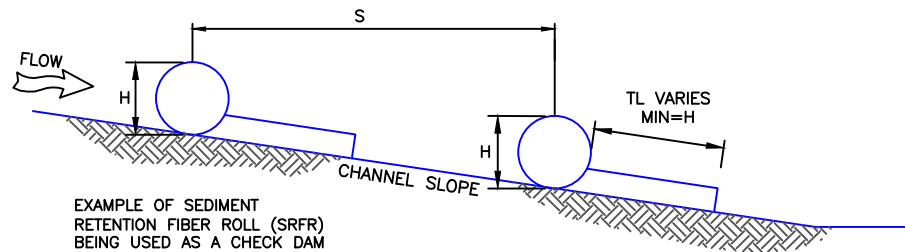


CD-SM

CHECK DAM 1



EXAMPLE OF PROPRIETARY DIKE BEING USED AS A CHECK DAM

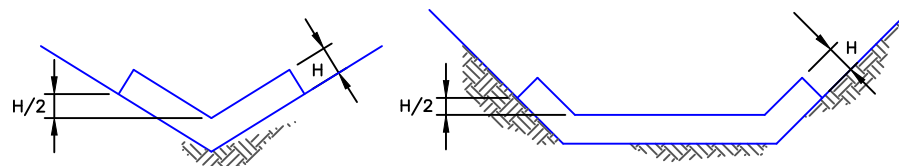


EXAMPLE OF SEDIMENT RETENTION FIBER ROLL (SRFR) BEING USED AS A CHECK DAM

#### PROPRIETARY CHECK DAMS SCALE: NOT TO SCALE

#### INSTALLATION NOTES SPECIFIC TO PROPRIETARY CHECK DAMS

- CHECK DAM SHOULD BE ATTACHED TO THE GROUND PER MANUFACTURERS RECOMMENDATIONS.
- IF TAIL LENGTH (TL) IS ROCK IT SHOULD NOT BE PLACED UNDER THE CHECK DAM AND THE PLAN VIEW WILL STATE ROCK SIZE. THE "t" DIMENSION EQUALS TWICE THE AVERAGE ROCK DIAMETER (SEE TABLE 1).
- IF TAIL LENGTH TYPE IS NOT ROCK, IT SHOULD BE PLACED UNDER THE CHECK DAM TO GROUND IN A FASHION THAT WILL NOT BE UNDERMINED OR MOVED.

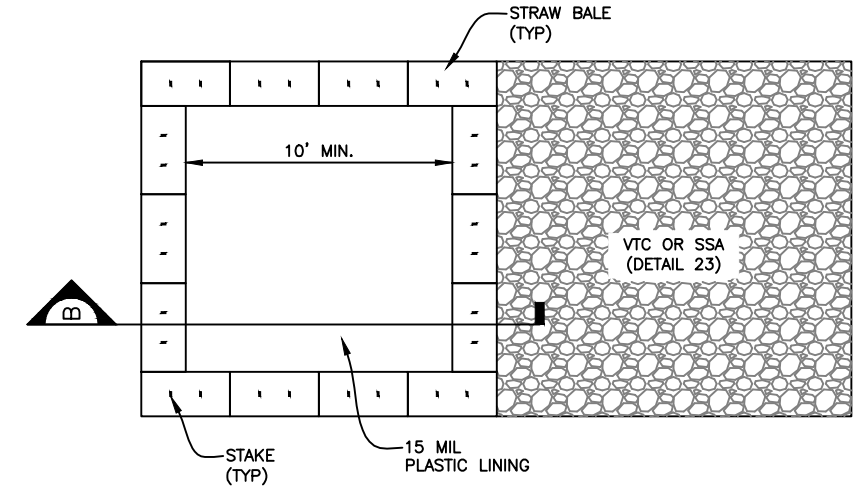


- THE SPACING REQUIREMENTS FOR ROCK CHECK DAMS ALSO APPLY TO PROPRIETARY CHECKS.

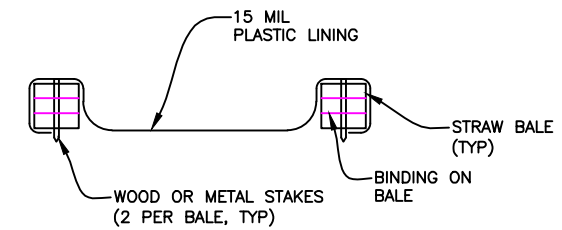
TABLE 1

ROCK TYPE	t*
1" CLEAN ROCK	2"
2" CLEAN ROCK	4"
3" CLEAN ROCK	6"
TYPE I RIPRAP (3" AVG. DIAMETER)	6"
TYPE II RIPRAP (6" AVG. DIAMETER)	12"
TYPE III RIPRAP (12" AVG. DIAMETER)	24"

t\* = 2 x AVG. DIAMETER



DETAIL A  
SCALE: NOT TO SCALE



SECTION B  
SCALE: NOT TO SCALE

#### CONCRETE WASHOUT AREA INSTALLATION NOTES

- SEE PLAN VIEW FOR:
  - LOCATIONS OF CONCRETE WASHOUT AREA.
  - LENGTH AND WIDTH OF WASHOUT AREA
- THE CONCRETE WASHOUT AREA SHALL BE INSTALLED PRIOR TO ANY CONCRETE PLACEMENT ON SITE.
- CONCRETE WASHOUT AREA SHALL BE ADJACENT TO EITHER THE VEHICLE TRACTION CONTROL (VTC) OR (STABILIZED STAGING AREA).
- SECURELY ATTACH PLASTIC TO STRAW BALE WITH 11 GAUGE LANDSCAPE STAPLES.

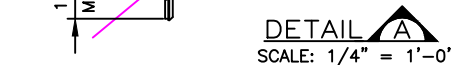
#### CONCRETE WASHOUT AREA MAINTENANCE NOTES

- 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.
- WHEN THE CONCRETE WASHOUT AREA IS REMOVED, THE DISTURBED AREA SHALL BE SEEDED AND MULCHED OR OTHERWISE STABILIZED IN A MANNER APPROVED BY THE CITY.
- INSPECT WEEKLY, DURING AND AFTER ANY STORM EVENT.
- IF POSSIBLE, LEAVE CONCRETE WASHOUT AREA IN USE UNTIL INITIAL CLOSEOUT INSPECTION SO IT CAN BE USED TO DISPOSE OF DISCARDED PORTIONS OF GROUT, MORTAR, STUCCO, DRY-WALL MUD, PAINT, AND PAINT WASH WATER.



CWA-C

CONCRETE WASHOUT AREA 2



1. SEE PLAN VIEW FOR:
  - LOCATION
  - LENGTH (L)
  - COORDINATES OR OTHER LOCATION INFORMATION

- ## CONSTRUCTION FENCE MAINTENANCE NOTES

- CF-C CONSTRUCTION FENCE 3

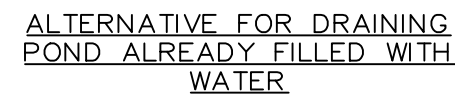
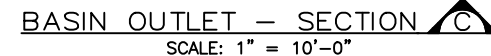


Diagram illustrating the bucket method for dewatering:

- LOWEST SUBGRADE ELEVATION TO BE DEWATERED
- 1" MIN.
- LID W/ HOLE CUT FOR SUCTION LINE
- PUMP SUCTION LINE OR SUBMERSIBLE PUMP
- 12" MIN. AROUND ON ALL SIDES OF BUCKET
- 12" MIN. BELOW BUCKET
- PLASTIC 5-GALLON BUCKET WITH 3/8" HOLES DRILLED AT 2" MAX SPACING IN SIDE AND BOTTOM
- 1" OR 2" CLEAN ROCK BEDDING SEE SHEET 13 FOR GRADATION

SCALE: 1/4" = 1'-0"



1. SEE PLAN VIEW FOR:

- LOCATION OF PROPOSED DEWATERING OPERATIONS
- DESCRIPTION OF DEWATERING METHODS
- ANTICIPATED VOLUME OF WATER TO BE DISCHARGED IN GALLONS PER MINUTE
- ANTICIPATED MAXIMUM FLOW DISCHARGED IN GALLONS PER MINUTE
- SIZE OF SETTLING BASIN TO BE PUMPED INTO. SEDIMENT BASIN OR SEDIMENT BAG MAY BE USED IN LIEU OF SETTLING BASIN. IF SO, APPROPRIATE INFORMATION SHOULD BE STATED IN PLAN VIEW.

- DEWATERING MAINTENANCE NOTES

1. THE ESC MANAGER SHALL INSPECT DEWATERING SYSTEMS AND PERFORM ANY NECESSARY REPAIRS OR MAINTENANCE ON A HOURLY BASIS.
2. TEMPORARY SETTLING BASINS SHALL BE REMOVED WHEN NO LONGER NEEDED FOR DEWATERING OPERATIONS. ANY DISTURBED AREA SHALL BE SEEDED AND MULCHED OR OTHERWISE STABILIZED IN A MANNER APPROVED BY THE CITY.



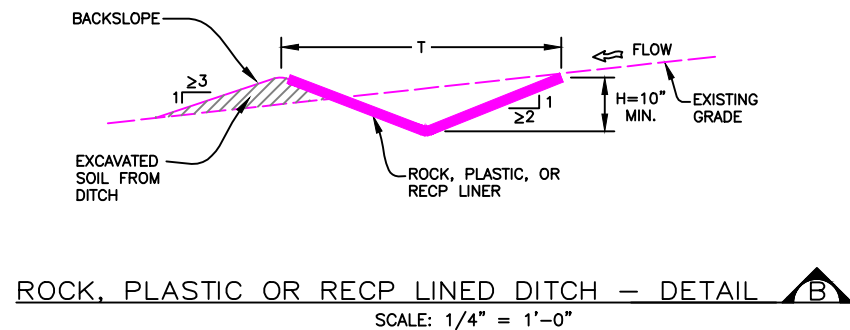
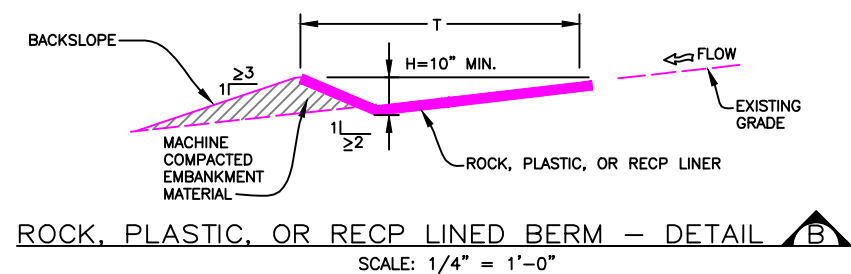
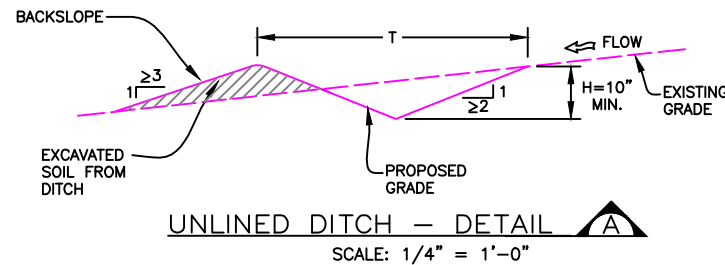
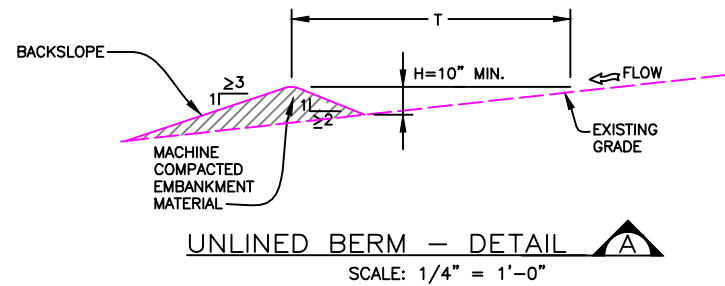
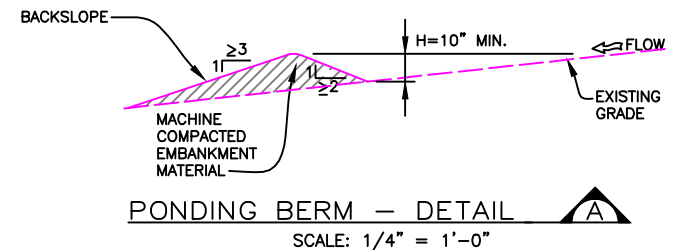


TABLE 2

CHANNEL TYPE	SECTION
I	
II	
III	
IV	



#### DIVERSION BERM & DIVERSION DITCH INSTALLATION NOTES

- SEE PLAN VIEW FOR:
  - LOCATION OF DIVERSION BERM OR DIVERSION DITCH
  - IF LINED STATE TYPE (RECP, 15 MIL PLASTIC, FABRIC, ROCK TYPE FROM TABLE 1, OR OTHER)
  - LENGTH (L)
  - CHANNEL TYPE (SEE TABLE 2), CANNOT USE CHANNEL TYPE I
  - HEIGHT (H) AND BOTTOM WIDTH (BW) OF CHANNEL IF TYPE IV
  - SIDE SLOPES (LOOKING DOWNSTREAM, LEFT AND RIGHT SIDE SLOPE RATIO)
  - TOP WIDTH (T)
- DIVERSION BERMS OR DITCHES INDICATED ON INITIAL ESC PLAN SHALL BE INSTALLED PRIOR TO ANY LAND-DISTURBING ACTIVITIES.
- RECP, PLASTIC OR FABRIC LINED DIVERSION BERMS AND DITCHES SHALL CONFORM TO THE FOLLOWING REQUIREMENTS:
  - SECURE RECP WITH WOOD STAKES OR LANDSCAPE STAPLES. SECURE PLASTIC WITH LANDSCAPE STAPLES
  - INSTALL ANCHOR TRENCH AT PERIMETER OF LINER AND AT OVERLAPPING JOINTS WITH ANY ADJACENT ROLLS OF LINER SIMILAR TO DETAIL 12
  - INSTALL INTERMEDIATE ANCHOR TRENCH AT ONE-HALF ROLL-LENGTH SIMILAR TO DETAIL 12
  - INSTALL TRANSVERSE ANCHOR TRENCHES AT PERIMETER OF BLANKET AND AT OVERLAPPING JOINTS WITH ANY ADJACENT ROLLS OF PRODUCT, SIMILAR TO DETAIL 12
- ROCK LINED DIVERSION BERMS AND DITCHES SHALL HAVE A ROCK DEPTH OF TWICE THE AVERAGE ROCK DIAMETER USED.
- BACKSLOPE OF BERM OR DITCH SHOULD BE SEEDED AND MULCHED IMMEDIATELY AFTER CONSTRUCTION.

#### DIVERSION BERM & DIVERSION DITCH MAINTENANCE NOTES

- THE ESC MANAGER SHALL INSPECT DIVERSION BERMS AND DITCHES WEEKLY, DURING AND AFTER ANY STORM EVENT AND MAKE REPAIRS AS NECESSARY.
- DIVERSION BERMS AND DITCHES ARE TO REMAIN IN PLACE UNTIL THE END OF CONSTRUCTION, OR, IF APPROVED BY THE CITY, LEFT IN PLACE.
- IF DIVERSION BERMS OR DITCHES ARE REMOVED, THE DISTURBED AREA SHALL BE SEEDED AND MULCHED OR OTHERWISE STABILIZED IN A MANNER APPROVED BY THE CITY.

#### PONDING BERM INSTALLATION NOTES

- SEE PLAN VIEW FOR:
  - LOCATION OF PONDING BERM
  - LENGTH (L)
  - HEIGHT (H)
  - SIDE SLOPES (BERM SIDE SLOPE RATIO AND SIDE SLOPE RATIO FLOWING TOWARDS THE BERM)
  - ELEVATION AT TOP OF BERM
- PONDING BERMS ARE UNLINED AND ARE DESIGNED TO POND WATER, NOT MOVE IT.
- BACKSLOPE OF BERM SHOULD BE SEEDED AND MULCHED IMMEDIATELY AFTER CONSTRUCTION OF BERM.

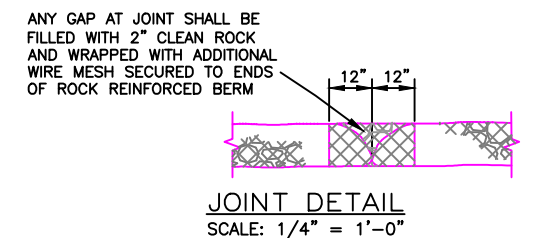
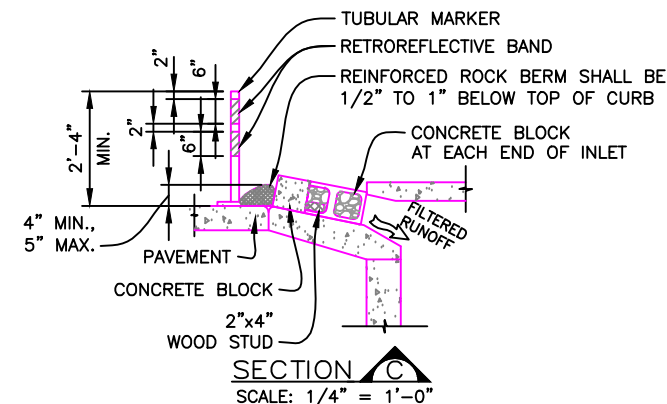
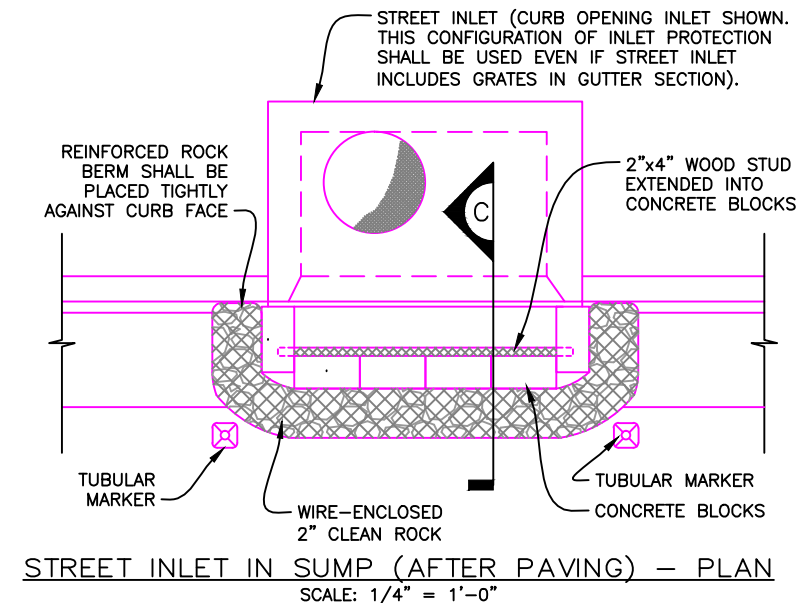
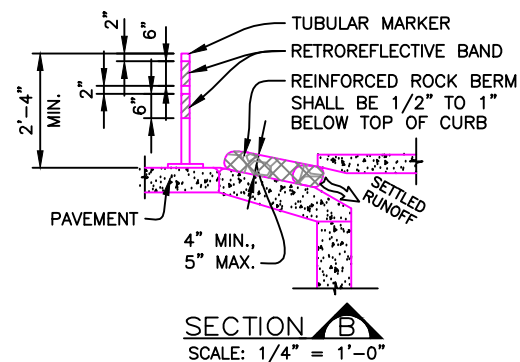
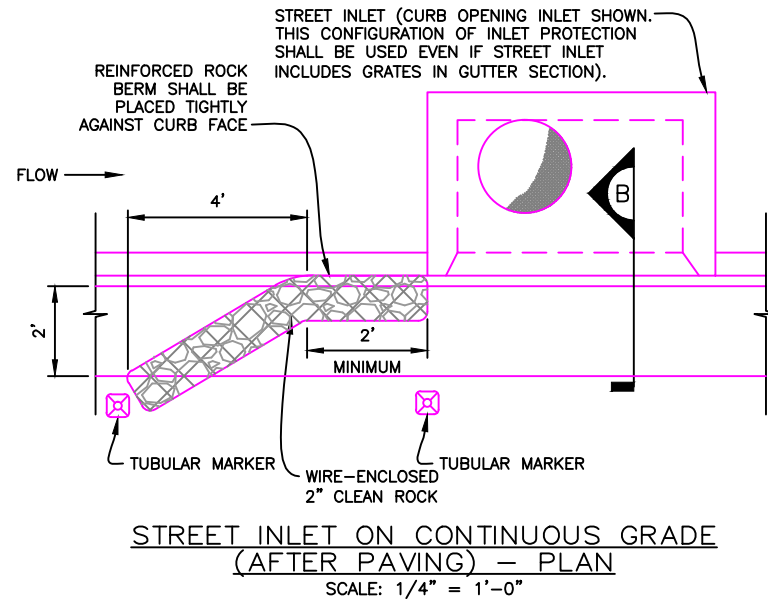
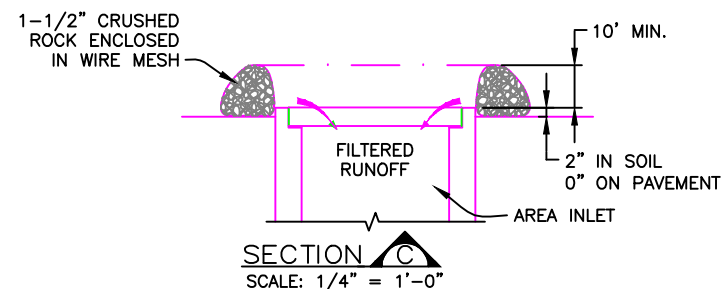
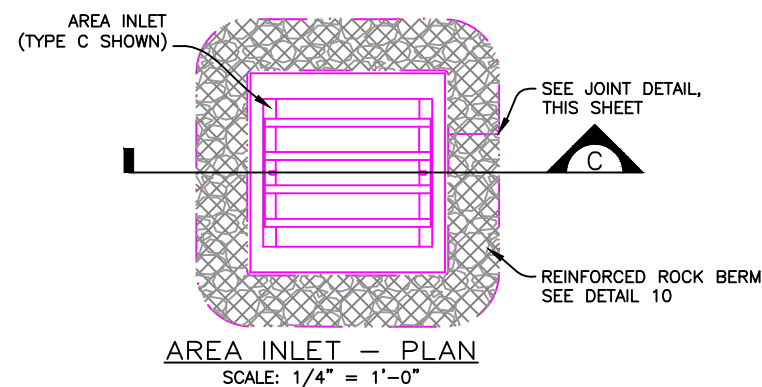
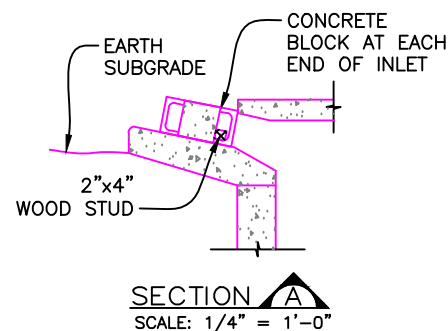
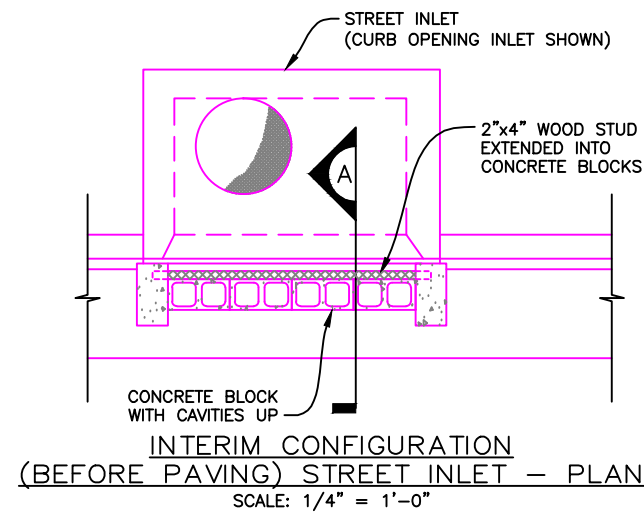
#### PONDING BERM MAINTENANCE NOTES

- THE ESC MANAGER SHALL INSPECT PONDING BERMS WEEKLY, DURING AND AFTER ANY STORM EVENT AND CLEAN OUT AS NECESSARY TO MAINTAIN REQUIRED HEIGHT.
- PONDING BERMS ARE TO REMAIN IN PLACE UNTIL THE END OF CONSTRUCTION, OR, IF APPROVED BY THE CITY, LEFT IN PLACE.
- IF PONDING BERMS ARE REMOVED, THE DISTURBED AREA SHALL BE SEEDED AND MULCHED OR OTHERWISE STABILIZED IN A MANNER APPROVED BY THE CITY.

DB-M DIVERSION BERM 6

DD-M DIVERSION DITCH 7

PB-P PONDING BERM 8

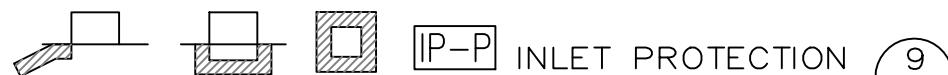


#### INLET PROTECTION INSTALLATION NOTES

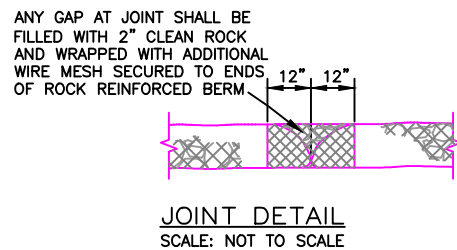
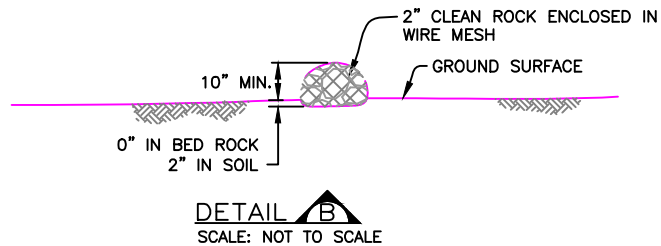
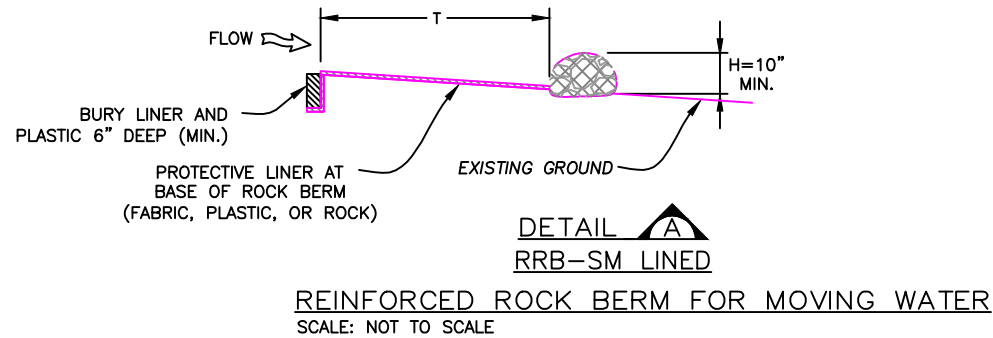
1. INTERIM CONFIGURATION OF INLET PROTECTION IN STREETS SHALL BE INSTALLED WITHIN 48-HOURS OF INSTALLING INLET. INLET PROTECTION (AFTER PAVING) SHALL BE INSTALLED WITHIN 48 HOURS AFTER PAVING IS PLACED.
2. INLET PROTECTION AT AREA INLETS SHALL BE INSTALLED WITHIN 48-HOURS OF INSTALLING INLET.
3. WIRE 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.
4. 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.
5. REINFORCED ROCK BERM SHALL BE CONSTRUCTED IN ONE PIECE OR SHALL BE CONSTRUCTED USING JOINT DETAIL.
6. TUBULAR MARKERS SHALL MEET REQUIREMENTS OF MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD), AS AMENDED.
7. THE TOP OF REINFORCED ROCK BERM SHALL BE 1/2"-1" BELOW TOP OF CURB.

#### INLET PROTECTION MAINTENANCE NOTES

1. THE ESC MANAGER SHALL INSPECT INLET PROTECTION WEEKLY, 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.
2. SEDIMENT ACCUMULATED UPSTREAM OF INLET PROTECTION SHALL BE REMOVED WHEN THE SEDIMENT DEPTH UPSTREAM OF ROCK BERM IS WITHIN 2-1/2 INCHES OF THE CREST.
3. INLET PROTECTION IS TO REMAIN IN PLACE UNTIL THE UPSTREAM DISTURBED AREA IS STABILIZED AND GRASS COVER IS APPROVED, UNLESS THE CITY APPROVES EARLIER REMOVAL OF INLET PROTECTION IN STREETS.
4. WHEN INLET PROTECTION AT AREA INLETS ARE REMOVED, THE DISTURBED AREA SHALL BE SEEDED AND MULCHED OR OTHERWISE STABILIZED IN A MANNER APPROVED BY THE CITY.





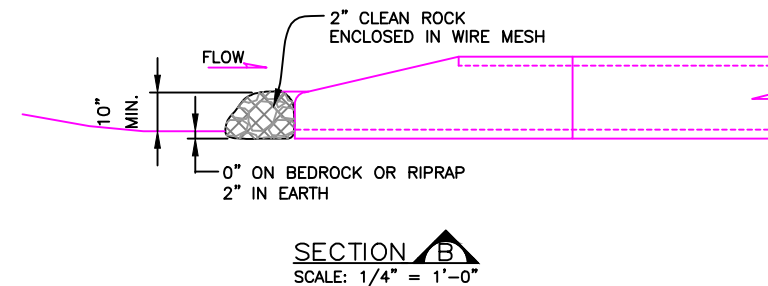
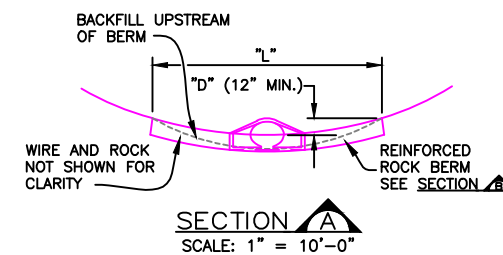
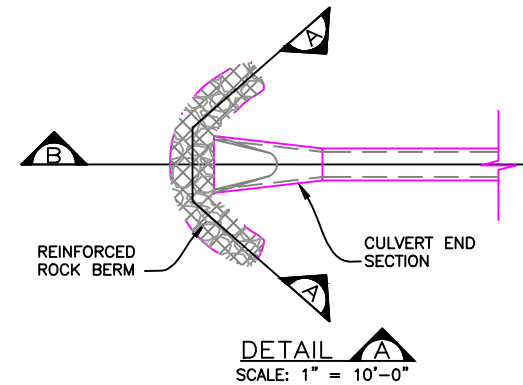


#### REINFORCED ROCK BERM INSTALLATION NOTES

- SEE PLAN VIEW FOR:
  - LOCATIONS
  - LENGTH (L)
  - IF LINED STATE TYPE (15 MIL PLASTIC, FABRIC, ROCK TYPE FROM TABLE 1, OR OTHER)
  - IF USED FOR MOVING WATER AND LINED STATE TOP WIDTH (T) OF LINER.
  - IF USED FOR PONDING, STATE GROUND ELEVATION AT BASE.
- REINFORCED ROCK BERM SECTION APPLIES TO CULVERT INLET FILTER AND INLET PROTECTION.
- 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 REINFORCED ROCK BERM CAN BE USED AS A DITCH CHECK OR PONDING BMP.
- IF REINFORCED ROCK BERM IS USED TO MOVE WATER, AND PLASTIC OR FABRIC IS UTILIZED, INSTALLATION MUST CONFORM TO THE FOLLOWING REQUIREMENTS:
  - SECURE FABRIC WITH WOOD STAKES OR LANDSCAPE STAPLES. SECURE PLASTIC WITH LANDSCAPE STAPLES
  - INSTALL ANCHOR TRENCH AT PERIMETER OF LINER AND AT OVERLAPPING JOINTS WITH ANY ADJACENT ROLLS OF LINER SIMILAR TO DETAIL 12
  - INSTALL INTERMEDIATE ANCHOR TRENCH AT ONE-HALF ROLL-LENGTH SIMILAR TO DETAIL 12
  - INSTALL TRANSVERSE ANCHOR TRENCHES AT PERIMETER OF BLANKET AND AT OVERLAPPING JOINTS WITH ANY ADJACENT ROLLS OF PRODUCT, SIMILAR TO DETAIL 12.

#### REINFORCED ROCK BERM MAINTENANCE NOTES

- THE ESC MANAGER SHALL INSPECT REINFORCED ROCK BERM WEEKLY, 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 OR 12" DEEP.
- REINFORCED ROCK BERMS ARE TO REMAIN IN PLACE UNTIL THE UPSTREAM DISTURBED AREA IS STABILIZED AND GRASS COVER IS APPROVED.
- WHEN REINFORCED ROCK BERMS ARE REMOVED, ANY DISTURBED AREA SHALL BE SEEDED AND MULCHED OR OTHERWISE STABILIZED IN A MANNER APPROVED BY THE CITY.



#### INSTALLATION NOTES

- SEE PLAN VIEW FOR:
  - LOCATIONS OF CULVERT INLET FILTERS.
  - LENGTH (L)
- 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").
- 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.
- THE ENDS OF THE REINFORCED ROCK BERM SHALL BE 12" HIGHER THAN THE CENTER OF THE BERM.

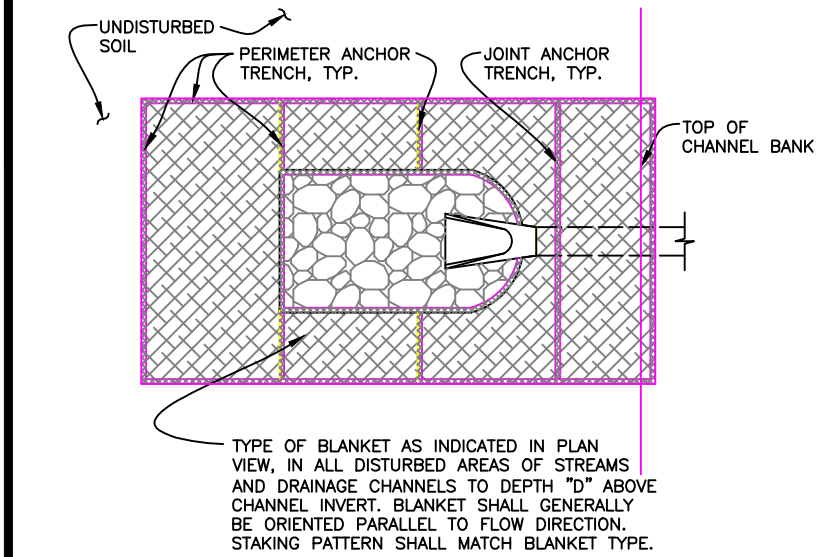
#### MAINTENANCE NOTES

- THE ESC MANAGER SHALL INSPECT CULVERT INLET FILTER WEEKLY, 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 OR 12" DEEP.
- RRB FOR CULVERT PROTECTION ARE TO REMAIN IN PLACE UNTIL THE UPSTREAM DISTURBED AREA IS STABILIZED AND GRASS COVER IS APPROVED BY THE CITY.
- WHEN CULVERT INLET FILTERS ARE REMOVED, ANY DISTURBED AREA SHALL BE SEEDED AND MULCHED OR OTHERWISE STABILIZED IN A MANNER APPROVED BY THE CITY.

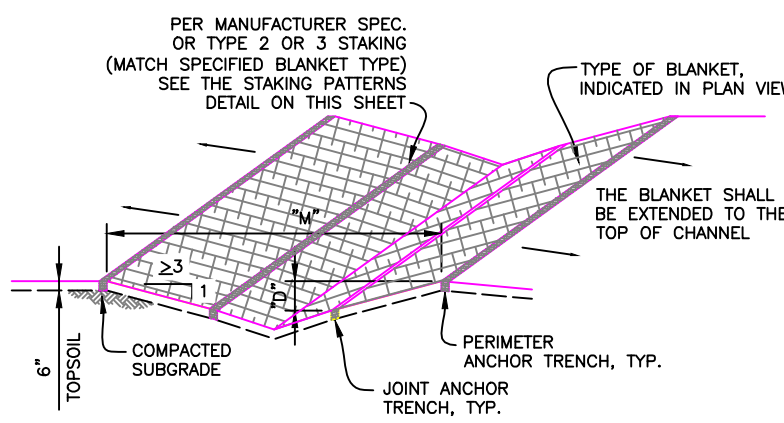
RRB-P/M/SM REINFORCED ROCK BERM 10

RRB-SM RRB FOR CULVERT PROTECTION 11

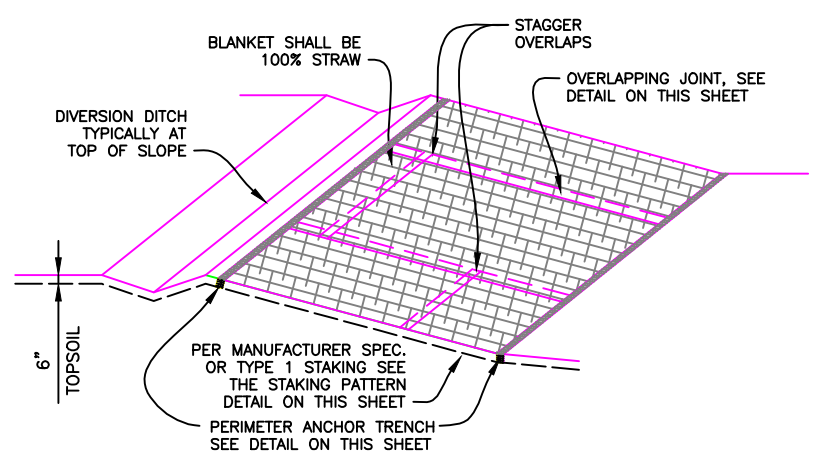




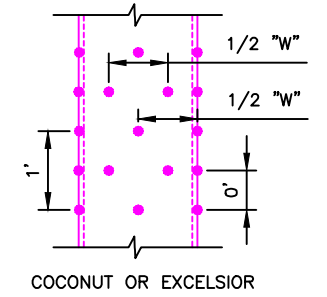
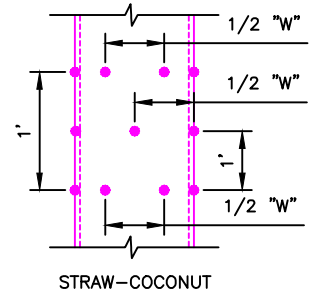
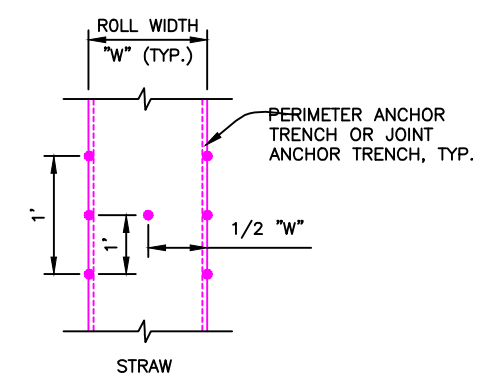
**IN DISTURBED AREAS OF  
STREAMS AND DRAINAGE CHANNELS — DETAIL A**  
SCALE: 1" = 10'-0"



**IN DIVERSION DITCH OR  
SMALL DITCH DRAINAGWAY — DETAIL B**  
SCALE: 1" = 10'-0"

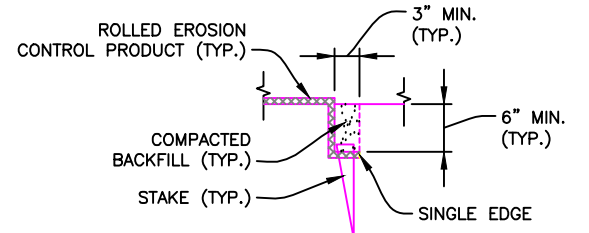


**OUTSIDE OF STREAMS  
AND DRAINAGE CHANNELS — DETAIL C**  
SCALE: 1" = 10'-0"

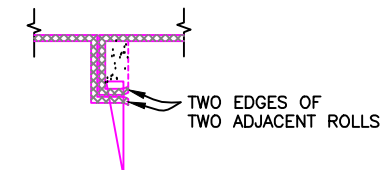


**STAKING PATTERNS**

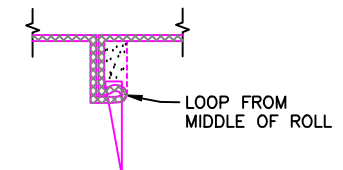
SCALE: 1" = 10'-0"  
SHALL BE IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATION. IF NO MANUFACTURER'S SPECIFICATION IS AVAILABLE USE THE ACCEPTABLE STAKING PATTERN (AS SHOWN ABOVE).



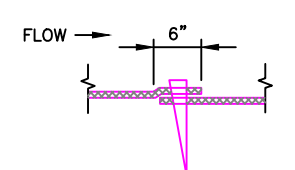
**PERIMETER ANCHOR TRENCH**  
SCALE: 1/2" = 1'-0"



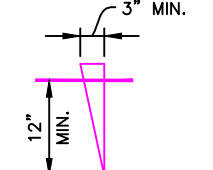
**JOINT ANCHOR TRENCH**  
SCALE: 1/2" = 1'-0"



**INTERMEDIATE  
ANCHOR TRENCH**  
SCALE: 1/2" = 1'-0"



**OVERLAPPING JOINT**  
SCALE: 1/2" = 1'-0"



**WOOD STAKE DETAIL**  
SCALE: 1/2" = 1'-0"  
MINIMUM THICKNESS 1/2"

**ROLLED EROSION CONTROL PRODUCT INSTALLATION NOTES**

- SEE PLAN VIEW FOR:
  - LOCATION OF PERIMETER AND DIMENSIONS OF RECP
  - BRAND NAME, MODEL NUMBER, AND PERMISSIBLE SHEAR STRESS
  - AREA (A) IN SQUARE YARDS OF EACH TYPE OF PRODUCT.
- IN AREAS WHERE RECP IS SHOWN ON THE PLANS, THE PERMITTEE SHALL PLACE TOPSOIL AND PERFORM FINAL GRADING, SURFACE PREPARATION, AND SEEDING BELOW THE PRODUCT IN ACCORDANCE WITH THE REQUIREMENTS OF DETAIL 16, SEEDING AND MULCHING. SUBGRADE SHALL BE SMOOTH AND MOIST PRIOR TO PRODUCT INSTALLATION AND THE BLANKET SHALL BE IN FULL CONTACT WITH SUBGRADE, NO GAPS OR VOIDS SHALL EXIST UNDER THE PRODUCT.
- PERIMETER ANCHOR TRENCH SHALL BE USED AT OUTSIDE PERIMETER OF ALL ROLLED EROSION CONTROL PRODUCT AREAS.
- JOINT ANCHOR TRENCH SHALL BE USED TO JOIN ROLLS OF BLANKETS TOGETHER (LONGITUDINALLY AND TRANSVERSELY) FOR ALL PRODUCTS EXCEPT STRAW, WHICH MAY USE AN OVERLAPPING JOINT.
- INTERMEDIATE ANCHOR TRENCH SHALL BE USED AT SPACING OF ONE-HALF THE ROLL LENGTH FOR COCONUT AND EXCELSIOR BLANKETS.
- THE OVERLAPPING JOINT DETAIL SHALL BE USED TO JOIN ROLLS OF PRODUCTS TOGETHER WHEN ON SLOPES.
- ANY AREAS OF SEEDING AND MULCHING DISTURBED IN THE PROCESS OF INSTALLING ROLLED EROSION CONTROL PRODUCT SHALL BE RESEEDED AND MULCHED IN ACCORDANCE WITH DETAIL 16.

**ROLLED EROSION CONTROL PRODUCT MAINTENANCE NOTES**

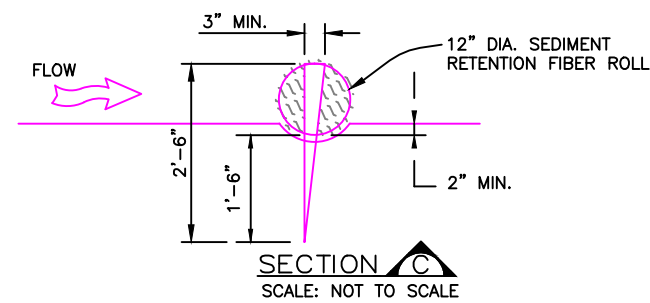
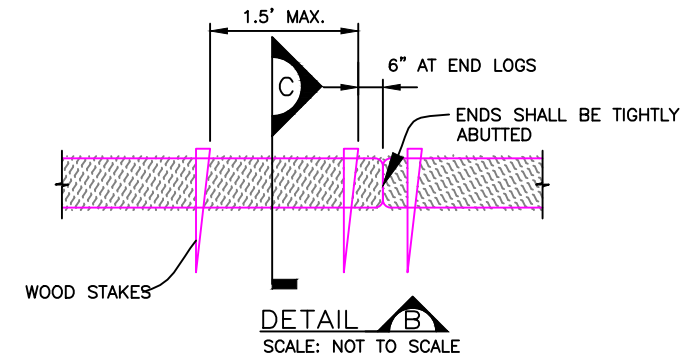
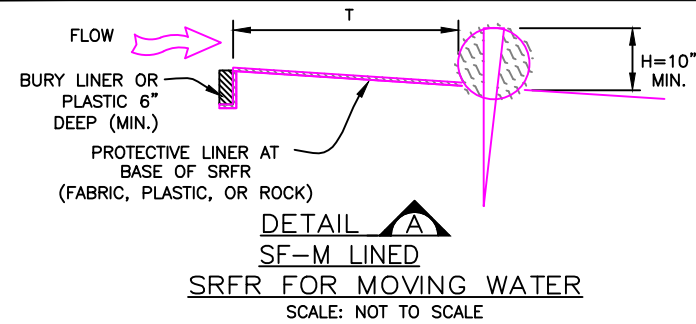
- THE ESC MANAGER SHALL INSPECT ROLLED EROSION CONTROL PRODUCTS WEEKLY, DURING AND AFTER ANY STORM EVENT AND MAKE REPAIRS AS NECESSARY.
- ROLLED EROSION CONTROL PRODUCT IS TO BE LEFT IN PLACE UNLESS REQUESTED TO BE REMOVED BY THE CITY.
- ANY ROLLED EROSION CONTROL PRODUCT PULLED OUT, TORN, OR OTHERWISE DAMAGED SHALL BE RE-INSTALLED. ANY SUBGRADE AREAS BELOW THE BLANKET THAT HAVE ERODED TO CREATE A VOID UNDER THE BLANKET, OR THAT REMAIN DEVOID OF GRASS SHALL BE REPAIRED, RESEEDED AND MULCHED AND THE EROSION CONTROL BLANKET REINSTALLED.



RECP-SM/S ROLLED EROSION CONTROL PRODUCTS (12)





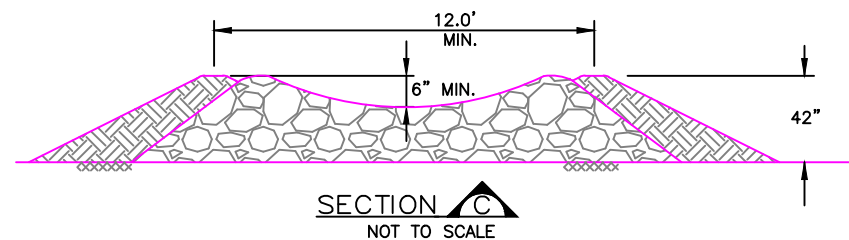
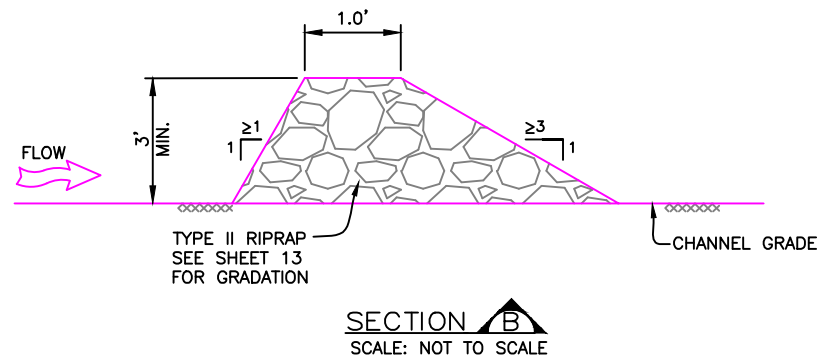
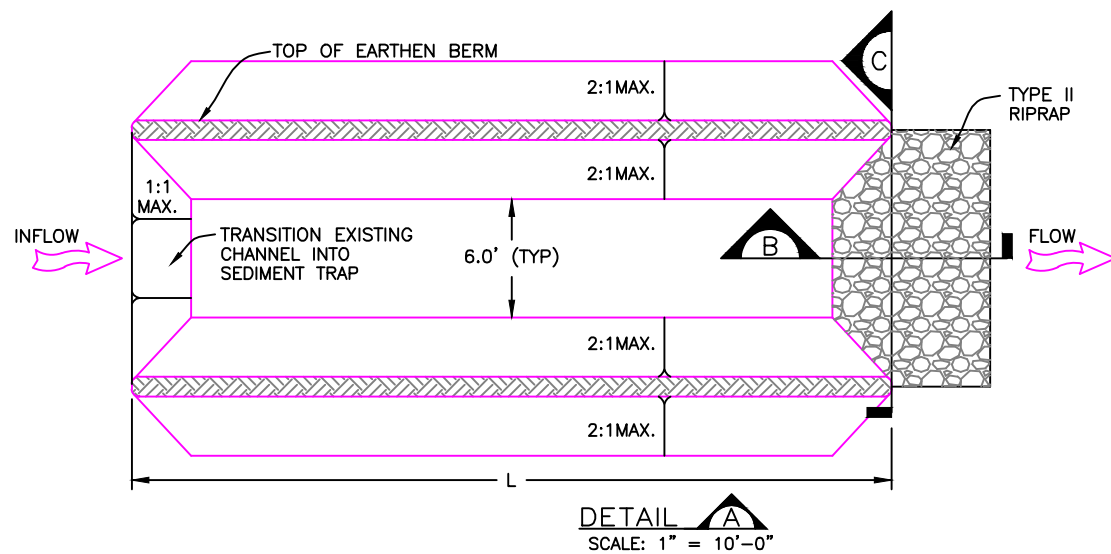


#### SEDIMENT RETENTION FIBER ROLL INSTALLATION NOTES

- SEE PLAN VIEW FOR:
  - LOCATION
  - LENGTH (L)
  - DEPTH (D), (TYPICAL DIAMETERS ARE 9", 12" AND 20")
  - IF LINED STATE TYPE (ROCK TYPE FROM TABLE 1, 15 MIL PLASTIC, FABRIC OR OTHER)
  - IF LINED STATE TOP WIDTH (T)
  - IF USED FOR PONDING, STATE GROUND ELEVATION AT BASE.
- SEDIMENT RETENTION FIBER ROLL (SRFR) INDICATED ON INITIAL ESC PLAN SHALL BE INSTALLED PRIOR TO ANY LAND-DISTURBING ACTIVITIES.
- SEDIMENT RETENTION FIBER ROLL SHALL CONSIST OF STRAW, COMPOST, EXCELSIOR, OR COCONUT FIBER.
- NOT FOR USE IN CONCENTRATED FLOW AREAS.
- THE SEDIMENT CONTROL LOG SHALL BE TRENCHED INTO THE GROUND A MINIMUM OF 2". IF REINFORCED ROCK BERM IS USED TO MOVE WATER, AND PLASTIC OR FABRIC IS UTILIZED,
- INSTALLATION MUST CONFORM TO THE FOLLOWING REQUIREMENTS:
  - SECURE FABRIC WITH WOOD STAKES OR LANDSCAPE STAPLES. SECURE PLASTIC WITH LANDSCAPE STAPLES
  - INSTALL ANCHOR TRENCH AT PERIMETER OF LINER AND AT OVERLAPPING JOINTS WITH ANY ADJACENT ROLLS OF LINER SIMILAR TO DETAIL 12
  - INSTALL INTERMEDIATE ANCHOR TRENCH AT ONE-HALF ROLL-LENGTH SIMILAR TO DETAIL 12
  - INSTALL TRANSVERSE ANCHOR TRENCHES AT PERIMETER OF BLANKET AND AT OVERLAPPING JOINTS WITH ANY ADJACENT ROLLS OF PRODUCT, SIMILAR TO DETAIL 12.

#### SEDIMENT RETENTION FIBER ROLL MAINTENANCE NOTES

- THE ESC 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 DISTURBED AREA EXISTS AFTER REMOVAL, IT SHALL BE SEEDED AND MULCHED OR OTHERWISE STABILIZED IN A MANNER APPROVED BY THE CITY.



#### SEDIMENT TRAP INSTALLATION NOTES

- SEE PLAN VIEW FOR:
  - LOCATION
  - LENGTH (L)
- SEDIMENT TRAPS INDICATED ON INITIAL ESC PLAN SHALL BE INSTALLED PRIOR TO ANY LAND-DISTURBING ACTIVITIES.
- SEDIMENT TRAP BERM SHALL BE MACHINE COMPACTED MATERIAL FROM EXCAVATION.
- RIPRAP OUTLET SHALL BE CONSTRUCTED WITH TYPE II RIPRAP WITH A MINIMUM OVERFLOW OF 6".
- THE TOP OF THE EARTHEN BERM SHALL BE A MINIMUM OF 6" HIGHER THAN THE TOP OF THE RIPRAP OUTLET STRUCTURE.
- THE ENDS OF THE RIPRAP OUTLET STRUCTURE SHALL BE MINIMUM OF 6" HIGHER THAN THE CENTER OF THE OUTLET STRUCTURE.

#### SEDIMENT TRAP MAINTENANCE NOTES

- THE ESC 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 RIPRAP SHALL BE REMOVED WHEN THE UPSTREAM SEDIMENT DEPTH IS WITHIN 1/2 THE HEIGHT OF THE RIPRAP OUTLET STRUCTURE.
- SEDIMENT TRAPS SHALL REMAIN IN PLACE UNTIL THE UPSTREAM DISTURBED AREA IS STABILIZED AND GRASS COVERAGE IS APPROVED BY THE CITY.
- WHEN SEDIMENT TRAPS ARE REMOVED THE DISTURBED AREA SHALL BE SEEDED AND MULCHED OR STABILIZED IN A MANNER APPROVED BY THE CITY.

#### SEEDING AND MULCHING INSTALLATION NOTES

- SEE PLAN VIEW FOR:
  - AREA (A) IN ACRES TO BE SEEDED AND MULCHED.
  - TYPE OF SEED MIX (PERMANENT OR TEMPORARY).
  - IF HYDRAULIC SEEDING AND MULCHING IS USED, STATE TYPE, BRAND NAME, AND ANY OTHER INFORMATION REQUIRED TO PURCHASE AND APPLY
- SEEDING SHALL CONFORM TO THE TABLE BELOW:
- PERMANENT SEED MIX SHALL BE USED UNLESS OTHERWISE APPROVED BY THE CITY.
- ALL AREAS TO BE SEEDED AND MULCHED SHALL HAVE NATIVE TOPSOIL OR APPROVED SOIL AMENDMENTS SPREAD TO A DEPTH OF AT LEAST 4 INCHES (LOOSE DEPTH). HAUL ROADS AND OTHER COMPACTED AREAS SHALL BE LOOSENEED TO A DEPTH OF 6 INCHES PRIOR TO SPREADING TOPSOIL.
- SOIL IS TO BE THOROUGHLY LOOSENEED (TILLED) TO A DEPTH OF AT LEAST 6 INCHES PRIOR TO SEEDING. THE TOP 4 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 THOROUGHLY LOOSENEED SHALL BE REJECTED.
- MATERIAL USED FOR MULCH SHALL CONSIST OF LONG-STEMMED STRAW. AT LEAST 50 PERCENT OF THE MULCH, BY WEIGHT, SHALL BE 10 INCHES OR MORE IN LENGTH. MULCH SHALL BE APPLIED AT A RATE OF 4000 LB. OF STRAW PER ACRE.
- SEEDING AND MULCHING SHALL BE COMPLETED WITHIN 30 DAYS OF INITIAL EXPOSURE OR 14 DAYS AFTER GRADING IS SUBSTANTIALLY COMPLETE IN A GIVEN AREA (OR HAVE AN APPROVED SCHEDULE OF STABILIZATION COMPLETION APPROVED BY THE ESC INSPECTOR DURING THE PRE-CONSTRUCTION MEETING). THIS MAY REQUIRE MULTIPLE MOBILIZATIONS FOR SEEDING AND MULCHING.
- MULCH SHALL BE APPLIED WITHIN 24-HOURS OF SEEDING.
- TACKIFIER MAY BE UTILIZED TO HELP WITH STRAW DISPLACEMENT.

#### SEEDING AND MULCHING MAINTENANCE NOTES

- SEEDED AND MULCHED AREAS SHALL BE INSPECTED FOR REQUIRED COVERAGE MONTHLY UNTIL A WRITTEN ACCEPTANCE OF VEGETATION IS RECEIVED FROM THE CITY. REPAIRS AND RE-SEEDING AND MULCHING SHALL BE UNDERTAKEN AFTER THE FIRST GROWING SEASON FOR ANY AREAS FAILING TO MEET THE REQUIRED COVERAGE.
- REQUIRED COVERAGE FOR 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-FOOT BY TWO-FOOT OR EQUIVALENT).
  - FREE OF ERODED AREAS.
- RILL AND GULLY EROSION SHALL BE FILLED WITH TOPSOIL PRIOR TO RESEEDING. THE RESEEDING METHOD SHALL BE APPROVED BY THE CITY.

Dates For Seeding												
Permanent Seeding	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Tall Fescue			0	0					0	0		
Smooth Brome			0	0					0	0		
Fescue & Brome			0	0					0	0		
Fescue, Rye & Bluegrass	A	A	0	0	A	P	P	0	0	A	P	P
Temporary Seeding	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Rye or Sudan	A	A	0	0	0	0	0	0	0	0	A	A
Oats	A	0	0	0	0	0	0	0	0	0		

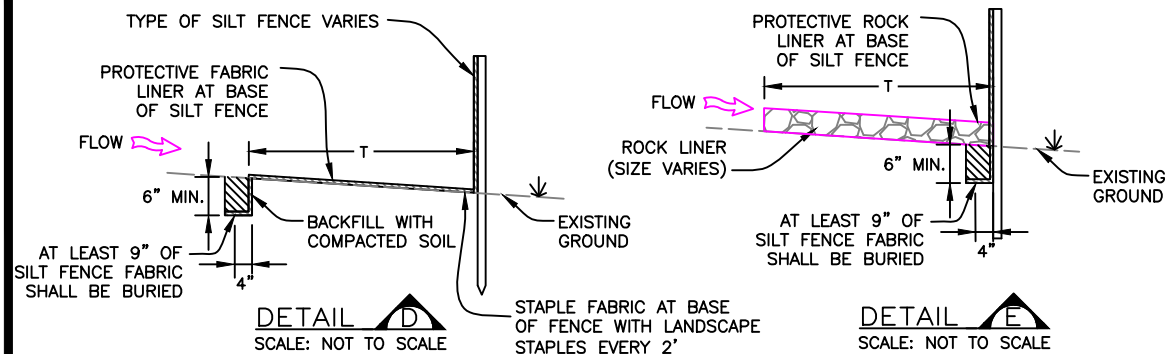
0 - Optimum seeding dates  
A - Acceptable seeding dates  
P - Permitted seeding dates with reseeding 2 months later - Initially use 50% of seed and 75% of fertilizer. Reseed with additional 75% seed and remaining fertilizer.

Minimum Fertilizer and Seeding Rates		
Permanent Seeding *	lb./acre	lb./1000 sq.ft.
Tall Fescue	300	7
Smooth Brome	200	4.6
Mixture #1	250	5.7
Mixture #2	210	4.8
Mixture #1 - Tall Fescue @ 150 lbs./ac. and Brome @ 100 lbs./ac. Mixture #2 - Tall Fescue @ 100 lbs./ac., Perennial Rye Grass @ 100 lbs./ac. and Kentucky Bluegrass @ 10 lbs./ac.		
* Seeding rate for slopes in excess of 20% (5:1) shall be 10 lb./1000 sq. ft.		
Temporary Seeding	lb./acre	lb./1000 sq.ft.
Rye or Sudan	150	3.5
Oats	120	2.8
Fertilizer	Permanent Seeding (lb./acre)	Temporary Seeding (lb./acre)
Nitrogen	45	30
Phosphate	65	30
Potassium	65	30
Lime - ENM	600	600
ENM - effective neutralizing material per State evaluation of quarried rock		

SRFR-P/M/SM/S SEDIMENT RETENTION FIBER ROLL 14

ST-P SEDIMENT TRAP 15

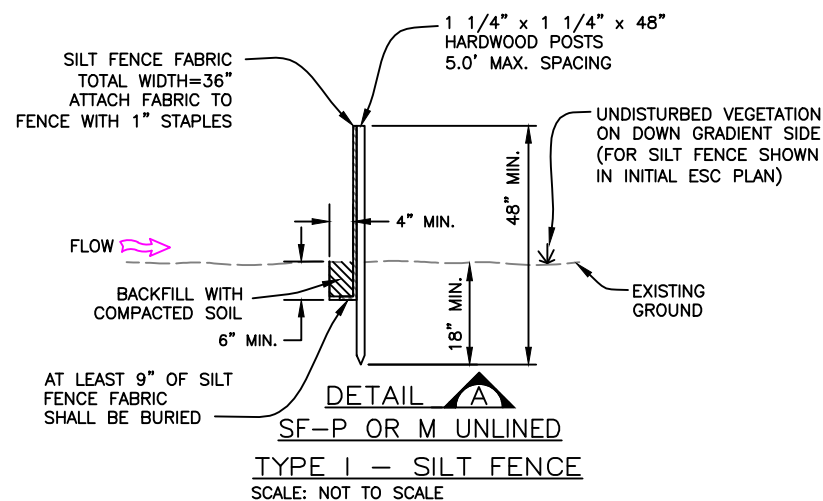
SM-S SEEDING AND MULCHING 16



SF-M LINED WITH FABRIC  
SILT FENCE FOR MOVING WATER (ALL TYPES OF SILT FENCE)

SILT FENCE FOR MOVING WATER GENERAL NOTES

1. ALL TYPES OF SILT FENCE (I, II, AND III) MAY BE USED TO MOVE WATER.
2. LINER TYPES INCLUDE FABRIC AND ROCK.



TYPE I SILT FENCE INSTALLATION NOTES

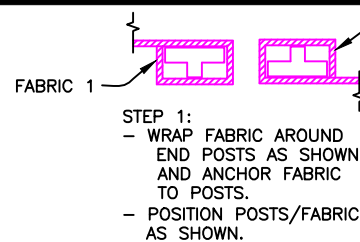
1. SEE PLAN VIEW FOR:
  - LOCATION
  - LENGTH (L)
  - TYPE (I, II, OR III)
  - IF LINED STATE TYPE (FABRIC, OR ROCK TYPE FROM TABLE 1).
  - IF LINED, STATE TOP WIDTH (T)
  - IF USED FOR PONDING, STATE GROUND ELEVATION AT BASE OF SILT FENCE.
2. TYPE I SILT FENCE IS DESIGNED FOR A MAXIMUM WATER DEPTH OF 12".
3. THE POSTS USED SHALL CONSIST OF HARDWOOD AND HAVE DIMENSIONS OF 48" TALL, 1 1/4"x1 1/4" OR LARGER AT A MAXIMUM SPACING OF 5.0'. SILT FENCE SHOULD BE ATTACHED TO THE POST BY A MINIMUM OF ONE STAPLE. THE REQUIRED MINIMUM DEPTH OF THE POSTS BELOW THE GROUND SURFACE IS 18".

GENERAL SILT FENCE NOTES

1. ANCHOR TRENCH SHALL BE COMPACTED SUCH THAT SILT FENCE RESISTS BEING PULLED OUT BY HAND.
2. SILT FENCE GEOTEXTILE SHALL MEET THE FOLLOWING REQUIREMENTS:
  - 6-TO 12-GALLONS PER MINUTE PER SQUARE FOOT CLEAN WATER FLOW CAPACITY.
  - 90 LB. TENSILE STRENGTH PER ASTM D4622.
  - UV DESIGN AT 500 HRS MIN. 70% STRENGTH RETAINED PER ASTM D 4355.
3. SILT FENCE INDICATED ON INITIAL ESC PLAN SHALL BE INSTALLED PRIOR TO ANY LAND-DISTURBING ACTIVITIES.
4. WHEN INSTALLED AT THE TOE OF A SLOPE, SILT FENCE SHALL BE PLACED A MINIMUM OF 5' FEET FROM THE TOE TO ALLOW SPACE FOR PONDING AND COLLECTION OF WATER AND SEDIMENT.

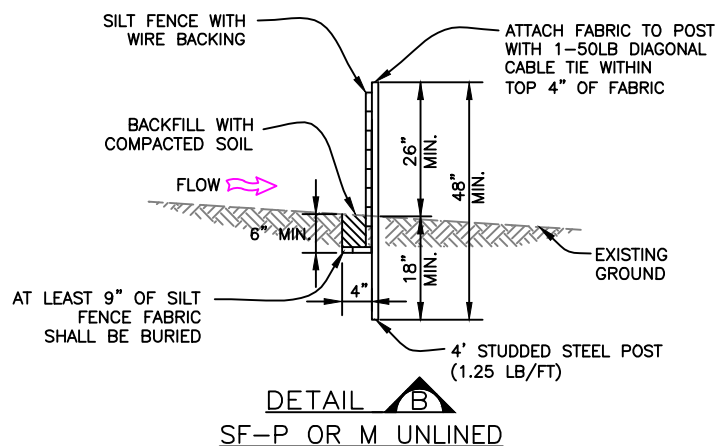
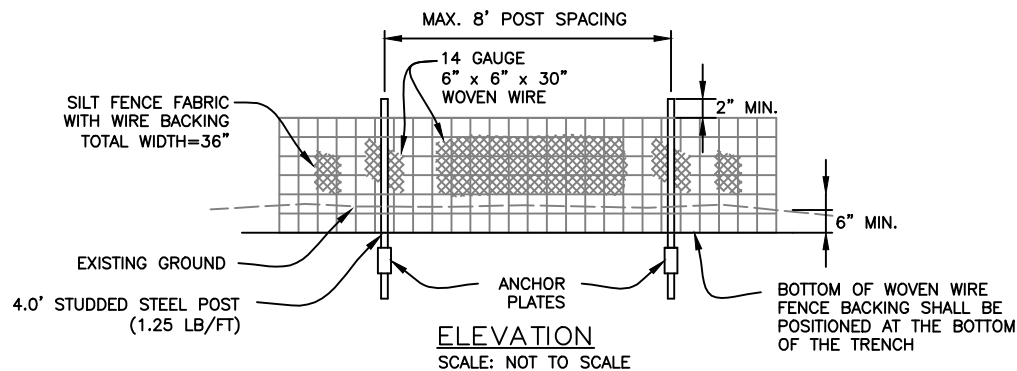
GENERAL SILT FENCE MAINTENANCE NOTES

1. MAINTENANCE SHALL BE PERFORMED ON SILT FENCE TO ALLOW THE MAXIMUM PONDING DEPTH FOR EACH TYPE OF SILT FENCE. FOR EXAMPLE, IF THE SEDIMENT HEIGHT FOR A TYPE I SILT FENCE REACHES 15" ABOVE THE GROUND LEVEL, SEDIMENT SHALL BE REMOVED TO ALLOW THE REQUIRED 12" OF PONDING.
2. CAPTURED SEDIMENT SHALL BE REMOVED WHEN "BULGES" DEVELOP IN THE SILT FENCE AND/OR WHEN EVIDENCE OF FILTER CLOGGING IS OBSERVED.



- JOINT DETAIL NOTES:**
- THICKNESS OF GEOTEXTILE HAS BEEN EXAGGERATED.
  - APPLICABLE FOR WOODEN POSTS OR STEEL POSTS.
  - WHEN USING WOODEN POSTS, STAPLE FABRIC TO POSTS AT 6" VERTICAL SPACING.

SILT FENCE JOINT DETAIL F  
SCALE: NOT TO SCALE

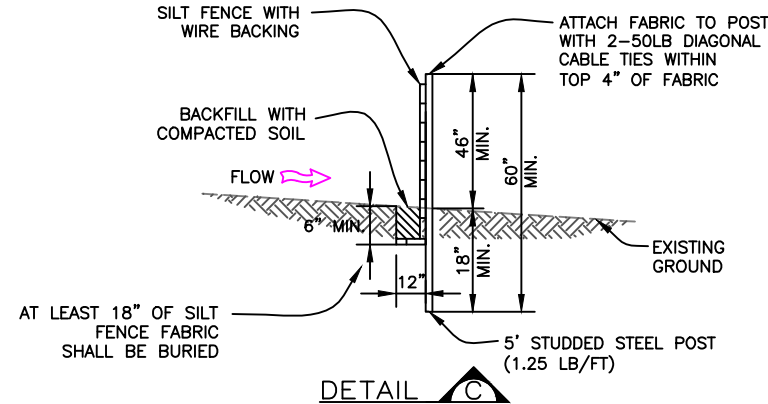
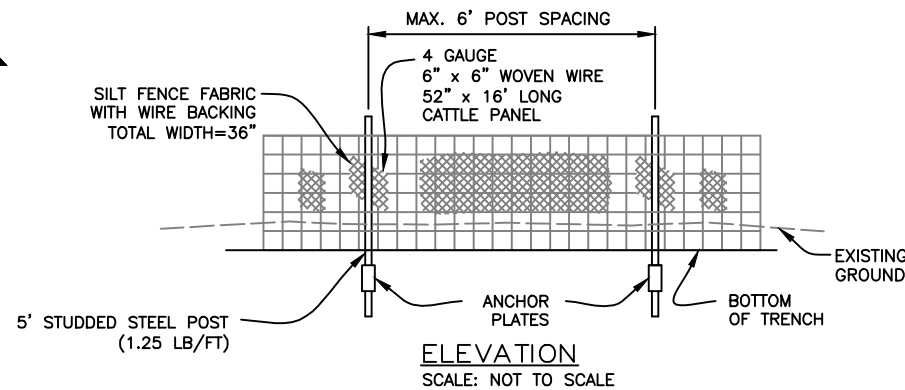
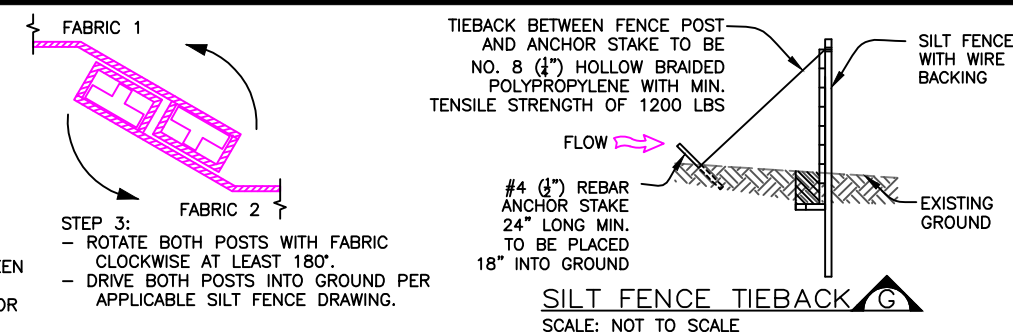


TYPE II - SILT FENCE WITH WIRE BACKING  
SCALE: NOT TO SCALE

TYPE II SILT FENCE INSTALLATION NOTES

1. SEE PLAN VIEW FOR:
  - LOCATION
  - LENGTH (L)
  - TYPE (I, II, OR III)
  - IF LINED STATE TYPE (FABRIC, PLASTIC OR ROCK TYPE FROM TABLE 1)
  - IF USED FOR PONDING, STATE GROUND ELEVATION AT BASE OF SILT FENCE.
2. TYPE II SILT FENCE IS DESIGNED FOR A MAXIMUM WATER DEPTH OF 18", SHALL CONSIST OF 36" WIDE GEOTEXTILE FABRIC, AND SHALL BE REINFORCED WITH 14 GAUGE 6"x6"x30" WELDED WIRE FABRIC.
3. FASTEN WITH 1-50LB DIAGONAL CABLE TIE WITHIN THE TOP 4" OF FABRIC.
4. "T" POSTS USED SHALL BE BE 4.0' LONG AND CONSIST OF STUDDED STEEL WITH A MAXIMUM SPACING OF 8'. "T-POST" SHALL BE 1.25 LB/FT.

SF-P/M SILT FENCE 17



TYPE III - SILT FENCE WITH WIRE BACKING  
SCALE: NOT TO SCALE

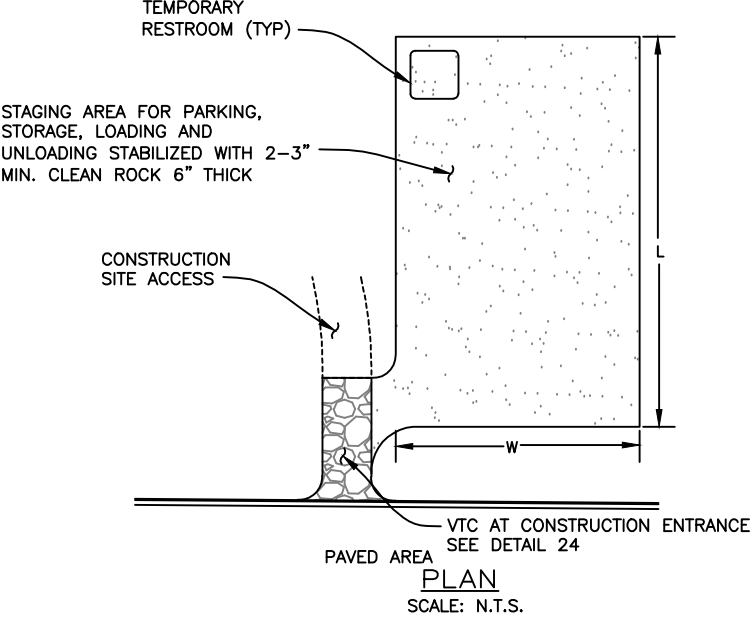
TYPE III SILT FENCE INSTALLATION NOTES

1. SEE PLAN VIEW FOR:
  - LOCATION
  - LENGTH (L)
  - TYPE (I, II, OR III)
  - IF LINED STATE TYPE (FABRIC OR ROCK TYPE FROM TABLE 1)
  - IF USED FOR PONDING, STATE GROUND ELEVATION AT BASE OF SILT FENCE.
2. TYPE III SILT FENCE IS DESIGNED FOR A MAXIMUM WATER DEPTH OF 36" AND CONSISTS OF 64" WIDE GEOTEXTILE FABRIC.
3. FASTEN WITH 2-50LB DIAGONAL CABLE TIES WITHIN THE TOP 4" OF FABRIC.
4. THE 72" GEOTEXTILE FABRIC IS NOT A STANDARD WIDTH OF FABRIC USED FOR SILT FENCE. THE CONTRACTOR MUST USE MIRAFI 500X GEOTEXTILE FABRIC (OR EQUAL) WHICH IS MANUFACTURED IN 12.5'x432' AND 17.5'x309' WIDTHS. IT IS ACCEPTABLE FOR THE CONTRACTOR TO CUT THE ROLL TO THE APPROPRIATE SIZE IN THE FIELD WITH A CONCRETE SAW.
5. FABRIC IS REINFORCED WITH 52"x16" CATTLE PANELS. THE MINIMUM WIRE THICKNESS OF PANEL IS 4 GAUGE WITH A MAXIMUM WIRE SPACING OF 6"x6". EACH PANEL SHALL BE OVERLAPPED BY ANOTHER PANEL BY 4' AND THE MIDDLE OF THE OVERLAP SHALL OCCUR OVER A "T-POST". THE PANELS ARE TO BE SECURED TO EACH OTHER WITHIN THE OVERLAP AT EACH END OF THE OVERLAP AND IN THE MIDDLE OF THE POST WITH WIRE EVERY 12" VERTICALLY. ALL CONNECTIONS BETWEEN THE OVERLAPPING PANELS AND "T-POST" SHOULD OCCUR PRIOR TO INSTALLING FABRIC.
6. SEPARATE ROLLS OF FABRIC SHOULD BE CONNECTED PER SILT FENCE JOINT DETAIL. EVERY FOURTH FENCE POST REQUIRES A TIEBACK AS SHOWN IN SILT FENCE TIEBACK DETAIL.
7. THE "T-POSTS" USED SHALL BE 5' LONG AND CONSIST OF STUDDED STEEL WITH A MAXIMUM SPACING OF 5.0'. "T-POST" SHALL BE 1.25 LB/FT.



Table with 3 columns: CONSTRUCTION PHASE, MIN. W, MIN. L. Rows include ROUGH GRADING, SEWER & STREET CONSTRUCTION, RESIDENTIAL CONSTRUCTION\*, and COMMERCIAL BUILDING CONSTRUCTION.

\* MULTIPLE BUILDINGS WILL REQUIRE MORE PARKING SPACE

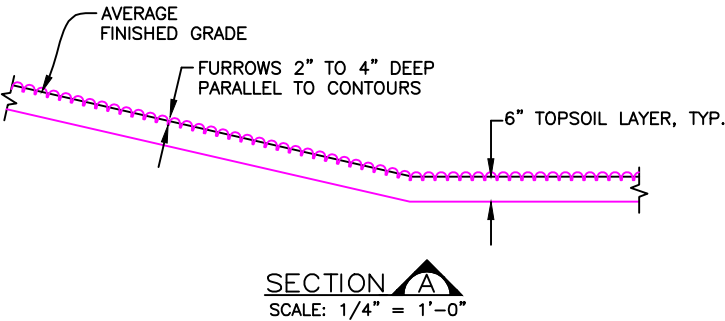


STABILIZED STAGING AREA INSTALLATION NOTES

- 1. SEE PLAN VIEW FOR: - LOCATION OF STAGING AREA (CONTRACTOR MAY MODIFY LOCATION AND SIZE OF STABILIZED STAGING AREA WITH CITY APPROVAL) - APPROXIMATE AREA (A) IN SQUARE YARDS
- 2. STABILIZED STAGING AREA SHALL BE LARGE ENOUGH TO FULLY CONTAIN PARKING, STORAGE, AND UNLOADING AND LOADING OPERATIONS.
- 3. IF REQUIRED BY THE CITY, SITE ACCESS ROADS SHALL BE STABILIZED IN THE SAME MANNER AS THE STAGING AREA.
- 4. STAGING AREA SHALL BE STABILIZED PRIOR TO ANY OTHER OPERATIONS ON THE SITE.
- 5. THE STABILIZED STAGING AREA SHALL CONSIST OF A MINIMUM OF 3" OF GRANULAR MATERIAL (GRAVEL OR RECYCLED CONCRETE).

STABILIZED STAGING AREA MAINTENANCE NOTES

- 1. THE ESC MANAGER SHALL INSPECT THE STABILIZED STAGING AREA WEEKLY, DURING AND AFTER ANY STORM EVENT AND MAKE REPAIRS OR CLEAN OUT UPSTREAM SEDIMENT AS NECESSARY.
- 2. ESC MANAGER SHALL PROVIDE ADDITIONAL THICKNESS OF GRANULAR MATERIAL IF ANY RUTTING OCCURS OR UNDERLYING SUBGRADE BECOMES EXPOSED.
- 3. STABILIZED STAGING AREA SHALL BE ENLARGED IF NECESSARY TO CONTAIN PARKING, STORAGE, AND UNLOADING AND LOADING OPERATIONS.
- 4. ANY ACCUMULATED DIRT OR MUD SHALL BE REMOVED FROM THE SURFACE OF THE STABILIZED STAGING AREA.
- 5. THE STABILIZED STAGING AREA SHALL BE REMOVED AT THE END OF CONSTRUCTION. THE GRANULAR MATERIAL SHALL BE REMOVED OR, IF APPROVED BY THE CITY, USED ON SITE, AND THE AREA TOPSOILED, SEEDED AND MULCHED OR OTHERWISE STABILIZED.

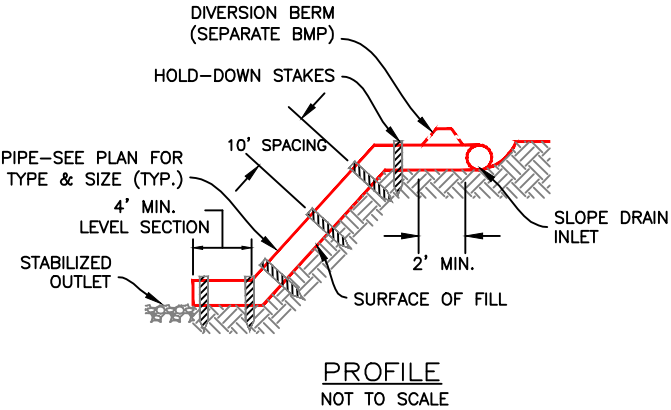
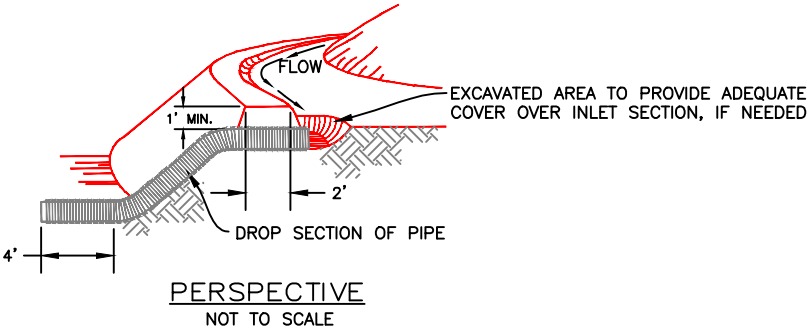


SURFACE ROUGHENING INSTALLATION NOTES

- 1. SURFACE ROUGHENING SHALL BE PROVIDED ON ALL FINISHED GRADES (SLOPES AND "FLAT" AREAS) WITHIN 2 DAYS OF COMPLETION OF FINISHED GRADE (FOR AREAS NOT RECEIVING TOPSOIL) OR WITHIN 2 DAYS OF TOPSOIL PLACEMENT.
- 2. AREAS WHERE BUILDING FOUNDATIONS, PAVEMENT, OR SOD IS TO BE PLACED WITHIN 7-DAYS OF FINISHED GRADING DO NOT NEED TO BE SURFACE ROUGHENED.
- 3. DISTURBED SURFACES SHALL BE ROUGHENED USING RIPPING OR TILLING EQUIPMENT ON THE CONTOUR OR TRACKING UP AND DOWN A SLOPE USING EQUIPMENT TREADS.

SURFACE ROUGHENING MAINTENANCE NOTES

- 1. THE ESC MANAGER SHALL INSPECT THE SURFACE ROUGHENING WEEKLY, DURING AND AFTER ANY STORM EVENT AND MAKE REPAIRS OR CLEAN OUT UPSTREAM SEDIMENT AS NECESSARY.
- 2. VEHICLES AND EQUIPMENT SHALL GENERALLY BE CONFINED TO ACCESS DRIVES AND SHALL NOT BE DRIVEN OVER AREAS THAT HAVE BEEN SURFACE ROUGHENED.
- 3. IN NON-TURF GRASS FINISHED AREAS, SEEDING AND MULCHING SHALL TAKE PLACE DIRECTLY OVER SURFACE ROUGHENED AREAS WITHOUT FIRST SMOOTHING OUT THE SURFACE.
- 4. IN AREAS NOT SEEDED AND MULCHED AFTER SURFACE ROUGHENING, SURFACES SHALL BE RE-ROUGHENED AS NECESSARY TO MAINTAIN GROOVE DEPTH AND SMOOTH OVER ANY RILL EROSION.



SLOPE DRAIN INSTALLATION NOTES

- 1. SEE PLAN VIEW FOR: - TYPE OF SLOPE DRAIN (PIPE, RIP RAP LINED, PLASTIC LINED, OR OTHER) - LOCATION AND LENGTH (L) OF SLOPE DRAIN. - PIPE DIAMETER (D) AND/OR SIZE OF RIPRAP (FROM TABLE 1)
- 2. SLOPE DRAIN DIMENSIONS SHALL BE CONSIDERED MINIMUM DIMENSIONS; CONTRACTOR MAY ELECT TO INSTALL LARGER FACILITIES. ANY DAMAGE TO SLOPE OR SLOPE DRAIN DURING RUNOFF EVENTS SHALL BE THE CONTRACTOR'S RESPONSIBILITY.
- 3. SLOPE DRAINS INDICATED ON INITIAL ESC PLAN SHALL BE INSTALLED PRIOR TO ANY UPSTREAM LAND-DISTURBING ACTIVITIES.
- 4. FOR TEMPORARY SLOPE DRAINS, PIPE MAY BE INSTALLED ON TOP OF SLOPE; HOWEVER, 12" MIN. COVER AT TOP OF SLOPE SHALL BE PROVIDED.
- 5. A RIPRAP PAD SHALL BE PLACED AT THE OUTFALL OF THE SLOPE DRAIN.

SLOPE DRAIN MAINTENANCE NOTES

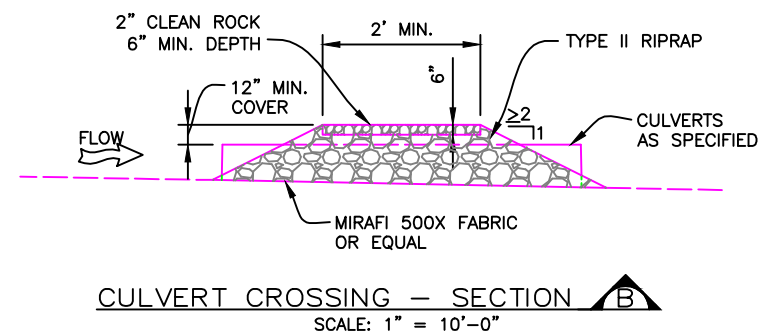
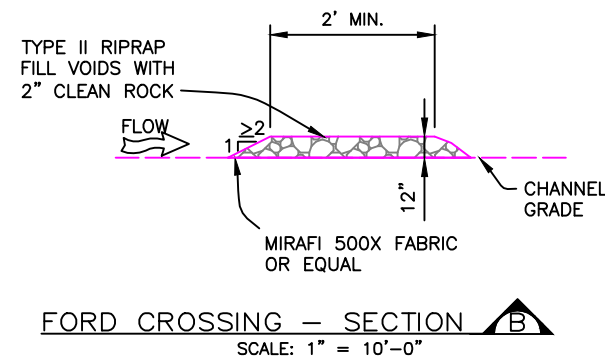
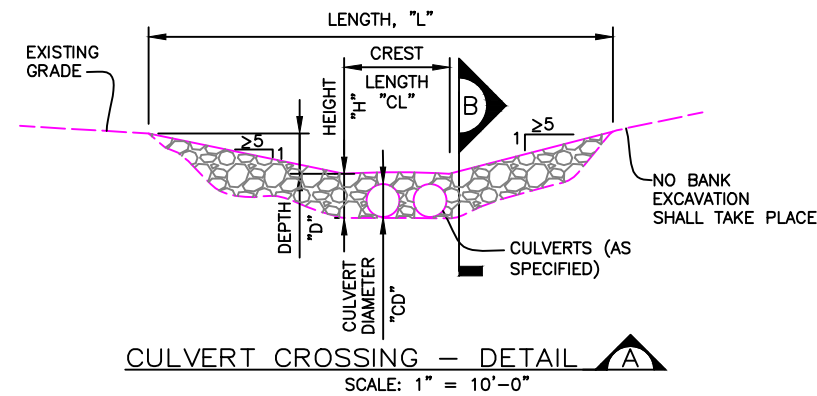
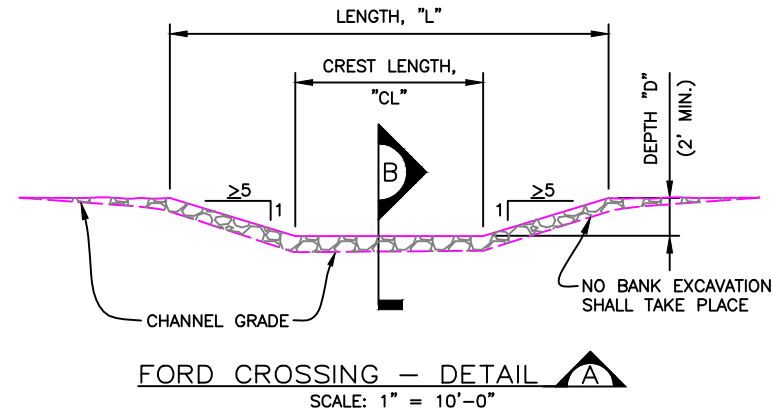
- 1. THE ESC MANAGER SHALL INSPECT SLOPE DRAINS WEEKLY, DURING AND AFTER ANY STORM EVENT AND MAKE REPAIRS AS NECESSARY.
- 2. TEMPORARY SLOPE DRAINS ARE TO REMAIN IN PLACE UNTIL NO LONGER NEEDED, BUT SHALL BE REMOVED PRIOR TO THE END OF CONSTRUCTION. WHEN SLOPE DRAINS ARE REMOVED, THE DISTURBED AREA SHALL BE SEEDED AND MULCHED OR OTHERWISE STABILIZED IN A MANNER APPROVED BY THE CITY.

SSA-C STABILIZED STAGING AREA 18

SR-S SURFACE ROUGHENING 19

TSD-S TEMPORARY SLOPE DRAIN 20





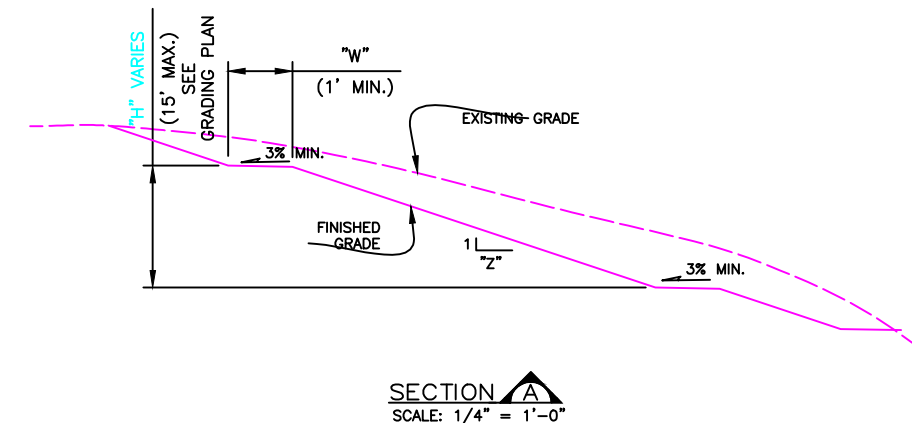
#### TEMPORARY STREAM CROSSING INSTALLATION NOTES

- SEE PLAN VIEW FOR:
  - LOCATION(S)
  - STREAM CROSSING TYPE (FORD OR CULVERT).
  - FOR FORD CROSSING: LENGTH (L), CREST LENGTH (CL) AND DEPTH (D).
  - FOR CULVERT CROSSING : LENGTH (L), CROSSING HEIGHT (Y), OVERTOPPING DEPTH (H), CULVERT DIAMETER (D), AND NUMBER OF CULVERTS.
- TEMPORARY STREAM CROSSING DIMENSIONS, AVERAGE ROCK DIAMETER, 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 13 FOR RIPRAP GRADATIONS.
- FOR A TEMPORARY STREAM CROSSING THAT WILL CARRY LOADS, THE TEMPORARY STREAM CROSSING MUST BE DESIGNED BY THE DESIGN ENGINEER.

#### TEMPORARY STREAM CROSSING MAINTENANCE NOTES

- THE ESC MANAGER SHALL INSPECT STREAM CROSSINGS WEEKLY, 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).
- STREAM CROSSINGS ARE TO REMAIN IN PLACE UNTIL NO LONGER NEEDED, BUT SHALL BE REMOVED PRIOR TO THE END OF CONSTRUCTION.
- WHEN STREAM CROSSINGS ARE REMOVED, THE DISTURBED AREA SHALL BE SEEDED AND MULCHED AND COVERED WITH EROSION CONTROL BLANKET OR OTHERWISE STABILIZED IN A MANNER APPROVED BY THE CITY.

 TSC-C TEMPORARY STREAM CROSSING (21)



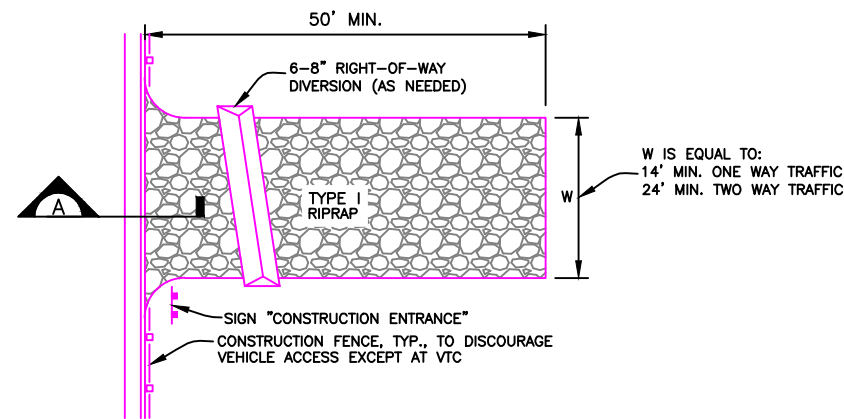
#### TERRACING INSTALLATION NOTES

- SEE PLAN VIEW FOR:
  - LOCATION AND LENGTH (L) OF TERRACING
  - WIDTH (W) AND HEIGHT (H)
- TERRACING IS NOT REQUIRED FOR SLOPES OF 4 TO 1 OR FLATTER.
- EARTH (VEGETATED) SLOPES STEEPER THAN 3 TO 1 ARE NOT ALLOWED ON THE SITE.

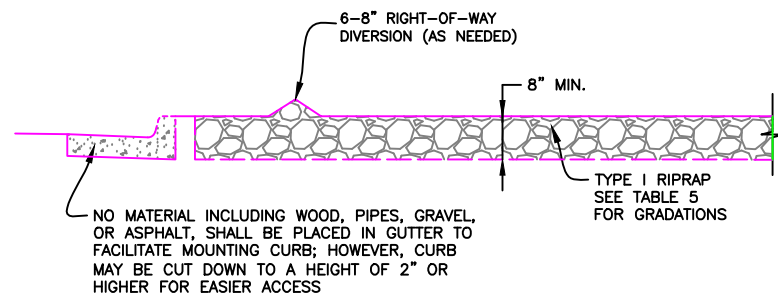
#### TERRACING MAINTENANCE NOTES

- THE ESC MANAGER SHALL INSPECT THE SURFACE ROUGHENING WEEKLY, DURING AND AFTER ANY STORM EVENT AND MAKE REPAIRS OR CLEAN OUT UPSTREAM SEDIMENT AS NECESSARY.
- ANY RILL EROSION OCCURRING ON SLOPES SHALL BE REPAIRED AND RESEEDED AND MULCHED IN ACCORDANCE WITH DETAIL 17.

 TER-S TERRACING (22)



PLAN  
SCALE: 1" = 20'-0"



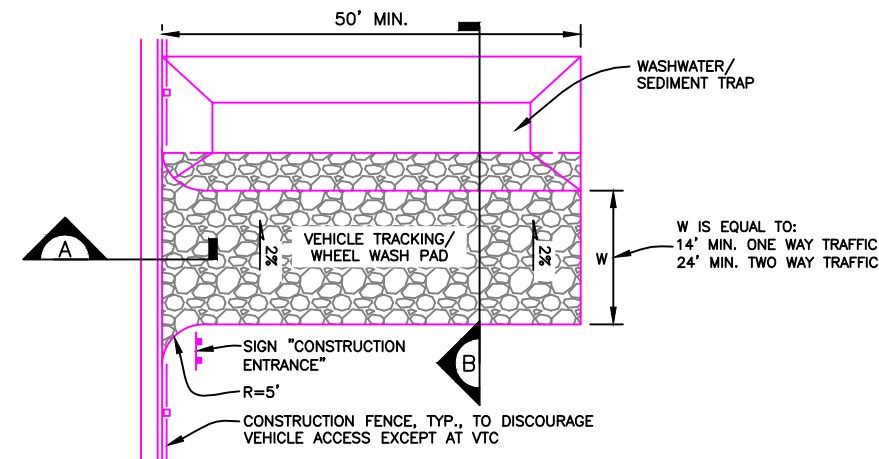
SECTION A  
SCALE: 1/4" = 1'-0"

#### VEHICLE TRACKING CONTROL INSTALLATION NOTES

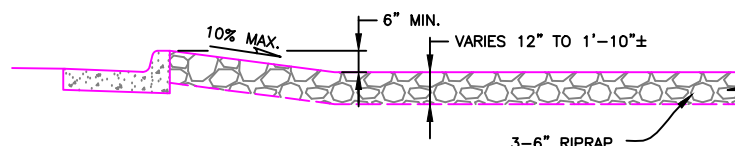
1. VEHICLE TRACKING CONTROL PADS SHALL BE INSTALLED AT EVERY ACCESS POINT TO SITE.
2. VEHICLE TRACKING CONTROL PADS SHALL CONSIST TYPE I RIPRAP (SEE TABLE 5 FOR GRADATIONS).
3. ANY CRACKED OR DAMAGED CURB AND GUTTER AND SIDEWALK SHALL BE REPLACED BY PERMITTEE.

#### VEHICLE TRACKING CONTROL MAINTENANCE NOTES

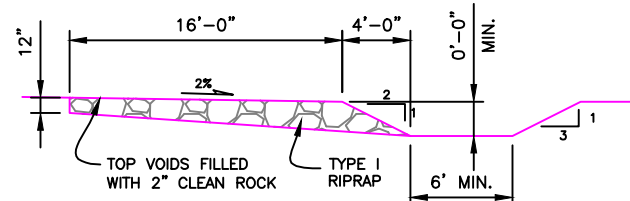
1. ESC MANAGER SHALL INSPECT VEHICLE TRACKING CONTROL DAILY. GRAVEL SURFACE SHALL BE CLEAN AND LOOSE ENOUGH TO RUT SLIGHTLY UNDER WHEEL LOADS AND CAUSE LOOSE GRAVEL TO DISLODGE MUD FROM TIRES. WHEN GRAVEL BECOMES COMPACTED OR FILLED WITH SEDIMENT SO THAT THE EFFECTIVENESS OF THE PAD IS DIMINISHED, CONTRACTOR SHALL RIP, TURN OVER, OR OTHERWISE LOOSEN GRAVEL, PLACE ADDITIONAL NEW GRAVEL, OR REPLACE WITH NEW GRAVEL AS NECESSARY TO RESTORE EFFECTIVENESS.
2. VEHICLE TRACKING CONTROL SHALL BE REMOVED AT THE END OF CONSTRUCTION, THE GRAVEL MATERIAL REMOVED OR, IF APPROVED BY THE CITY, USED ON SITE, AND THE AREA TOPSOILED, SEEDED AND MULCHED OR OTHERWISE STABILIZED.



PLAN  
SCALE: 1" = 20'-0"



SECTION A  
SCALE: 1/4" = 1'-0"



SECTION B  
SCALE: 1" = 10'-0"

#### VEHICLE TRACKING CONTROL WITH WHEEL WASH INSTALLATION NOTES

1. ALTHOUGH NOT NORMALLY USED, THE CITY RESERVES THE RIGHT TO REQUIRE VEHICLE TRACKING CONTROL WITH WHEEL WASH FACILITIES AT SITES WHERE TRACKING ONTO PAVED AREAS BECOMES A SIGNIFICANT PROBLEM.
2. 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.
3. VEHICLE TRACKING CONTROL PADS SHALL CONSIST TYPE I RIPRAP (SEE TABLE 5 FOR GRADATIONS).
4. ANY CRACKED OR DAMAGED CURB AND GUTTER AND SIDEWALK SHALL BE REPLACED BY CONTRACTOR.

#### VEHICLE TRACKING CONTROL WITH WHEEL WASH MAINTENANCE NOTES

1. ESC MANAGER SHALL INSPECT VEHICLE TRACKING CONTROL WITH WHEEL WASH FACILITIES DAILY. ACCUMULATED SEDIMENTS SHALL BE REMOVED FROM PAD SURFACE.
2. ACCUMULATED SEDIMENT IN THE WASHWATER/SEDIMENT TRAP SHALL BE REMOVED WHEN THE SEDIMENT DEPTH REACHES AN AVERAGE OF 12-INCHES.
3. VEHICLE TRACKING CONTROL WITH WHEEL WASH FACILITY SHALL BE REMOVED AT THE END OF CONSTRUCTION, THE RIPRAP MATERIAL REMOVED OR, IF APPROVED BY THE CITY, USED ON SITE, AND THE AREA TOPSOILED, SEEDED AND MULCHED OR OTHERWISE STABILIZED.

TABLE 5

RIPRAP TYPE	RIPRAP GRADATION
TYPE I	SHALL CONSIST OF MATERIAL WITH A PREDOMINANT ROCK SIZE OF 3 INCHES, A MAXIMUM ROCK SIZE OF 6 INCHES AND A GRADATION SUCH THAT NO MORE THAN 15 PERCENT WILL BE LESS THAN 1 INCH.
TYPE II	SHALL CONSIST OF MATERIAL WITH A PREDOMINANT ROCK SIZE OF 6 INCHES, A MAXIMUM ROCK SIZE OF 10 INCHES AND A GRADATION SUCH THAT NO MORE THAN 15 PERCENT WILL BE LESS THAN 3 INCHES.
TYPE III	SHALL CONSIST OF MATERIAL WITH A PREDOMINANT ROCK SIZE OF 12 INCHES, A MAXIMUM ROCK SIZE OF 20 INCHES AND A GRADATION SUCH THAT NO MORE THAN 15 PERCENT WILL BE LESS THAN 4 INCHES.

VTC-C VEHICLE TRACKING CONTROL (23)

WW-C VTC WITH WHEEL WASH (24)

*Appendix C*

**Example Staged ESC Drawings**

CONTRACT DRAWINGS FOR CONSTRUCTION OF  
BUSINESS SITE A  
GRADING, EROSION AND SEDIMENT CONTROL PLAN

I, PROPERTY OWNERS SIGNATURE, ASSUME AND ACKNOWLEDGE ANY LAND CLEARING, CONSTRUCTION, OR DEVELOPMENT INVOLVING THE MOVEMENT OF EARTH SHALL BE IN ACCORDANCE WITH THE ESC PLAN. I WILL MAINTAIN A CURRENT COPY OF THE ESC PLAN ON THE SITE IN A LOCATION VISIBLE TO ANYONE ENTERING THE SITE. THIS WILL ALLOW CITY PERSONNEL TO PERFORM QUALITY ASSURANCE INSPECTIONS WHEN NO ONE REPRESENTING THE ESC PLAN IS ON SITE. I WILL ALSO MAINTAIN ALL SITE INSPECTIONS WITH THE ESC PLAN ON SITE. I UNDERSTAND THAT THE ESC PLAN IS DEVELOPED TO PROTECT THE WATER QUALITY TO THE MAXIMUM EXTENT PRACTICABLE AND THIS MAY REQUIRE MODIFICATION TO THE ESC PLAN DURING THE DURATION OF THE PROJECT. IF THE REPRESENTATIVE OF THE CITY OF WEST PLAINS, THE ESC MANAGER, OR THE DESIGNER OF THE ESC PLAN, NOTIFIES ME THAT THE ESC PLAN NEEDS TO BE AMENDED, I WILL NOTIFY THE ENGINEER OF THE ESC PLAN TO ENSURE RECOMMENDATIONS ARE CONSIDERED.

I, SIGNATURE OF P.E., CERTIFY THAT THE ESC PLAN HAS BEEN DEVELOPED TO MINIMIZE EROSION AND REDUCE SEDIMENT FROM ENTERING ANY STATE, CITY, OR PRIVATELY OWNED WATERS TO THE MAXIMUM EXTENT PRACTICABLE. I HAVE VERIFIED ANY SPECIAL CONDITIONS FOR THIS SITE AND HAVE INCORPORATED SUCH INTO THE ESC PLAN. I SHALL AMEND THE ESC PLAN WHENEVER THE CURRENT ESC PLAN DOES NOT MEET STATE STANDARDS FOR STORMWATER OUTFALL REQUIREMENTS, SITE CONDITIONS CHANGE BMP REQUIREMENTS, EXCESSIVE AMOUNTS OF EROSION HAVE OCCURRED AND/OR NOTICEABLE SEDIMENT HAS LEFT THE SITE. I UNDERSTAND THAT THE ESC PLAN IS DEVELOPED TO PROTECT THE WATER QUALITY TO THE MAXIMUM EXTENT PRACTICABLE, AND THIS MAY REQUIRE MODIFICATION TO THE ESC PLAN DURING THE DURATION OF THE PROJECT. IF THE OWNER OF PROPERTIES NAME OR ESC MANAGER CONTACTS ME TO UPDATE OR CHANGE THE ESC PLAN AND I AGREE, THEN THE ESC PLAN WILL BE UPDATED WITHIN 72 HOURS OF NOTED NEED OF CHANGE TO THE ESC PLAN. IF I DISAGREE WITH AMENDING THE ESC PLAN AND THE CHANGES ARE NOT REQUIRED BY FEDERAL, STATE, OR CITY REQUIREMENTS, THEN IT SHOULD BE NOTED THAT I TAKE LIABILITY FOR ANY DEGRADATION OF WATER QUALITY THAT MAY OCCUR BY NOT MAKING THE REQUESTED AMENDMENT TO THE ESC PLAN. IF CHANGES ARE MADE TO THE ESC PLAN, I WILL PUBLISH ALL CHANGES TO THE ESC PLAN WITH AN INDICATOR TO ALL PARTIES AS TO WHICH COPY IS CURRENT.

I, SIGNATURE OF ESC MANAGER, AM THE AGENT OF OWNER OF PROPERTIES NAME TO INSURE THAT THIS SITE IS IN ACCORDANCE WITH THE ESC PLAN. I WILL PERFORM SITE INSPECTIONS AT LEAST ONCE PER WEEK BY THURSDAY SO THAT CORRECTIONS CAN BE MADE BEFORE THE END OF FRIDAY, AND NO LATER THAN 72 HOURS AFTER A HALF INCH OR MORE OF RAINFALL IN 24 HOURS. THESE SITE INSPECTIONS WILL BE RECORDED ON AN ESC INSPECTION FORM LOCATED IN THE CITY OF WEST PLAINS ESC MANUAL. THE PURPOSE OF SUCH INSPECTIONS WILL BE TO ENSURE PROPER INSTALLATION, OPERATION AND MAINTENANCE OF BMPS AND TO DETERMINE THE OVERALL EFFECTIVENESS OF THE ESC PLAN, AND THE NEED FOR ANY ADDITIONAL CONTROL MEASURES. IF CHANGES TO THE ESC PLAN ARE REQUIRED I WILL NOTIFY THE OWNER OF PROPERTIES NAME AND NAME OF P.E. WITHIN 24 HOURS.

THE EROSION AND SEDIMENT CONTROL PLAN INCLUDED HEREIN HAS BEEN PLACED IN THE WEST PLAINS FILE FOR THIS PROJECT AND APPEARS TO FULFILL APPLICABLE WEST PLAINS EROSION AND SEDIMENT CONTROL CRITERIA. ADDITIONAL 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.

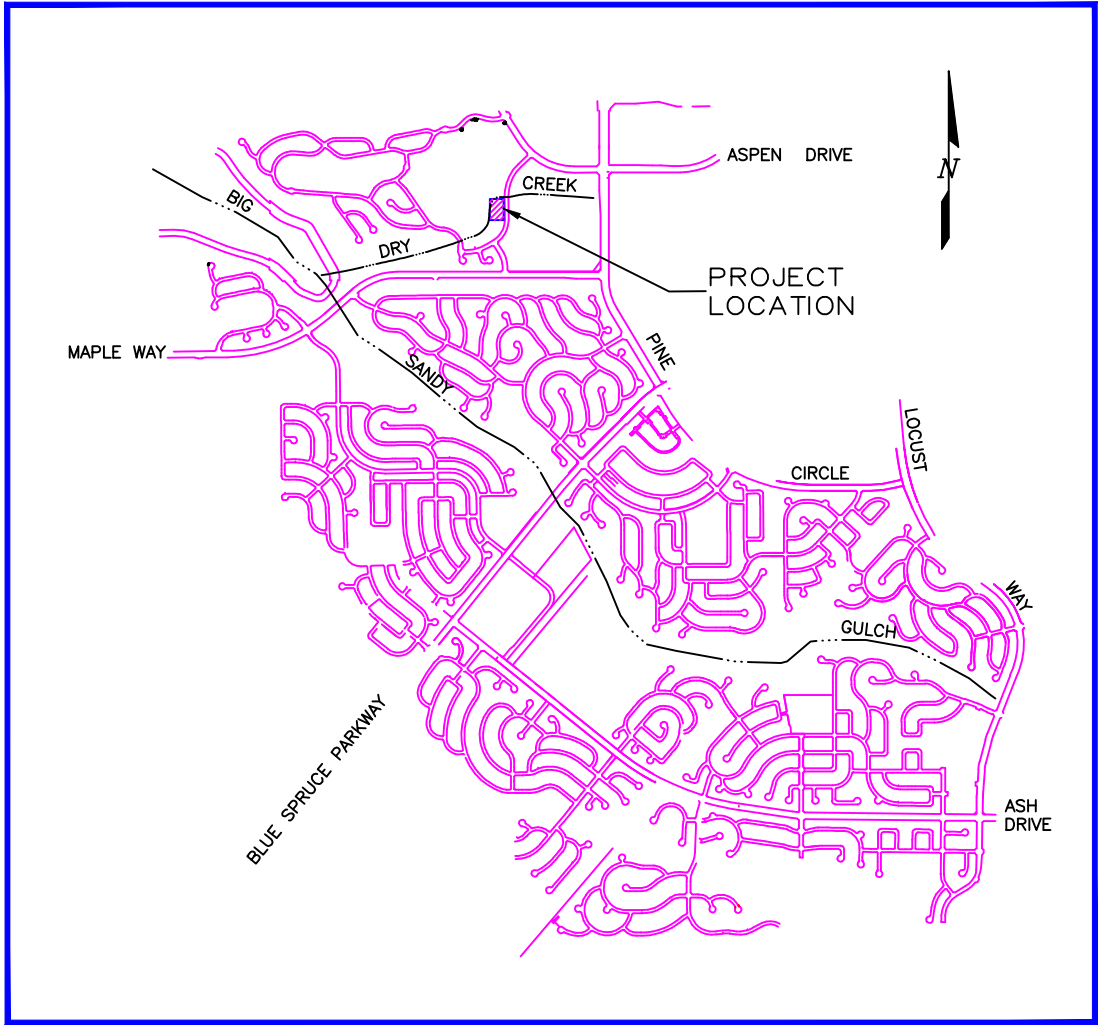
THE EROSION AND SEDIMENT CONTROL PLAN INCLUDED HEREIN HAS BEEN PREPARED UNDER MY DIRECT SUPERVISION IN ACCORDANCE WITH THE REQUIREMENTS OF THE EROSION, AND SEDIMENT CONTROL (ESC) MANUAL OF WEST PLAINS.

ESC PLANS PREPARED BY:

ENGINEER

DATE

PE NUMBER



PROJECT LOCATION: SOUTHWEST QUARTER OF SECTION 9  
TOWNSHIP 6S, RANGE 68W  
LOCATION MAP

SCALE 1"=1500'

MISSOURI ONE CALL  
SYSTEM, INC  
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BEFORE YOU DIG, GRADE, OR EXCAVATE  
FOR THE MARKING OF UNDERGROUND  
MEMBER UTILITIES.

EXAMPLE  
WEST PLAINS  
SMALL SITE  
ESC DRAWINGS

LIST OF DRAWINGS		
SHEET	DRAWING NO	TITLE
GENERAL DRAWINGS		
1	G-1	COVER SHEET
ESC DRAWINGS		
2	E-1	INITIAL ESC PLAN
3	E-2	INTERIM ESC PLAN
4	E-3	FINAL ESC PLAN
5	SHEET 1	ESC PLAN GENERAL NOTES AND LEGEND
6	SHEET 2	ESC PLAN GENERAL DETAILS
ESC GENERAL NOTES AND DETAILS		
7	SHEET 1	ESC PLAN GENERAL NOTES AND LEGEND
8 - 19	SHEETS 2 - 13	ESC PLAN GENERAL DETAILS

STORMWATER COORDINATOR

DATE

THESE CONSTRUCTION DRAWINGS HAVE BEEN  
REVIEWED BY WEST PLAINS FOR EROSION AND  
SEDIMENT CONTROL IMPROVEMENTS ONLY.

ENGINEERING DEPARTMENT ACCEPTANCE BLOCK

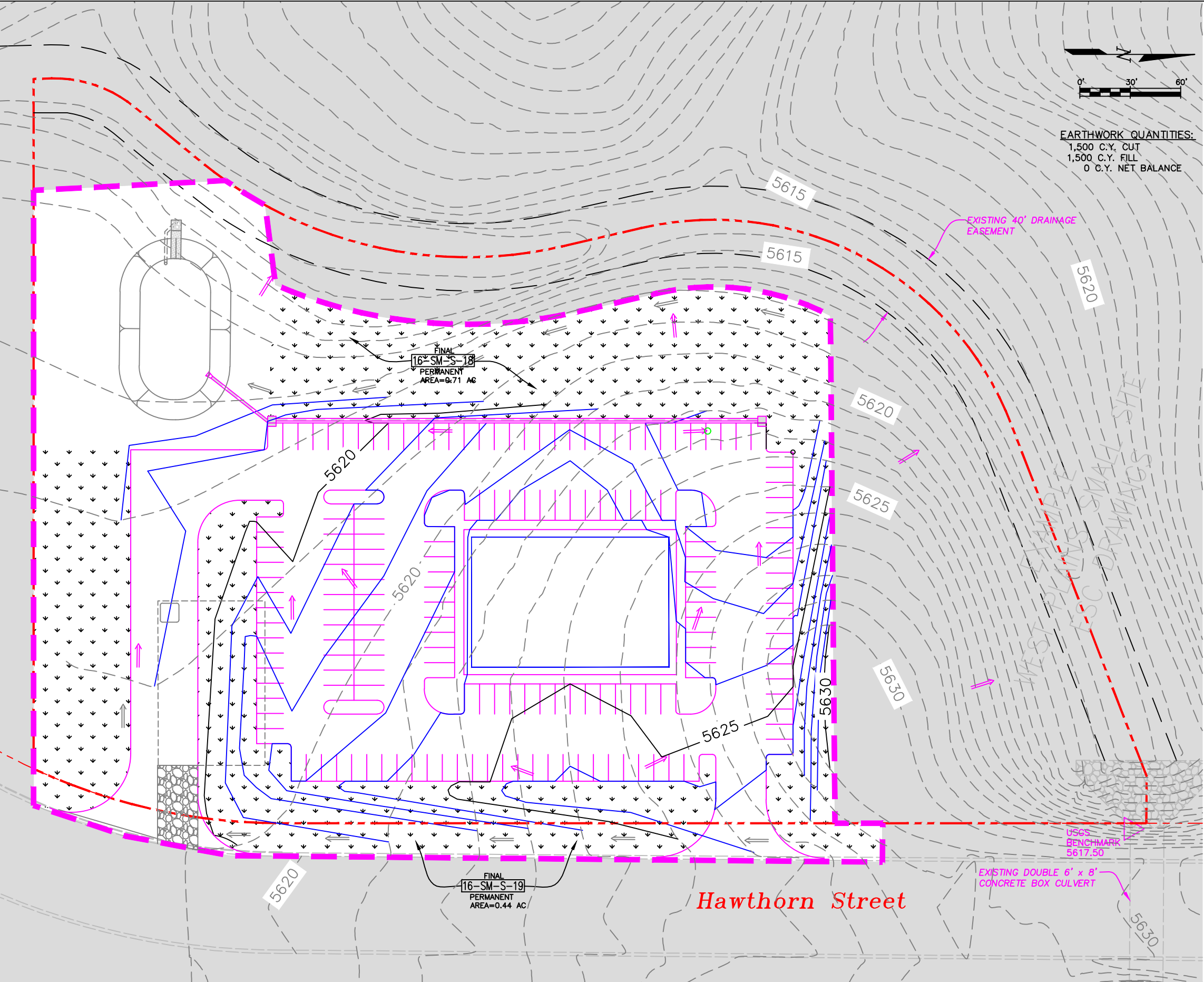
Sheet Revisions				ABC ENGINEERING CO., INC. CONSULTING ENGINEERS 123 PLAZA DRIVE, SUITE 200 WEST PLAINS, MISSOURI 65775 (123) 123-1234 FAX: (123) 123-1234	ABC DEVELOPMENT CO., INC. 1234 GRANT STREET WEST PLAINS, MISSOURI 65775 (123) 123-1234 FAX: (123) 123-1234	BUSINESS SITE A	COVER SHEET	DRAWING G-1
0000								











**EARTHWORK QUANTITIES:**  
1,500 C.Y. CUT  
1,500 C.Y. FILL  
0 C.Y. NET BALANCE

- BMP CONSTRUCTION & SEQUENCING NOTES:**
1. REMOVE PORTABLE RESTROOM FACILITY AND BMP 13.
  2. SEED AND MULCH WITHIN 7 DAYS AFTER PAVING OPERATIONS.
  3. SWEEP CLEAN STREET, SIDEWALK AND PARKING LOT.
  4. SCHEDULE INITIAL CLOSE-OUT INSPECTION.
  5. ATTEND INITIAL CLOSE-OUT INSPECTION.
  6. RECEIVE INITIAL CLOSE-OUT ACCEPTANCE.
  7. INSPECT MONTHLY AND ADDRESS ANY MAINTENANCE REQUIRED.
  8. SCHEDULE A VEGETATION ACCEPTANCE MEETING WHEN 80% VEGETATION COVERAGE IS ACHIEVED OVER ALL OF THE DISTURBED AREA.
  9. ATTEND VEGETATION ACCEPTANCE INSPECTION.
  10. RECEIVE WRITTEN VEGETATION ACCEPTANCE FROM THE CITY.
  11. AFTER RECEIVING ACCPETANCE, REMOVE ALL BMP'S.
  12. SEED AND STRAW ALL AREAS DISTURBED BY REMOVAL OF BMP'S.
  13. SCHEDULE FINAL CLOSE-OUT INSPECTION.
  14. ATTEND FINAL CLOSE-OUT INSPECTION.
  15. RECEIVE FINAL CLOSEOUT INSPECTION ACCEPTANCE.
  16. PERMITTEE(S) MAY FILL OUT AND SUBMIT A RELEASE OF ESC FISCAL SECURITY REQUEST FORM AND SUBMIT ALL INSPECTION REPORTS.
  17. CITY WILL RELEASE ESC FISCAL SECURITY.
  18. ESC PERMIT WILL BE CLOSED.

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BEFORE YOU DIG, GRADE, OR EXCAVATE FOR THE MARKING OF UNDERGROUND MEMBER UTILITIES.

**BMP ID**  
DETAIL#-TYPE-INTENT-BMP#

--- EXISTING 1' CONTOUR  
--- EXISTING 5' CONTOUR  
--- PROPOSED 1' CONTOUR  
--- PROPOSED 5' CONTOUR  
⇒ FLOW DIRECTION ARROW

AREA OUTSIDE LIMITS OF CONSTRUCTION

AREA TO BE DISTURBED

**NOTES:**

1.) SEE COVER SHEET OF GENERAL NOTES AND DETAILS (SHEET 1) FOR LEGEND OF BMP NAMES AND SYMBOLS.

2.) CONTROL POINT NO. 1: 3" BRASS CAP ON SOUTH CORNER OF WEST HEADWALL, USGS ELEVATION 5617.50.

3.) SEE CONSTRUCTION PLANS (STORMWATER PERMIT APPROVED) FOR DETAILS OF PERMANENT DRAINAGE FACILITIES SUCH AS DETENTION FACILITIES, CULVERTS, STORM DRAINAGE AND INLET AND OUTLET PROTECTION.

STORMWATER COORDINATOR

DATE

THESE CONSTRUCTION DRAWINGS HAVE BEEN REVIEWED BY WEST PLAINS FOR EROSION AND SEDIMENT CONTROL IMPROVEMENTS ONLY.

ENGINEERING DEPARTMENT ACCEPTANCE BLOCK



EROSION AND SEDIMENT CONTROL (ESC) GENERAL NOTES

1. THE WEST PLAINS STORMWATER COORDINATOR’S SIGNATURE AFFIXED TO THIS DOCUMENT INDICATES THE ENGINEERING DEPARTMENT HAS REVIEWED THE DOCUMENT AND FOUND IT IN GENERAL COMPLIANCE WITH THE WEST PLAINS REGULATIONS AND THE EROSION AND SEDIMENT CONTROL (ESC) MANUAL. THE WEST PLAINS ENGINEERING DEPARTMENT, THROUGH ACCEPTANCE OF THIS DOCUMENT, ASSUMES NO RESPONSIBILITY (OTHER THAN AS STATED ABOVE) FOR THE COMPLETENESS AND/OR ACCURACY OF THESE DOCUMENTS.
2. THE ADEQUACY OF THIS ESC PLAN LIES WITH THE ORIGINAL DESIGN ENGINEER.
3. THE ESC PLAN SHALL BE CONSIDERED VALID FOR TWO (2) YEARS FROM THE DATE OF ACCEPTANCE BY WEST PLAINS, AFTER WHICH TIME THE PLAN SHALL BE VOID AND WILL BE SUBJECT TO RE–REVIEW AND RE–ACCEPTANCE BY WEST PLAINS.
4. ALL MATERIALS AND WORKMANSHIP SHALL BE SUBJECT TO INSPECTION BY THE WEST PLAINS ENGINEERING DEPARTMENT. WEST PLAINS RESERVES THE RIGHT TO ACCEPT OR REJECT ANY SUCH MATERIALS AND WORKMANSHIP THAT DOES NOT CONFORM TO THE ESC MANUAL, ESC PLAN OR ESC PERMIT.
5. THE PLACEMENT OF EROSION AND SEDIMENT CONTROL BEST MANAGEMENT PRACTICES (BMPs) SHALL BE IN ACCORDANCE WITH THE WEST PLAINS – ACCEPTED ESC PLAN AND THE WEST PLAINS ESC MANUAL.
6. ALL STORMWATER LEAVING THE SITE SHALL PASS THROUGH AT LEAST ONE (1) EROSION AND SEDIMENT CONTROL BMP IF AT ALL POSSIBLE.
7. ANY VARIATION IN MATERIAL, TYPE OR LOCATION OF EROSION AND SEDIMENT CONTROL BMPs FROM THE WEST PLAINS – ACCEPTED ESC PLAN WILL REQUIRE APPROVAL FROM AN ACCOUNTABLE REPRESENTATIVE OF THE WEST PLAINS ENGINEERING DEPARTMENT.
8. AFTER THE ESC PLAN HAS BEEN ACCEPTED, THE ESC PERMIT APPLIED FOR, FEES AND FISCAL SECURITY SUBMITTED TO THE CITY, THE CONTRACTOR MAY INSTALL THE INITIAL–STAGE EROSION AND SEDIMENT CONTROL BMPs INDICATED ON THE ACCEPTED ESC PLAN.
9. 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.
10. AFTER INSTALLATION OF THE INITIAL–STAGE EROSION AND SEDIMENT CONTROL BMPs, THE PERMITTEE SHALL CALL THE WEST PLAINS ENGINEERING DEPARTMENT TO SCHEDULE A PRE–CONSTRUCTION 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 PRE–CONSTRUCTION MEETING.
11. THE OWNER OR OWNER’S REPRESENTATIVE, THE ESC MANAGER, THE GENERAL CONTRACTOR, AND THE GRADING SUBCONTRACTOR (IF DIFFERENT FROM THE GENERAL CONTRACTOR) MUST ATTEND THE PRE–CONSTRUCTION MEETING. IF ANY OF THE REQUIRED PARTICIPANTS FAIL TO ATTEND THE PRE–CONSTRUCTION MEETING, OR IF THE INSTALLATION OF THE INITIAL BMPs ARE NOT APPROVED BY THE WEST PLAINS ENGINEERING DEPARTMENT, THE APPLICANT WILL HAVE TO PAY A REINSPECTION FEE, ADDRESS ANY PROBLEMS WITH BMP INSTALLATION, AND CALL TO RESCHEDULE THE MEETING, WITH A CORRESPONDING DELAY IN THE START OF CONSTRUCTION. WEST PLAINS STRONGLY ENCOURAGES THE APPLICANT TO HAVE THE ENGINEER OF RECORD AT THE PRE–CONSTRUCTION MEETING. FAILURE OF THE ENGINEER OF RECORD TO ATTEND MAY RESULT IN A DELAY OF THE START OF CONSTRUCTION.
12. CONSTRUCTION SHALL NOT BEGIN UNTIL THE WEST PLAINS STORMWATER INSPECTOR APPROVES THE INSTALLATION OF THE INITIAL BMPs AND THE APPROVED ESC PERMIT IS PICKED UP FROM THE CITY 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.
13. THE ESC MANAGER SHALL STRICTLY ADHERE TO THE WEST PLAINS–APPROVED LIMITS OF CONSTRUCTION AT ALL TIMES. THE WEST PLAINS ENGINEERING DEPARTMENT MUST APPROVE ANY CHANGES TO THE LIMITS OF CONSTRUCTION AND, AT THE DISCRETION OF THE ENGINEERING DEPARTMENT, ADDITIONAL EROSION/SEDIMENT CONTROLS MAY BE REQUIRED IN ANY ADDITIONAL AREAS OF CONSTRUCTION.
14. THE MAXIMUM AREA OF CONSTRUCTION SHALL BE LIMITED TO 40 ACRES TO REDUCE THE AMOUNT OF LAND DISTURBED AT ANY ONE TIME. LARGER SITES SHALL BE DIVIDED INTO PHASES THAT ARE EACH 40 ACRES OR LESS IN SIZE. THESE PROJECTS SHALL CONDUCT GRADING ACTIVITIES IN ACCORDANCE WITH THE ACCEPTED ESC PLAN. BMP INSTALLATION AND APPROVAL BY WEST PLAINS AT THE START AND COMPLETION OF EACH PHASE SHALL BE CONDUCTED IN ACCORDANCE WITH THE PROCEDURES OUTLINED IN THE ESC MANUAL.
15. PRIOR TO ACTUAL CONSTRUCTION, THE PERMITTEE SHALL VERIFY THE LOCATION OF EXISTING UTILITIES.
16. 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.
17. THE ESC PERMIT SHALL BE VALID FOR A PERIOD OF ONE (1) YEAR.
18. A COPY OF THE ESC PERMIT, ESC FIELD MANUAL, ACCEPTED ESC DRAWINGS, AND INSPECTIONS SHALL BE ON SITE AT ALL TIMES.
19. THE ESC MANAGER SHALL BE RESPONSIBLE FOR ENSURING THAT THE SITE REMAINS IN COMPLIANCE WITH THE ESC PERMIT AND SHALL BE THE PERMITTEE’S CONTACT PERSON WITH THE CITY FOR ALL MATTERS PERTAINING TO THE ESC PERMIT. THE ESC MANAGER SHALL BE PRESENT AT THE SITE THE MAJORITY OF THE TIME AND SHALL BE AVAILABLE THROUGH A 24–HOUR CONTACT NUMBER. IN THE EVENT THAT THE CONTRACTOR’S ESC MANAGER IS NOT ON SITE AND CANNOT BE REACHED DURING A VIOLATION, THE ALTERNATE ESC MANAGER SHALL BE CONTACTED. IF NEITHER THE ESC MANAGER NOR ALTERNATE ESC MANAGER CAN BE CONTACTED DURING ANY VIOLATION, A STOP WORK ORDER SHALL BE ISSUED.
20. ALL CONSTRUCTION TRAFFIC MUST ENTER/EXIT THE SITE THROUGH THE WEST PLAINS–APPROVED ACCESS POINT. A VEHICLE TRACKING CONTROL PAD IS REQUIRED AT ALL ACCESS POINTS ON THE SITE. ADDITIONAL STABILIZED CONSTRUCTION ENTRANCES MAY BE ADDED WITH AUTHORIZATION FROM THE WEST PLAINS ENGINEERING DEPARTMENT.

21. THE ESC 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 WEST PLAINS STORMWATER COORDINATOR. STREET WASHING IS NOT ALLOWED. WEST PLAINS RESERVES THE RIGHT TO REQUIRE ADDITIONAL MEASURES TO ENSURE AREA STREETS ARE KEPT FREE OF SEDIMENT AND/OR CONSTRUCTION DEBRIS.
22. APPROVED EROSION AND SEDIMENT CONTROL BMPs SHALL BE MAINTAINED AND KEPT IN GOOD REPAIR FOR THE DURATION OF THIS PROJECT. AT A MINIMUM, THE ESC MANAGER SHALL INSPECT ALL BMPs IN ACCORDANCE WITH THE ACCEPTED ESC PLAN AND ESC MANUAL. ALL NECESSARY MAINTENANCE AND REPAIR ACTIVITIES SHALL BE COMPLETED WITHIN 48 HOURS FOR LEVEL III VIOLATIONS, AND IMMEDIATELY FOR LEVEL II VIOLATIONS, OR AS DIRECTED BY THE WEST PLAINS STORMWATER COORDINATOR. ACCUMULATED SEDIMENT AND CONSTRUCTION DEBRIS SHALL BE REMOVED AND PROPERLY DISPOSED.
23. STRAW BALES ARE NOT A WEST PLAINS ESC–ACCEPTED SEDIMENT CONTROL BMP. THEY ARE ONLY TO BE USED FOR CONCRETE WASHOUT AREAS.
24. TOPSOIL SHALL BE STRIPPED AND STOCKPILED IN THE LOCATION SHOWN ON THE ACCEPTED ESC PLAN. THE ESC MANAGER SHALL SCHEDULE AN INSPECTION WITH THE WEST PLAINS STORMWATER COORDINATOR AS SOON AS TOPSOIL STRIPPING IS COMPLETED. FAILURE TO SCHEDULE SUCH INSPECTION OR FAILURE TO STOCKPILE TOPSOIL SHALL RESULT IN ISSUANCE OF A STOP WORK ORDER. THE STOP WORK ORDER SHALL REMAIN IN PLACE UNTIL TOPSOIL IS STOCKPILED ON SITE OR APPROPRIATE SOIL AMENDMENTS ARE STOCKPILED ON SITE.
25. THE ACCEPTED ESC PLAN MAY REQUIRE CHANGES OR ALTERATIONS AFTER APPROVAL TO MEET CHANGING SITE OR PROJECT CONDITIONS OR TO ADDRESS INEFFICIENCIES IN DESIGN OR INSTALLATION. THE ESC MANAGER SHALL OBTAIN PRIOR APPROVAL FROM THE DESIGN ENGINEER AND WEST PLAINS ENGINEERING DEPARTMENT FOR ANY PROPOSED CHANGES.
26. NO PERMANENT EARTH SLOPES GREATER THAN 3:1 SHALL BE ALLOWED.
27. ANY SETTLEMENT OR SOIL ACCUMULATIONS BEYOND THE LIMITS OF CONSTRUCTION DUE TO GRADING OR EROSION SHALL BE REPAIRED IMMEDIATELY BY THE ESC MANAGER. THE ESC 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.
28. A WATER SOURCE SHALL BE AVAILABLE ON SITE DURING EARTHWORK 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 WEST PLAINS ENGINEERING DEPARTMENT.
29. IF SUBSTANCES SUCH AS OIL, DIESEL FUEL, HYDRAULIC FLUID, ANTIFREEZE, ETC. ARE SPILLED, LEAKED, OR RELEASED ONTO SOIL, THE SOIL SHALL BE DUG UP AND DISPOSED OF AT A LICENSED SANITARY LANDFILL (NOT A CONSTRUCTION/DEMOLITION DEBRIS LANDFILL). SPILLS ON PAVEMENT SHALL BE ABSORBED WITH SAWDUST, KITTY LITTER OR PRODUCT DESIGNED FOR THAT PURPOSE AND DISPOSED OF AT A LICENSED SANITARY LANDFILL. HAZARDOUS OR INDUSTRIAL WASTES SUCH AS MOST SOLVENTS, GASOLINE, OIL–BASED PAINTS, AND CEMENT CURING COMPOUNDS REQUIRE SPECIAL HANDLING. THESE MATERIALS WILL BE REMOVED FROM THE SITE AND RECYCLED OR DISPOSED OF IN ACCORDANCE WITH MODNR REQUIREMENTS.
30. STATE LAW REQUIRES THE PARTY RESPONSIBLE FOR A PETROLEUM PRODUCT SPILL IN EXCESS OF 50 GALLONS TO REPORT THE SPILL TO MODNR (537–634–2436) AS SOON AS PRACTICAL AFTER DISCOVERY. FEDERAL LAW REQUIRES THE RESPONSIBLE PARTY TO REPORT ANY RELEASE OF OIL IF IT REACHES OR THREATENS A SEWER, LAKE, CREEK, STREAM, RIVER, GROUNDWATER, WETLAND, OR ANY AREA THAT DRAINS TO ONE OF THE ABOVE.
31. 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 WEST PLAINS ESC PLAN.
- ALL PROJECTS SHALL BALANCE EARTHWORK QUANTITIES ON SITE. IN THE EVENT A VARIANCE IS GRANTED BY THE STORMWATER COORDINATOR TO ALLOW IMPORT OR EXPORT OF MATERIAL, THE PERMITEE SHALL HAVE AN ESC PERMIT IN HAND FOR THE IMPORT OR EXPORT SITE PRIOR TO ANY TRANSPORTING OF EARTHEN MATERIAL. THE ESC MANAGER SHALL NOTIFY THE WEST PLAINS STORMWATER COORDINATOR OF THE LOCATION AND PERMIT NUMBERS OF BOTH THE EXPORTING AND IMPORTING SITES PRIOR TO ANY IMPORT/ EXPORT OPERATIONS.
32. 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.
33. ALL DEWATERING ON SITE SHALL BE COORDINATED WITH THE WEST PLAINS STORMWATER COORDINATOR AND BE FREE OF SEDIMENT.
34. 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 WEST PLAINS.
35. ALL DISTURBED AREAS SHALL BE SEEDED AND MULCHED IN ACCORDANCE WITH THE ESC MANUAL WITHIN THIRTY DAYS OF INITIAL EXPOSURE OR WITHIN FIFTEEN (15) DAYS OF SUBSTANTIAL COMPLETION (AS DEFINED BY WEST PLAINS) OF AN AREA, WHICHEVER IS LESS. THIS MAY REQUIRE MULTIPLE MOBILIZATIONS FOR SEEDING AND MULCHING. IF PERMITEE CAN NOT MEET THIS REQUIREMENT THEY MUST COMPLETE A SCHEDULE OF COMPLETION OF STABILIZATION AS AN ATTACHMENT TO FORM 1 THAT WILL BE SUBMITTED TO THE CITY AT THE PRECONSTRUCTION MEETING.
35. A FINAL ESC INSPECTION SHALL BE CONDUCTED A MINIMUM OF TWO WEEKS PRIOR TO OCCUPANCY.

DETAIL SHEET		BMP LEGEND (TYPE–INTENT)	
NO.	NO.		
2	②		<b>CWA–C</b> CONCRETE WASHOUT AREA
9	⑤		<b>IP–P</b> INLET PROTECTION
13	⑧		<b>SB–P</b> SEDIMENT BASIN
16	⑨		<b>SM–S</b> SEEDING AND MULCHING
17	⑩		<b>SF–P/M</b> SILT FENCE
18	⑪		<b>SSA–C</b> STABILIZED STAGING AREA
23	⑬		<b>VTC–C</b> VEHICLE TRACKING CONTROL
			<b>LOC</b> LIMITS OF CONSTRUCTION

BMP ID

DETAIL#–TYPE–INTENT–BMP#

BMP SYMBOL NOTE:

SOME BMP TYPES MAY HAVE MORE THAN ONE INTENT, HOWEVER EACH INDIVIDUAL BMP ON A SITE WILL HAVE ONLY ONE INTENT. FOR FURTHER EXPLANATION OF BMP ID SEE PAGES 22–24 OF ESC FIELD MANUAL.

BMP INTENT LIST:

C–CONSTRUCTION  
M–MOVING  
P–PONDING  
S–STABILIZE  
SM–STABILIZE MOVING (WATER)

WEST PLAINS ESC GENERAL  
DETAILS TO GO HERE

ONLY INCLUDE DETAILS THAT  
APPLY TO THIS PROJECT



*Appendix D*

**Required Checklist for  
Preliminary Acceptance  
of ESC Plan**



## Required Checklist for Preliminary Acceptance of ESC Plan

### A. Addressing the Eleven Elements of an effective ESC Plan & Overall Design Intent

#### Element 1. Preserve and Stabilize Drainageways

- \_\_\_\_ yes \_\_\_\_ no 1. Determine any streams within the project area have City regulated Stream Buffer.  
(See *Stormwater Management Manual Volume II* to assist)  
If Stream Buffer area exists on-site, it should be shown on all ESC drawings and not disturbed unless a Stream Buffer Permit is obtained.
- \_\_\_\_ yes \_\_\_\_ no 3. Show **Construction Fence (CF)** or, if approved, **Construction Markers (CM)** to delineate the limits of construction adjacent to Stream Buffer.
- \_\_\_\_ yes \_\_\_\_ no 2. All drainageways, ditches, and anyother concentrated flow area are stabilized during and after land disturbance. After being disturbed, they are stabilized per section 3.14.2 of the *Stormwater Management Manual Volume I* until permanent drainage facilities or constructed per *Stormwater Management Manual Volume II*. Temporary stabilization is addressed on ESC drawings and permanent is addressed in the Stormwater Management Design Plan.

#### Element 2. Avoid the Clearing and Grading of Sensitive Areas.

- \_\_\_\_ yes \_\_\_\_ no 1. Conduct site vist and identfy on the ESC drawings the sensitive areas such as the following:
- \_\_\_\_ yes \_\_\_\_ no a. Identify sinkholes (See *Stormwater Management Manual Volume II* to assist) or caves.  
If sinkhole exists on-site or disturbed area drains to an off-site sinkhole, it should be shown on all ESC drawings and any area draining to the sinkhole should not be disturbed unless a sinkhole permit is obtained.
- \_\_\_\_ yes \_\_\_\_ no b. Losing streams (May require a hydrogeological evaluation from the Department of Geology and Land Surveying).
- \_\_\_\_ yes \_\_\_\_ no c. Forrested areas not to be disturbed.
- \_\_\_\_ yes \_\_\_\_ no d. Single trees not to be disturbed.
- \_\_\_\_ yes \_\_\_\_ no e. Steep slopes not to be disturbed.
- \_\_\_\_ yes \_\_\_\_ no f. Potential stormwater infiltration areas.
- \_\_\_\_ yes \_\_\_\_ no 2. Endeavor to avoid, or minimize, disturbance to the sensitive areas identified in 1.a.e. above.
- \_\_\_\_ yes \_\_\_\_ no 3. Show **Construction Fence (CF)** or, if approved, **Construction Markers (CM)** to delineate the limits of construction adjacent to sensitive areas.

#### Element 3. Balance Earthwork On-site

- \_\_\_\_ 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 achieved.
- \_\_\_\_ yes \_\_\_\_ no 2. If it is impossible to balance earthwork quantities on-site, prepare letter requesting variance per the information in Section 3.5 and 3.19 of the *ESC Manual*.

#### 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.
- \_\_\_\_ yes \_\_\_\_ no 2. Considered separate grading phases for any project size to minimize amount of area being disturbed at any one time.
- \_\_\_\_ yes \_\_\_\_ no 3. Balance earthwork for each phase following the guidance from Element 3, above.

### Element 5. Stabilize Soils in a Timely Manner.

\_\_\_ yes \_\_\_ no 1. Adequate "footprints" for topsoil stockpiles

### Element 6. Implement Perimeter Controls.

#### A. Upslope Perimeters.

- \_\_\_ yes \_\_\_ no 1. Determine area upslope of the land disturbance that will generate stormwater runoff and will enter the land disturbance area. Determine if it is entering the site as sheet flow or concentrated flow, see section 3.8.1. Determine if the stormwater should be ponded upslope of the disturbed area or conveyed around or through the land disturbance area as stabilized concentrated flow.
- \_\_\_ yes \_\_\_ no a. Determine storage requirements behind BMP if ponding upslope stormwater is proposed method, see section 3.14.1.
- \_\_\_ yes \_\_\_ no b. Ensure upslope stormwater is conveyed in a stable ditch or drainageway (concentrated flow area), if moving stormwater through our around land disturbance area is proposed, see section 3.14.2, 3.15.8, 3.15.16, and Table 3-3.

**NOTE: Upslope stormwater does not need to be treated by ponding BMP or sedimentation facility.**

**The intent is to ensure that upslope stormwater does not generate additional erosion**

**by ponding upslope or conveying through or around site in a stabilized concentrated flow area.**

#### B. Downslope Perimeters.

- \_\_\_ yes \_\_\_ no 1. Determine the size of sheet flow areas draining to a downslope perimeter or a concentrated flow area. Locate all concentrated flow areas that are disturbed, proposed, and existing. Determine if stormwater from disturbed areas draining to the downslope perimeter is treated or untreated. Treated means all stormwater from disturbed areas has been pond by a BMP or went through a sedimentation facility.
- \_\_\_ yes \_\_\_ no a. Check to ensure all ditches or drainageways existing disturbed or proposed must be stable, see section 3.15.2, 3.16.8, 3.16.16, and Table 3-3.
- \_\_\_ yes \_\_\_ no b. Check to ensure all untreated stormwater is ponded by BMP or flow through a sedimentation facility, see sections 3.15.1, 3.16.17, and 3.16.19

### Element 7. The Use of Sedimentation Facilities.

- \_\_\_ yes \_\_\_ no 1. Runoff from all disturbed areas is treated in a sedimentation facility or ponding BMP. In the case sedimentation facilities are used in an area to be treated greater than 1.0 acre, they 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 (ST)** is used, see sections 3.10, 3.16.17, and 3.16.19.
- \_\_\_ yes \_\_\_ no 2. Wherever possible, sediment basins are to be located within any permanent water quality or quantity detention facilities.

### Element 8. Protect Steep Slopes.

#### A. Proposed Slopes Shall be no Steeper than 3 to 1.

- \_\_\_ yes \_\_\_ no 1. Ensure that no slopes are proposed that are steeper than 3H to 1V, use retaining walls instead.
- \_\_\_ yes \_\_\_ no 2. Show **Erosion Control Blanket (ECB)** on slopes steeper than 4 to1.

#### B. Runoff Shall be Diverted Away from Steep Slopes.

- \_\_\_ yes \_\_\_ no 1. Use **Diversion Ditch (DD)** or **Temporary Slope Drains (TSD)** 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 culvert protection, temporary at culvert inlets and temporary or permanent at culvert outlets.
- \_\_\_ yes \_\_\_ no 3. Design outlet protection for all storm sewer outfalls and culvert outlets.
- \_\_\_ yes \_\_\_ no 4. Show immediate method of stabilization 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 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.

### Element 11. Identify Downstream Sensitive Areas.

- \_\_\_ yes \_\_\_ no 1. Conduct site visit and identify on the ESC drawings the downstream sensitive areas such as the following:
- \_\_\_ yes \_\_\_ no a. Identify sinkholes (See *Stormwater Management Manual Volume II* to assist) and caves that the land disturbance area will drain too  
If sinkhole exists on-site or disturbed area drains to a off-site sinkhole, it should be shown on all ESC drawings and any area draining to the sinkhole should not be disturbed unless a sinkhole permit is obtained.
- \_\_\_ yes \_\_\_ no b. Losing streams downstream (May require a hydrogeological evaluation from the Department of Geology and Land Surveying)
- \_\_\_ yes \_\_\_ no b. Ponds or lakes that the land disturbance area will drain to.
- \_\_\_ yes \_\_\_ no c. Wetlands that the land disturbances area will drain to.
- \_\_\_ yes \_\_\_ no 3. Classify the site to have downstream sensitive area if any of step one's sensitive areas were found or any other things that could be considered sensitive.

### Section 3.14 of Stormwater Management Manual Vol I -- Design Intent ESC Drawings

- \_\_\_ yes \_\_\_ no 1. Met the overall goal of the ESC design by capturing and containing sheet flow behind ponding BMPs or running the stormwater through a sedimentation facility. The design is within IAW the West Plain's *Stormwater Management Manual Volume I*. Section 3.14 or a more detailed method that is in accordance with sound engineering practice to meet this goal.
- \_\_\_ yes \_\_\_ no 3. Met the overall goal of the ESC design by preventing erosion in disturbed or proposed concentrated flow areas. The design is within IAW the West Plain's *Stormwater Management Manual Vol I*. Section 3.14 or a more detailed method that is IAW with sound engineering practice to meet this goal.

## B. DRAWINGS

### I. COVER SHEET

Yes\_\_\_No\_\_\_  
Yes\_\_\_No\_\_\_  
Yes\_\_\_No\_\_\_  
Yes\_\_\_No\_\_\_  
Yes\_\_\_No\_\_\_  
Yes\_\_\_No\_\_\_  
Yes\_\_\_No\_\_\_

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

I, property owners signature. assume and acknowledge any land clearing, construction, or development involving the movement of earth shall be in accordance with the ESC Plan. I will maintain a current copy of the ESC Plan on the site in a location visible to anyone entering the site. This will allow City personnel to perform quality assurance inspections when no one representing the ESC Plan is on site. I will also maintain all site inspections with the ESC Plan on site. I understand that the ESC Plan is developed to protect the water quality to the maximum extent practicable and this may require modification to the ESC Plan during the duration of the project. If the representative of the City of West Plains, the ESC Manager, or the designer of the ESC Plan, notifies me that the ESC Plan needs to be amended, I will notify the engineer of the ESC Plan to ensure recommendations are considered.

Yes\_\_\_No\_\_\_

8. ESC Plan Designer's signature block with name, date, and Professional Engineer registration number. Signature block shall include the following note:

I, signature of P.E. certify that the ESC Plan has been developed to minimize erosion and reduce sediment from entering any state, city, or privately owned waters to the maximum extent practicable. I have verified any special conditions for this site and have incorporated such into the ESC Plan. I shall amend the ESC Plan whenever the current ESC Plan does not meet state standards for stormwater outfall requirements, site conditions change BMP requirements, excessive amounts of erosion have occurred and/or noticeable sediment has left the site. I understand that the ESC Plan is developed to protect the water quality to the maximum extent practicable, and this may require modification to the ESC Plan during the duration of the project. If the owner of properties name or ESC Manager contacts me to update or change the ESC Plan and I agree, then the ESC Plan will be updated within 72 hours of noted need of change to the ESC Plan. If I disagree with amending the ESC Plan and the changes are not required by federal, state, or City requirements, then it should be noted that I take liability for any degradation of water quality that may occur by

not making the requested amendment to the ESC Plan. If changes are made to the ESC Plan, I will publish all changes to the ESC Plan with an indicator to all parties as to which copy is current.

Yes\_\_\_No\_\_\_

9. The following note:

I, signature of ESC Manager, am the agent of owner of properties name to ensure that this site is in accordance with the ESC Plan. I will perform site inspections at least once per week by Thursday so that corrections can be made before the end of Friday and no later than 72 hours after a half inch or more of rainfall in 24 hours. These site inspections will be recorded on an ESC Inspection form located in the City of West Plains ESC Manual. The purpose of such inspections will be to ensure proper installation, operation and maintenance of BMPs and to determine the overall effectiveness of the ESC Plan, and the need for any additional control measures. If changes to the ESC Plan are required I will notify the owner of properties name and Name of P.E. within 24 hours.

Yes\_\_\_No\_\_\_

10. The following note:

The Erosion and Sediment Control Plan included herein has been placed in the West Plains File for this project and appears to fulfill applicable West Plains erosion and sediment control criteria, as amended. Additional erosion and sediment control measures may be required of the permittee(s) due to unforeseen erosion problems or if the submitted ESC Plan does not function as intended. The requirements of this ESC Plan shall run with the land and be the obligation of the permittee(s) until such time as the ESC plan is properly completed, modified, or voided.

Yes\_\_\_No\_\_\_

11. City Acceptance Block. .

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. ESC 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 ESC PLAN

This plan sheet shall provide erosion and sediment controls for the initial clearing, grubbing and grading of a project. The layout and design of the initial BMPs should be based off the existing



topography at the limits of construction (LOC). The initial ESC plans should include BMPs for perimeter control to ensure sediment does not leave the site to the maximum extent possible. The initial BMPs will be placed at the same time and prior to on-site preconstruction meeting and the signing of the ESC permit application. 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-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.   |
| Yes___No___ | 6. Limits of construction showing all areas of land disturbance. Stream buffer, sinkhole drainage area, and other resource areas to be preserved and all other areas outside the limits of land disturbance shall be lightly shaded to clearly show area not to be disturbed. If stream buffer or sinkhole drainage area is within the limit of land disturbance then a stream buffer or a sinkhole permit must be obtained. The requirements to receive these permits are located in the Storm Management Manual Vol. II these requirements must be submitted with the ESC plan. |
| Yes___No___ | 8. Location of vehicle tracking control (VTC), storage and staging areas for equipment, fuel, lubricant, chemicals and waste storage, and temporary restrooms.  |
| Yes___No___ | 9. Location of temporary roads if needed.   |
| Yes___No___ | 10. Location of initial BMPs, BMP IDs to include: symbol, detail number, two to three letter abbreviation, BMP intent, and BMP number, see section of 3.15.1- 3.15.7 of Stormwater Management Manual Vol. I. For example a BMP shown on plan sheets as 17-SF-P-1 is detail 17, which is a silt fence used to pond and is BMP 1 of the initial ESC plan. The BMP number is used for a reference number when construction notes call out specifics or sequencing to that BMP.   |
| Yes___No___ | 11. Design parameters of each BMP placed under BMP ID on initial ESC plan, see Section 3.15.8-3.15.29 for design parameters for standard BMPs nonstandard BMP must also have include design parameter in line with the standard design parameters.  |
| Yes___No___ | 12. The following note:<br>See cover sheet of West Plains Standard Notes and Details for legend of BMP names and symbols.   |
| Yes___No___ | 13. West Plains approval block.   |
| Yes___No___ | 14. Other information as may be reasonably required by West Plains.   |

#### IV. INTERIM ESC PLAN

This plan sheet shows BMPs to control grading, erosion and sediment during and after grading, site construction and site revegetation process. This plan sheet will include BMPs with-in the perimeter and any modifications to the perimeter BMPs due to the proposed grading. The

interim BMPs will not all be placed at the same time. Therefore a schedule of installation will be within the construction notes on the plan sheet for each BMP number that is installed. At a minimum, it shall contain the following information:

The Interim ESC Plan shall show all the information included on the Initial ESC Plan, as noted below:

Yes\_\_\_No\_\_\_

1. Existing topography at one -foot contour intervals extending a minimum of 100 feet beyond the property line, as shown on Initial ESC 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** ESC Plan Sheet. **These control measures shall be screened. Design parameters for initial stage BMPs shall not be shown. If any of the initial BMPs will be moved or removed during the interim plan they should be screened but construction notes should state BMP number and when they the action should occur.**

Yes\_\_\_No\_\_\_

3. Items 1, 2, and 4 through 10 from the Initial ESC Plan are shown on this Plan (see Pg 6 of this checklist).

In addition, the Interim ESC Plan shall include the following:

Yes\_\_\_No\_\_\_

4. Proposed topography at one -foot contour intervals, showing elevations, dimensions, locations, and slope of all proposed grading.

Yes\_\_\_No\_\_\_

6. Location of interim BMPs, BMP IDs to include: symbol, detail number, two- to three-letter abbreviation, BMP intent, and BMP number, see Sections 3.15.1-3.15.7 of *Stormwater Management Manual Vol. I*. The BMP number is used for a reference number when construction notes need to call out specifics or sequencing to that BMP.

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 stormwater permit and building permit. If the development has ½ or more of impervious area the site will require stormwater permit. This stormwater permit will require construction drawings to be developed. These drawings are consistent with the ESC plan.

Yes\_\_\_No\_\_\_

8. The following notes:
  - See cover sheet of West Plains Standard Notes and Details for legend of BMP names and symbols.
  - Shaded BMPs were installed in initial stage and shall be left in place in interim stage (not moved or removed)
  - If the development has ½ or more of impervious area the site will require stormwater permit. This stormwater permit will require construction drawings to be developed within a Stormwater Management Design Plan (SMDP). These drawings include all details of permanent drainage facilities such as detention facilities, culverts, storm drains, stormwater

conveyance systems, stormwater inlets, stormwater treatment, and other item used to control or treat stormwater on the site. Other construction information for non-stormwater related structures or sites that do not require a stormwater permit see the site plan required to receive the building permit.

Yes\_\_\_No\_\_\_

9. All interim BMP numbers, have corresponding notes on the sheet to include: when to install, installation or maintenance details specific to that BMP number that are not covered in standard detail notes.

Yes\_\_\_No\_\_\_

10. Summary of cut and fill volumes.

Yes\_\_\_No\_\_\_

11. West Plains acceptance block.

Yes\_\_\_No\_\_\_

12. Other information or data as may be reasonably required by West Plains.

## V. Final ESC Plan.

This plan sheet shows controls for final completion of the site. The final BMPs may not all be placed at the same time. Therefore a schedule of installation will be within the construction notes on the plan sheet for each BMP number that is installed. All final BMPs will be installed prior to initial close-out inspection. At a minimum, this plan sheet shall contain the indicated information.

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

Yes\_\_\_No\_\_\_

1. Existing topography in areas of proposed contours are not shown.

Yes\_\_\_No\_\_\_

2. Existing Initial and Interim BMPs shall be shown, **(screened)**. Design parameters shall not be shown. **If any of the initial or interim BMPs will be moved or removed during the final plan they should be screened but construction notes should state BMP number and when they the action should occur.**

In addition, the following information shall be shown:

Yes\_\_\_No\_\_\_

3. Location of final BMPs, BMP IDs to include: symbol, detail number, two- to three-letter abbreviation, BMP intent, and BMP number, see Section of 3.15.1 of *Stormwater Management Manual Vol. I*. The BMP number is used for a reference number when construction notes what to call out specifics to that BMP. 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\_\_\_

4. Show area of buildings, pavement, sod, and permanent landscaping per approved site plan for building permit or other drawing required for City approval.

Yes\_\_\_No\_\_\_

5. Show final stabilization methods everywhere except buildings and pavement areas.

Yes\_\_\_No\_\_\_

6. Show other BMPs considered by the designer to be appropriate.

Yes\_\_\_No\_\_\_

Yes\_\_\_No\_\_\_

7. Stated in construction notes all BMPs to be removed and when.

8. Include the following notes:

- See cover sheet of West Plains Standard Notes and Details for legend of BMP names and symbols.
- Shaded BMPs were installed in initial or interim ESC Plan and, unless otherwise indicated, shall be left in place until revegetation establishment is approved by the City.
- If the development has ½ or more of impervious area the site will require stormwater permit. This stormwater permit will require construction drawings to be developed within a Stormwater Management Design Plan (SMDP). These drawings include all details of permanent drainage facilities such as detention facilities, culverts, storm drains, stormwater conveyance systems, stormwater inlets, stormwater treatment, and other item used to control or treat stormwater on the site. Other construction information for non-stormwater related structures or sites that do not require a stormwater permit see the site plan required to receive the building permit.

Yes\_\_\_No\_\_\_

Yes\_\_\_No\_\_\_

9. West Plains Acceptance block.

10. Other information as may be reasonably required by West Plains.

## VI. West Plains General Notes and Details

These sheets show general notes and details for each BMP shown in the drawings.

The West Plains Standard notes and details shall include at a minimum, it shall contain:

Yes\_\_\_No\_\_\_

Yes\_\_\_No\_\_\_

Yes\_\_\_No\_\_\_

Yes\_\_\_No\_\_\_

1. Includes; ESC general notes, detail number of all included BMPs, sheet number of BMP detail, BMP symbol and name for all included BMPs.
2. All non-standard BMPs added to drawings have been approved by the Stormwater Coordinator
3. All BMPs standard and non-standard include enough detail for the contractor to properly construct them.
4. All BMPs standard and non-standard include installation notes and maintenance notes.

### **C. Submittals for Preliminary Acceptance of ESC Plan**

The submittals shall contain the following information:

Yes\_\_\_No\_\_\_

Yes\_\_\_No\_\_\_

Yes\_\_\_No\_\_\_

Yes\_\_\_No\_\_\_

1. ESC drawings that address all of Section A of this checklist.
2. This checklist completely filled out and signed by the design engineer
3. Probable BMP cost worksheet
4. Determine if downstream area is considered sensitive per Section 3.13 of *Stormwater Management Manual Vol. I*. If so, the required attachments to this checklist are include in the submittal package for preliminary acceptance of the ESC Plan.

### **D. Required Signing of this Checklist by the Design Engineer**

I, \_\_\_\_\_ as a licensed professional engineer in the State of Missouri certify that the ESC Plan has been developed to minimize erosion and reduce sediment from entering any state-, city-, or privately-owned waters to the maximum extent practicable. I have verified any special conditions for this site and have incorporated such into the ESC Plan. I have addressed all of the items within this checklist and the West Plain's ESC manual (*Stormwater Management Manual Vol. I*).

Affix professional engineer seal below then sign and date



*Appendix E*

**West Plains ESC  
Acceptance Block**

4"

3"

\_\_\_\_\_

STORMWATER COORDINATOR

\_\_\_\_\_

DATE

THESE CONSTRUCTION DRAWINGS HAVE BEEN  
REVIEWED BY WEST PLAINS FOR EROSION AND  
SEDIMENT CONTROL IMPROVEMENTS ONLY.

ENGINEERING DEPARTMENT ACCEPTANCE BLOCK

*Appendix F*

**Opinion of Probable Cost  
Example Spreadsheet**

## West Plains ESC Permit

## Cost Opinion Spreadsheet

Jan-10

BMP No.	BMP	ID	Unit	Installation Unit Cost	Quantity	Cost
1	Check Dam	CD	LF	\$ 24.00		\$ -
2	Concrete Washout Area	CWA	EA	\$ 100.00		\$ -
3	Construction Fence	CF	LF	\$ 2.00		\$ -
4	Construction Markers	CM	LF	\$ 0.20		\$ -
5	Dewatering	DW	EA	\$ 600.00		\$ -
6	Diversion Ditch (unlined)	DD	LF	\$ 1.00		\$ -
6	Diversion Ditch (lined)	DD	LF	\$ 3.00		\$ -
7	Diversion Berm (unlined)	DD	LF	\$ 1.00		\$ -
7	Diversion Berm (lined)	DD	LF	\$ 3.00		\$ -
8	Ponding Berm	PB	LF	\$ 1.00		\$ -
9	Inlet Protection	IP	LF	\$ 20.00		\$ -
10	Reinforced Rock Berm	RRB	LF	\$ 9.00		\$ -
11	RRB for Culvert Protection	RRB	LF	\$ 9.00		\$ -
12	Rolled Erosion Control Product (RECP) Erosion Control Blanket (ECB) - Short Term	RECP	SY	\$ 2.50		\$ -
12	Rolled Erosion Control Product (RECP) Erosion Control Blanket (ECB) - Long Term	RECP	SY	\$ 3.30		\$ -
12	Rolled Erosion Control Product (RECP) Turf Reinforced Mat (TRM) - Low End	RECP	SY	\$ 5.50		\$ -
12	Rolled Erosion Control Product (RECP) Turf Reinforced Mat (TRM) - High End	RECP	SY	\$ 10.00		\$ -
13	Sediment Basin	SB	AC	\$ 1,100.00		\$ -
14	Sediment Control Log	SCL	LF	\$ 2.00		\$ -
15	Sediment Trap	ST	EA	\$ 600.00		\$ -
16	Seeding and Mulching	SM	AC	\$ 1,500.00		\$ -
17	Silt Fence-Type I- Ponding or unlined	SF	LF	\$ 1.50		\$ -
17	Silt Fence-Type II- Ponding or unlined	SF	LF	\$ 2.25		\$ -
17	Silt Fence-Type III- Ponding or unlined	SF	LF	\$ 4.00		\$ -
17	Silt Fence-Type I- lined	SF	LF	\$ 2.50		\$ -
17	Silt Fence-Type II- lined	SF	LF	\$ 3.25		\$ -
17	Silt Fence-Type III- lined	SF	LF	\$ 5.50		\$ -
18	Stabilized Staging Area	SSA	SY	\$ 2.00		\$ -
19	Surface Roughening	SR	AC	\$ 600.00		\$ -
20	Temporary Slope Drain	TSD	LF	\$ 30.00		\$ -
21	Temporary Stream Crossing	TSC	EA	\$ 1,500.00		\$ -
22	Terracing	TER		\$ -		\$ -
23	Vehicle Tracking Control	VTC	EA	\$ 1,000.00		\$ -
24	VTC with Wheel Wash	WW		\$ -		\$ -
25	Focculants	F	AC	\$ 500.00		\$ -
TOTAL						\$

*Appendix G*

**ESC Inspection Forms**



# Erosion and Sediment Control City Inspection Report

West Plains, MO  
Engineering Department

<b>Project:</b>				<b>Date of Inspection:</b>			
<b>Contractor:</b>				<b>Report No:</b>			
<b>Owner/Permittee:</b>				<b>Permit No:</b>			
<b>Plans on site:</b>							
<b>Weekly inspections on site:</b>							
<b>Weekly inspections up to date:</b>							
<b># of BMPs currently installed:</b>							
BMP #	Maintenance Required?		BMP #	Maintenance Required?		Course of Action Required (State BMP #)	Date Items to be Completed
	Yes	No		Yes	No		
1			26				
2			27				
3			28				
4			29				
5			30				
6			31				
7			32				
8			33				
9			34				
10			35				
11			36				
12			37				
13			38				
14			39				
15			40				
16			41				
17			42				
18			43				
19			44				
20			45				
21			46				
22			47				
23			48				
24			49				
25			50				

**Comments:**

Stormwater Coordinator/City Inspector: \_\_\_\_\_

*Name*
*Signature*

# Erosion and Sediment Control (ESC) Manager Inspection Report

West Plains, MO

Level I violations shall result in issuance of a Stop Work Order and revocation of the ESC Permit, Level II violations shall be corrected immediately upon receipt of this inspection form, and Level III violations shall be corrected within 48 hours unless otherwise directed by the City Stormwater Coordinator. Failure to complete the Level II or Level III violations, as directed below, may result in issuance of a Level I violation and Stop Work Order. This inspection report shall be kept on-site and made available to the Stormwater Coordinator upon request until final acceptance is granted.

<b>Project:</b>	<b>Date of Inspection:</b>
<b>Contractor:</b>	<b>Report No:</b>
<b>Owner/Permittee:</b>	<b>Permit No:</b>
<b>Inspection Type:</b> <input type="checkbox"/> Weekly <input type="checkbox"/> Rain Event (date of event _____)	
<b># of BMPs currently installed:</b>	

BMP #	Maintenance Required?		BMP #	Maintenance Required?		Course of Action Required (State BMP #)	Date Items to be Completed
	Yes	No		Yes	No		
1			26				
2			27				
3			28				
4			29				
5			30				
6			31				
7			32				
8			33				
9			34				
10			35				
11			36				
12			37				
13			38				
14			39				
15			40				
16			41				
17			42				
18			43				
19			44				
20			45				
21			46				
22			47				
23			48				
24			49				
25			50				

Comments:

On-site ESC Manager/Representative: \_\_\_\_\_

*Name*
*Signature*

*Appendix H*

**ESC Permit Application**

## EROSION AND SEDIMENT CONTROL (ESC) 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.**

PROPERTY OWNER		CONTRACTOR	
Name:		Name:	
Address:		Address:	
Contact Name:	Phone:	Contact Name:	Phone:
Acres (Including grading/excavation/fill):		Estimated material volume _____ cu yard(s)	
Project Name:		Import/Export Permit <input type="checkbox"/> Y <input type="checkbox"/> N	
Location:			
<p>By signing below, both applicants hereby apply for a West Plains ESC Permit for the aforementioned property and certify as follows:</p> <ol style="list-style-type: none"><li>1. To the best of my/our knowledge, the information provided herein is correct;</li><li>2. An ESC Plan for the disturbed area on this site was prepared and submitted in accordance with the ESC Manual, as amended; and</li><li>3. I certify I am legally authorized to sign on behalf of and bind the above-listed entity.</li></ol> <p>The ESC Permit is granted with the explicit understanding that it is the Permittees' responsibility to:</p> <ol style="list-style-type: none"><li>1. Allow West Plains unrestricted access to the site to conduct regular site inspections; Comply with all requirements of the ESC Manual, accepted ESC Plan, and ESC Permit;</li><li>2. Immediately cease land-disturbing activities upon receipt of a written Stop Work Order from an authorized representative of West Plains. A Stop Work Order shall be issued and this permit revoked if the Permittees are not in compliance with the ESC Permit, ESC Plan and /or ESC Criteria Manual, or the permittees fail to take corrective action within the time specified on the written notification of such non-compliance.</li></ol>			
Property Owner: _____		Contractor: _____	
Date: _____		Date: _____	
Print Name: _____		Print Name: _____	
Title: _____		Title: _____	

Permit Approval (for City Use Only)			
Base Fee - \$250.00	Additional Cost: (\$25 x _____ disturbed acres)= _____	Base Fee: _____ No Permit Fee 2x: _____ Total Fee: _____	Renewal <input type="checkbox"/> \$100.00 Transfer <input type="checkbox"/> \$100.00
Engineer's Estimate \$ _____ (x 1.15) Total Security \$ _____		Security Received <input type="checkbox"/> Y <input type="checkbox"/> N	
Date ESC Plan Accepted: _____			
STAFF APPROVAL			
<div style="display: flex; justify-content: space-between; width: 80%; margin: auto;"><div>_____ Stormwater Coordinator</div><div>_____ Date</div></div>			

*Appendix I*

**Irrevocable Letter of Credit  
Forms**



## IRREVOCABLE LETTER OF CREDIT

To: The City of West Plains  
P.O. Box 710  
West Plains, MO 65775-0710

No:  
Date:

Gentlemen:

We hereby authorize you to draw on \_\_\_\_\_  
(Name of Bank)

\_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_  
(Street) (City) (State)

\_\_\_\_\_, for the account of \_\_\_\_\_  
(Zip) (Name of customer)

\_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_  
(Street) (City) (State)

\_\_\_\_\_, up to an aggregate amount of \_\_\_\_\_  
(Zip) (Dollars)

(\$ \_\_\_\_\_) available by your drafts at sight accompanied by a certificate purportedly signed by the City Engineer stating:

- (1) that West Plains is entitled to draw under this Letter of Credit pursuant to that certain Agreement dated \_\_\_\_\_, 20\_\_\_\_, between the City of West Plains and \_\_\_\_\_; and  
(Name of customer)
- (2) the amount of money to be drawn on this Letter of Credit.

This Letter of Credit shall expire on \_\_\_\_\_, 20\_\_\_\_. This letter shall expire prior to said date if \_\_\_\_\_ received a release purportedly signed by the City Engineer stating that all or a portion of this Letter of Credit is to be released.

All drafts drawn under this Letter of Credit are to be endorsed hereon and shall bear the clause DRAWN UNDER \_\_\_\_\_  
(Name of bank - must be drawable within West Plains)

LETTER OF CREDIT NO. \_\_\_\_\_, DATED \_\_\_\_\_.

We hereby agree with the drawers, endorsers, and bona fide holders of drafts drawn under and in accordance with the terms of this Letter of Credit that said drafts shall be duly honored on presentation to us at our office specified above on or before the expiration date. Further, we agree that all fees associated with this letter of credit shall not be the responsibility of West Plains.

\_\_\_\_\_  
(Name of bank)

By: \_\_\_\_\_  
(Authorized signature)

*Appendix J*

**Release of Fiscal Security  
Request Form**

# **West Plains**

---

**Missouri**

## **RELEASE OF SECURITY FOR EROSION AND SEDIMENT CONTROL PERMIT**

---

---

**DATE:**\_\_\_\_\_ **FILE NUMBER:**\_\_\_\_\_

**PROJECT NAME:**\_\_\_\_\_

**LOCATION:**\_\_\_\_\_

---

**AMOUNT OF SECURITY:**\_\_\_\_\_

---

**DATE OF APPROVAL OF FINAL CLOSEOUT  
INSPECTION:**\_\_\_\_\_

*Appendix K*

**ESC Permit Fees**

## ESC Permit Fees

Below is a list of the basic fees that apply to the West Plains Erosion and Sediment Control Program.

**Standard ESC Permit Fee:**     \$250 + \$25 per acre

**Renewal Fee:**                     \$100

**Transfer Fee:**                     \$100

**Re-Inspection Fee:**             \$50

**If found working without a City-issued permit, a fee of three times the Initial Permit Fee will be imposed.**



West Plains  
Engineering Department  
P.O. Box 710  
West Plains, MO 65775-0710  
(417) 256-7176

