Chapter 13

EROSION AND SEDIMENT CONTROL

ODOT ROADWAY DRAINAGE MANUAL

November 2014

Chapter 13
EROSION AND SEDIMENT CONTROL

Table of Contents

Section **Page**

Table of Contents
(Continued)

Section **Page**

Table of Contents
(Continued)

Section **Page**

List of Figures

Figure **Page**

Chapter 13
EROSION AND SEDIMENT CONTROL

13.1 INTRODUCTION

13.1.1 Background

This chapter is based on the erosion and sediment control policy, requirements for a plan of action, general criteria for controlling erosion and control measures summarized in the AASHTO *Drainage Manual* (1). Chapter 15 "Permits" contains procedures that should be followed to comply with the *Clean Water Act* requirements.

13.1.2 Overview

The hydraulics designer should use the procedures in this chapter to prepare the project specific erosion and sediment control plan, see Section 13.6. The erosion and sediment control plan should consider the following:

- policies discussed in Section 13.2;
- factors influencing erosion discussed in Section 13.3;
- follow the technical principles discussed in Section 13.4;
- follow the general criteria outlined in Section 13.5;
- prepare a control plan outlined in Section 13.6; and
- at a minimum, use the control measures and practices discussed in Section 13.7.

13.2 POLICIES

13.2.1 Background

Erosion and sedimentation are natural or geologic processes whereby soil materials are detached and transported from one location and deposited in another, primarily due to rainfall and runoff. Accelerated erosion and sedimentation can occur at times in conjunction with highway and transportation facility construction. This accelerated process can result in significant impacts (e.g., safety hazards, expensive maintenance problems, unsightly conditions, instability of slopes and disruption of ecosystems, costly penalties, cease-and-desist orders) resulting in project delay. For this reason, the total design process must be performed considering the minimization of erosion and the management of sediment control. General erosion and sediment control guidance can be found in the AASHTO *Highway Drainage Guidelines*, Chapter 3 (2).

13.2.2 Federal Policy

As a result of the *National Environmental Policy Act* of 1969 (see Chapter 2 "Legal Aspects"), much attention has been directed to the control of erosion and sedimentation. As a result of this concern, numerous state and Federal regulations and controls governing land disturbing activities have been developed and published. There are also Federal control requirements exerted by numerous agencies (USACE, USEPA, USFWS) through their administration of various permitting requirements: Section 404, Section 402 and the NPDES *Program of the Federal Water Pollution Control Act* (FWPCA), commonly referred to as the *Clean Water Act*, and Sections 9 and 10 of the *Rivers and Harbors Act* and the National Pollutant Discharge Elimination System (NPDES) permit (see Chapter 15 "Permits").

A NPDES permit requires a Stormwater Pollution Prevention Plan (SWPPP) for industrial activities (including construction) for disturbed areas of 1 acre or more.

The US Environmental Protection Agency (USEPA) has delegated its authority to the Oklahoma Department of Environmental Quality (ODEQ) and the program is called the Oklahoma Pollutant Discharge Elimination System (OPDES).

13.2.3 AASHTO Policy

The policy for erosion and sediment control is stated in AASHTOs publication*, A Policy on Geometric Design of Highways and Streets* (3)*,* as follows:

> *"Erosion prevention is one of the major factors in design, construction and maintenance of highways. It should be considered early in the location and design stages. Some degree of erosion control can be incorporated into the geometric design, particularly in the cross section elements. Of course, the most direct application of erosion control occurs in drainage design and in the writing of specifications for landscaping and slope planting.*

> *Erosion and maintenance are minimized largely by using specific design features: flat side slopes, rounded and blended with natural terrain; serrated cut slopes; drainage channels designed with due regard to width, depth, slopes, alignment and protective treatment; inlets located and spaced with erosion control in mind; prevention of erosion at culvert outlets; proper facilities for groundwater interception; dikes, berms and other protective devices; and other protective devices to trap sediment at strategic locations; and protective ground covers and planting. To the extent practical, these features should be designed and located to minimize the potential crash severity for motorists who unintentionally run off the roadway."*

Although some standardization of methods for minimizing soil erosion in highway construction is possible, national guidelines for erosion control are of a general nature because of the wide variation in climate, topography, geology, soils, vegetation, water resources and land use encountered in different parts of the Nation.

13.2.4 ODOT Erosion and Sediment Control Program

Because modern highway construction may involve the disturbance of large land areas, control of erosion and sedimentation is a major concern. A commitment to erosion and sediment prevention during all phases of highway design, construction and maintenance is essential.

Although much of the effort for control of erosion and sedimentation is expended during the construction phase of highway development, a successful program must address expected erosion and sedimentation issues during the planning, location, design and future maintenance phases, as well. The erosion and sediment control program should be a plan of action and include contract documents, (e.g., standards, specifications) to achieve an acceptable level of control within established criteria and control limits. This plan of action is analogous to a state's highway development process that results in contract plans and documents to provide and maintain transportation facilities based on certain criteria and controls.

The ODOT's Roadway Design Division, Roadside Development Support Unit, has the primary responsibility in assisting the hydraulics designer of Roadway Design Division to satisfy state and Federal regulations in regard to erosion and sediment control problems related to their project. This is accomplished by helping the engineer/designer to comply with all the rules and regulations for storm water discharges from construction activities within the state of Oklahoma, as stated in the ODEQ's "General Permit OKR10".

More information about erosion and sediment control procedures could be found at the website: http://www.okladot.state.ok.us/roadway/Rdy-rdydev.htm.

13.3 FACTORS INFLUENCING EROSION

13.3.1 Principle Factors

The inherent erosion potential of any area is determined by four principle factors:

- soil characteristics (Section 13.3.2),
- vegetative cover (Section 13.3.3),
- topography (Section 13.3.4), and
- climate (Section 13.3.5).

Although each is discussed separately herein, they are interrelated in evaluating erosion potential.

13.3.2 Soil Characteristics

The properties of soil that influence erosion by rainfall and runoff are those that affect the infiltration capacity of a soil and the resistance of a soil to detachment and being carried away by falling or flowing water. Soils containing high percentages of fine sands and silt are normally the most erodible. As the clay and organic matter content of these soils increase, the erodibility decreases. Clays act as a binder to soil particles, thus reducing erodibility. However, although clays have a tendency to resist erosion, once eroded they are easily transported by water and can remain suspended in the water column for long periods of time. Soils high in organic matter have a more stable structure that improves their permeability. Such soils resist raindrop detachment and infiltrate more rainwater. Well-drained and well-graded gravels and gravel-sand mixtures are usually the least erodible soils. Soils with high infiltration rates and permeabilities reduce the amount of runoff.

13.3.3 Vegetative Cover

Vegetative cover plays an important role in controlling erosion in the following ways:

- shields the soil surface from the impact of rain drops,
- holds soil particles in place,
- maintains the soil's capacity to absorb water,
- slows the velocity of runoff, and
- removes subsurface water between rainfalls through the process of evapotranspiration.

By limiting or staging, or both, the removal of existing vegetation and by decreasing the area and duration of exposure, soil erosion can be significantly reduced. Special consideration should be given to the maintenance of existing vegetative cover on areas of high-erosion potential (e.g., erodible soils, steep slopes, drainage ways, banks of streams).

13.3.4 Topography

The size, shape and slope characteristics of a watershed influence the amount and rate of runoff. As both slope length and gradient increase, the rate of runoff increases and the potential for erosion is magnified. Slope orientation can also be a factor in determining erosion potential.

13.3.5 Climate

The frequency, intensity and duration of rainfall are fundamental factors in determining the amounts of runoff produced in a given area. As both the volume and velocity of runoff increase, the ability of runoff to detach and transport soil particles also increases. Where storms are frequent, intense or of long duration, erosion risks are high. Seasonal changes in temperature and variations in rainfall help to define the high erosion risk period of the year. When precipitation falls as snow, typically no erosion will take place. However, in the spring, the melting snow adds to the runoff and erosion potential. Because the ground is still partially frozen, its absorptive capacity is reduced. Frozen soils are relatively erosion-resistant. However, soils with high moisture content are subject to uplift by freezing action and are usually very easily eroded upon thawing.

13.4 TECHNICAL PRINCIPLES

13.4.1 Introduction

For an erosion and sediment control program to be effective, it must be an integral part of the project planning process. These planned erosion and sediment control measures, when conscientiously and expeditiously applied during construction, will result in orderly development without environmental degradation. From the previous discussion on the erosion and sedimentation processes and the factors affecting erosion, basic technical principles can be formulated to assist the designer in providing an effective erosion and sediment control plan. These principles should be utilized to the maximum extent possible on all projects.

13.4.2 Principles

The following principles should be integrated into a system of vegetative measures, structural measures and management techniques to develop a plan to prevent erosion and control sediment. In most cases, a combination of limited time of exposure, and a judicious selection of erosion control practices and sediment control facilities will prove to be the most practical method of controlling erosion and the associated production and transport of sediment.

- Plan the highway project to fit the particular topography, soils, drainage patterns and natural vegetation as practicable.
- Minimize the extent and the duration of exposure of disturbed soils.
- Apply appropriate erosion control practices to prevent on-site erosion.
- Apply perimeter control practices to protect the disturbed area from off-site runoff and to prevent sedimentation damage to areas below the construction site.
- The best way to control sediment is to prevent erosion. If erosion occurs, sediment can be retained by filtering runoff as it flows through an area and impounding the sediment-laden runoff for a period of time so that the soil particles settle out.
- Keep runoff velocities low and retain runoff on the site.
- Stabilize disturbed areas immediately after final grade has been attained.
- Implement a maintenance and follow-up program to ensure continued functionality of permanent control practices.

13.5 GENERAL CRITERIA FOR CONTROLLING EROSION

13.5.1 Application

The General Criteria (Section 13.5.2) are minimum requirements for controlling erosion and sedimentation from "land-disturbing activities." These general criteria work in concert with individually developed erosion and sediment control plans. They establish minimum standards of soil conservation practices that apply to all land-disturbing projects that are subject to. Before the General Criteria (Section 13.5.2) are applied; the local program requirements should be reviewed.

13.5.2 General Criteria

Following is a discussion of the general criteria that should be considered in developing an erosion and sediment control plan.

13.5.2.1 Stabilization

Soil stabilization refers to measures that protect soil from the erosive forces of raindrop impact and flowing water. Applicable practices include temporary erosion control material, vegetative establishment, mulching and the early application of a gravel base on areas to be paved. Soil stabilization measures should be selected to be appropriate for the time of year, site conditions and estimated duration of use. The following refers to stabilization of denuded areas and soil stockpiles:

- Permanent or temporary soil stabilization should be applied to denuded areas within seven days after final grade is reached on any portion of the site. Soil stabilization should also be applied within seven days to denuded areas that may not be at final grade, but will remain undisturbed for longer than 14 days.

- Soil stockpiles should be stabilized or protected with sediment control measures to prevent soil loss.

13.5.2.2 Permanent Vegetation

A permanent vegetative cover should be established on denuded areas not otherwise permanently stabilized (e.g., concrete, asphalt, compacted stone).

13.5.2.3 Protection of Adjacent Property

Properties adjacent to the site of a land disturbance should be protected from sediment deposition. This may be accomplished by preserving a well-vegetated buffer strip around the lower perimeter of the land disturbance; by installing perimeter controls such as sediment barriers, filters or dikes or sediment basins; or by a combination of such measures.

13.5.2.4 Timing and Stabilization

Sediment basins and traps, perimeter dikes, sediment barriers and other measures intended to trap sediment on-site should be constructed as a first step in grading and become functional before upslope land disturbance occurs. Earthen structures such as dams, dikes and diversions should be stabilized as soon as grading has been completed.

13.5.2.5 Sediment Basins

Stormwater runoff from drainage areas with five disturbed acres or greater drainage to a common location must pass through a sediment basin or other suitable sediment-trapping facility. Sediment basins are more cost effective when most of the area draining to the basin is disturbed area, because they must be sized based on total contributing area.

13.5.2.6 Polyacrylamides

Polyacrylamides (PAMs) are often the only workable treatment approach to settle colloidal sediments in runoff. PAMs are used both to stabilize slopes against erosion and as a coagulant to facilitate deposition in removing fine sediments from runoff. PAM dosage and type should be site specifically formulated for effectiveness and avoidance of toxicity. The PAM vendor must submit a written toxicity report, which verifies that the PAM exhibits acceptable toxicity parameters that meet state and Federal water quality standards. Toxicity tests should use the following:

- EPA-821-R-02-012 (acute testing for freshwater/marine organisms), and
- EPA-821-R-02-013 (chronic testing for freshwater organisms).

13.5.2.7 Cut and Fill Slopes

Cut and fill slopes should be designed and constructed to minimize erosion. Consideration should be given to the length and steepness of the slope, the soil type, the upslope drainage area, groundwater conditions and other applicable factors. The following guidelines are provided to aid site planners and plan reviewers in developing an adequate design:

- Roughened soil surfaces are generally preferred to smooth surfaces on slopes.

- Diversions should be constructed at the top of long, steep slopes that have significant drainage areas above the slope. Diversions or terraces may also be used to reduce slope length.

- Concentrated stormwater should not be allowed to flow down cut or fill slopes unless contained within an adequate temporary or permanent channel, flume or slope drain structure.

- Wherever a slope face crosses a water seepage plane that endangers the stability of the slope, adequate subsurface drainage or other protection should be provided.

13.5.2.8 Waterways and Outlets

All on-site stormwater conveyance channels should be designed and constructed to withstand at a minimum the expected velocity of flow from a 24 hour frequency storm. Stabilization adequate to minimize erosion should also be provided at the outlets of all pipes and paved channels (4).

13.5.2.9 Inlet Protection

All storm drain inlets that are made operable during construction should be protected so that sediment-laden water will not enter the conveyance system without first being filtered or otherwise treated to remove sediment. When downstream sediment capture mechanisms are in place, sediment filtration at the inlet should be targeted, at a minimum, to remove sediment large enough to settle out within the pipe system; in such cases, the capture of smaller sediment should then be accomplished downstream.

13.5.2.10 Crossing Watercourses

ODOT specifications prohibit fording of streams. Construction vehicles should be kept out of watercourses as much as possible. Where in-channel work is necessary, precautions should be taken to stabilize the work area during construction to minimize erosion. The channel (including bed and banks) should always be stabilized immediately after in-channel work is completed.

Where an active (wet) watercourse must be crossed by construction vehicles regularly during construction, a temporary stream crossing should be provided.

13.5.2.11 Disposing of Measures

All temporary erosion and sediment control measures should be disposed of after final site stabilization is achieved or after the temporary measures are no longer needed. Trapped sediment and other disturbed soil areas resulting from the disposition of temporary measures should be permanently stabilized to prevent further erosion and sedimentation.

13.5.2.12 Inspection and Maintenance

All erosion and sediment control practices will be maintained in good working order from the beginning of construction until an acceptable cover is established. Inspection by the contractor and any necessary repairs should be performed once every 7 calendar days and within 24 hours after any storm event greater than 0.5 in.

13.6 EROSION SEDIMENT CONTROL PLAN

13.6.1 Plan Overview

An erosion and sediment control plan is a document that identifies the potential for erosion and sedimentation problems on a construction project and explains and illustrates the measures that are to be taken to control those problems. The plan has a written portion known as a narrative and an illustrative portion known as a map or site plan. This plan, including standards and specifications, should be a part of the project contract documents.

A narrative is a written statement that explains the erosion and sediment control decisions made for a particular project and the application of control measures to mitigate those issues. The narrative is important to the construction superintendent and inspector, who are responsible to ensure that the plan is implemented properly. It provides them with a document that describes where and when the various erosion and sediment control practices should be installed.

13.6.2 Plan Guidelines

The development of the erosion and sediment control plan involves common-sense planning and should consider the schedule and timing of construction activities and the application of control measures that will minimize the adverse impacts of soil erosion, transport and deposition. The following basic guidelines govern the development and implementation of a sound erosion and sediment control plan:

- The project should be planned to take advantage of the topography, soils, waterways and natural vegetation at the site.
- The smallest practical area should be exposed to erosive elements for the shortest possible time.
- Onsite erosion control measures should be applied to reduce the potential for erosion of the site.
- Sediment control measures should be applied to avoid potential offsite impacts.
- A thorough maintenance and follow-up program should be implemented.

In practice, these erosion and sediment control guidelines should be considered in the planning process in order to identify potential erosion and sediment control issues before construction begins. General guidance can be found in AASHTO *Highway Drainage Guidelines*, Chapter 3 (2). The USEPA website (5) provides guidelines for roads, highways and bridges on nonpoint source pollution prevention.

13.6.3 Plan Development Procedures

The length and complexity of the plan should be commensurate with the size of the project, the severity of site conditions and the potential for off-site impacts. A narrative should be considered for complex projects.

Step 1. Data collection and preliminary analysis.

The highway construction plans can serve as the base map for the erosion control plan. If available, a soils map should be obtained from the local office of NRCS. The hydraulics designer responsible for developing the plan should inspect the site to verify natural drainage patterns, drainage areas, general soil characteristics and off-site factors.

The base data should reflect such information as:

- land slopes;
- natural drainage patterns;
- unstable stream reaches and flood marks;
- watershed areas;
- existing vegetation (noting special vegetative associations);
- critical areas (e.g., steep slopes, eroding areas, rock outcroppings, seepage zones);
- unique or noteworthy landscape values to protect;
- adjacent land uses, especially areas sensitive to sedimentation or flooding; and
- critical or highly erodible soils that should be left undisturbed.

In the analysis of the base data, identify:

- buffer zones;
- areas of steep, natural and man-made slopes;
- stream crossing areas;
- access routes for construction and maintenance of sedimentation control devices;
- borrow and waste disposal areas;
- the most practical sites for control practices; and
- potential for sediment pollution of adjacent water courses and properties.

When all data are considered together, a picture of the site potentials and limitations should begin to emerge. The hydraulics designer should be able to determine those areas that have potentially critical erosion hazards.

Step 2. Plan for erosion and sediment control.

The following general procedure is recommended for erosion and sediment control planning:

a. Determine limits of clearing and grading. Decide exactly which areas must be disturbed to accommodate the proposed construction. Pay special attention to critical areas that must be disturbed.

b. Divide the site into drainage areas. Determine how runoff will travel over the site. Consider how erosion and sedimentation can be controlled in each small drainage area before looking at the entire site. Remember, it is easier to control erosion than to contend with sediment after it has been carried downstream.

c. Select erosion and sediment control practices. Erosion and sediment control practices can be divided into three broad categories: vegetative controls, structural controls and management measures. Management measures are construction management techniques that, if properly utilized, can minimize the need for physical controls and possibly reduce costs.

Vegetative Controls

Remember that the first line of defense is to prevent erosion. This is accomplished by protecting the soil surface from raindrop impact and overland flow of runoff. The best way to protect the soil surface is to preserve the existing ground cover. Where land disturbance is necessary, temporary seeding and mulching, as needed, should be used on areas that will be exposed for long periods of time.

Erosion and sediment control plans should contain provisions for permanent stabilization of disturbed areas. Selection of permanent vegetation should include the following considerations:

- establishment requirements,
- adaptability to site conditions, and
- maintenance requirements.

Structural Controls

Structural control measures are required where potentially damaging, sediment-laden runoff leaves a disturbed site and generally include sediment traps, diversions, sediment basins and permanent drainage facilities.

Structural control practices are most obviously distinguished from vegetative control practices in that they are constructed or installed as opposed to being planted. While the function of the vegetative practices is almost always erosion control, the function of structural practices is varied between erosion control and sediment trapping. Structural erosion control measures, such as riprap, paved flumes, check dams and concrete linings, are those which shield the soil from the erosive energy of falling or flowing water. Sediment trapping practices, such as sediment basins, permanent stormwater treatment, drainage facilities and silt fences, are those which cause water to temporarily pond so that sediment can drop out. In order to adequately specify uses of structural control practices, it is important to understand the intended function and limitations of each one.

It is important that structural control practices be selected, designed and constructed according to the standards and specifications established for the state or locality in which the project is located, and the intended functions and limitations of each one. Improper use or inadequate installation of the structural control can create problems that are greater than the structural control was designed to solve.

In general, structural controls are more costly and, in most cases, considerably less effective in sediment trapping than vegetative controls. This is why the use of vegetation is stressed—to maximize cost-effectiveness. However, the need for structural controls on construction sites cannot be denied. There will almost always be denuded areas that will be exposed to rainfall sometime during the construction process, and steps must be taken to minimize sediment loss during these periods. In these cases, structural controls are often the only alternative.

The most effective conservation plans will consist of a coordinated combination of vegetative and structural controls.

Management Measures

Good construction management is as important as physical practices for erosion and sediment control. The following management considerations should be employed:

- Sequence construction so that no area remains exposed for unnecessarily long periods of time.
- Temporary seeding should be done immediately after grading is halted for any prolonged period of time.
- On large projects, stage the construction, if possible, so that one area can be stabilized before another is disturbed.
- Develop and carry out a regular inspection and maintenance schedule for erosion and sediment control practices.
- Ensure that all workers understand the major provisions of the erosion and sediment control plan.
- Responsibility for implementing the erosion and sediment control plan should be designated to one individual.

Step 3. Prepare the plan.

The final step consists of consolidating the pertinent information and developing it into a specific erosion and sediment control plan for the project. The plan consists of a narrative and a plan:

- The narrative verbally explains the problems and their solution.
- The plan is the pictorial explanation of information contained in the narrative.

13.6.4 Examples of Storm Water Pollution Prevention Plan (SWPPP) and 404 Permit Application Forms

The ODOT Roadway Stormwater Pollution Prevention Plan (SWPPP), as shown in Appendix A, should include all the necessary information that the hydraulics designer must include in their project plans to comply with the requests from ODEQ.

See Appendix B for the USACE 404 permit application form and instructions.

1

2

13.7 CONTROL MEASURES AND PRACTICES

13.7.1 Introduction

Control measures, such as stabilizing emulsions and vegetation, are required for all disturbed areas. Vegetation measures generally include retention or provision of strips of vegetation to provide a filtration buffer, temporary seeding, permanent seeding, sodding and mulching. Structural control measures are required where potentially damaging, sediment-laden runoff leaves a disturbed site and generally include sediment traps, diversions, sediment basins and permanent drainage facilities.

The erosion and sediment control plan discussed in Section 13.6 should be a part of the overall construction plan for the project including appropriate construction specifications for all control measures. These specifications should be developed in consultation with the erosion and sediment control plan designer in order to address site-specific conditions. Following is a discussion of the commonly used highway erosion and sediment control practices that should be considered for a site specific erosion control plan as discussed in Section 13.6. The emphasis in this discussion is on providing:

- use limitations,
- design detailing, and
- construction guidelines.

13.7.2 Vegetation

Vegetative filter strips may be used to remove suspended solids from sheet flow runoff but are unacceptable for controlling erosion and sedimentation from concentrated flows. Filter strips may be used to control suspended solids on areas with slopes up to 12% and with slope lengths up to 165 ft.

The hydraulics designer should consider the following use limitations:

- Temporary seeding with appropriate, rapidly growing grasses and plants is suitable for use on disturbed areas when no additional disturbance is planned for periods of 14 days or longer. Grass or plant selection should be based on a consideration of the growing season and estimated duration of protection requirements.

- Permanent seeding with perennial cover is suitable for cases where the life expectancy of temporary plantings is inadequate to protect a site during long periods between disturbance activities. Permanent seeding is also appropriate for final vegetative cover establishment during acceptable growing seasons.

- Sodding is preferable for use in areas requiring additional protection from concentrated flow, such as grassed swales and waterways and storm drain inlets. Sodding may also be appropriate when an immediate aesthetic effect is desired. Also, ODEQ's permit requires 70% native background cover for termination of the Storm Water permit. This may be a consideration on stabilization and length of time required prior to final acceptance of the project.

- Mulching should be used with all permanent seeding operations to provide temporary protection during adverse growing seasons. Typical mulching material includes straw, hay and wood chips.

Seed bed preparation is an important consideration for all vegetative control measures. Soil characteristics (e.g., depth to rock, pH, fertility, moisture) should all be evaluated during plant selection. Lime, fertilizer and irrigation will often be required to establish vegetative cover that meets local requirements. The amounts of lime and fertilizer required will vary by location, and the recommendations of an agronomist may be required. The local NRCS office may also provide guidance. The erosion and sediment control plan should clearly specify soil-preparation requirements for the project site. Erosion and sediment control facilities may not be considered complete until suitable vegetative cover is established.

When applying temporary erosion protection or to protect the permanent vegetation establishment, the Roadway engineer/designer could use the following methods:

13.7.2.1 Vegetative Mulch

The vegetative mulch includes:

1. Hydraulic Method. During the spreading operation of the mulch material, inject the adhesive material into the mulch at the rates given in the ODOT Standard Specifications for the type of mulch materials being used, and

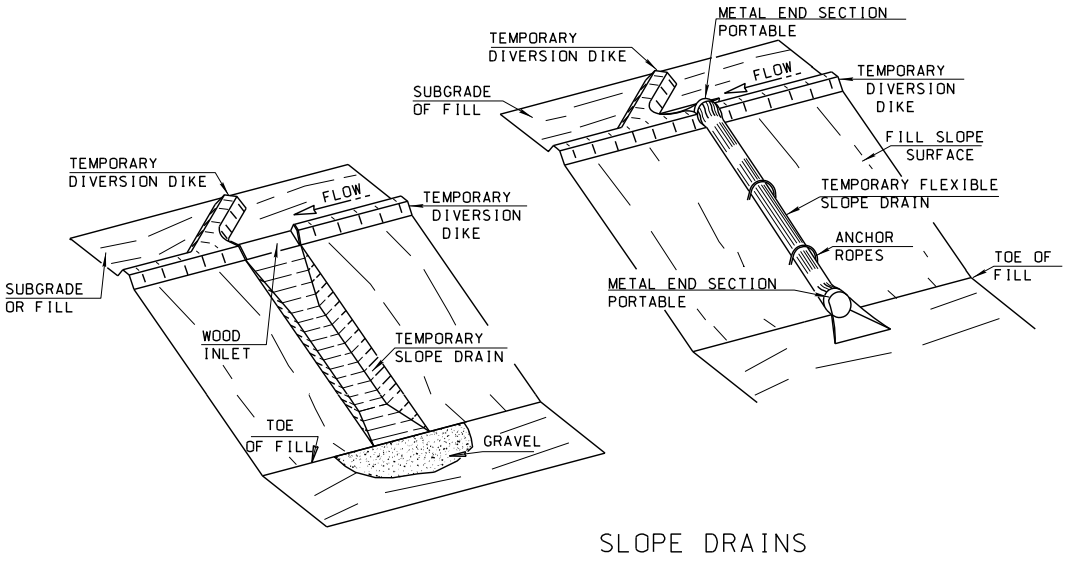
2. Tiller Method. Spread the material being used uniformly at the rates given in the ODOT Standard Specifications for the type of mulch materials being used and immediately till the area to press the material into the soil at the specified depth.

13.7.2.2 Erosion Control Mats

The Erosion Control Mats are specified in ODOT *Standard Specifications* as excelsior or nylon mats. These are usually rolled product fastened to the soil with the appropriate fasteners specified. These mats are used on steep temporary slopes and sometimes in small channels. Rolled products can also be used over permanent seeding to aid in establishment. Rolled products which are not in ODOT *Standard Specifications* can be used only when approved by the hydraulics designer using manufacturer's specifications.

13.7.3 Temporary Slope Drain

A flexible or rigid conduit used during construction to convey concentrations of runoff from the top to bottom of disturbed slopes before permanent drainage structures are installed. See Figure 13.7-A.



Source: ODOT Roadway Standard Drawings

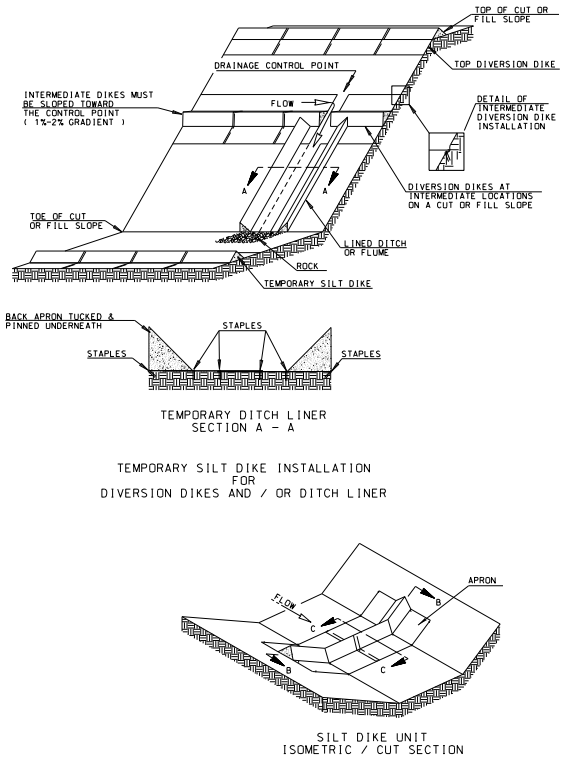
Figure 13.7-A — CROSS SECTION OF TEMPORARY SLOPE DRAIN

The hydraulics designer should consider the following use limitations:

- maximum drainage area allowed for each slope drain,
- open-chute drains should be used only on straight alignment, and
- slope drains should be placed only on well-compacted stable slopes.

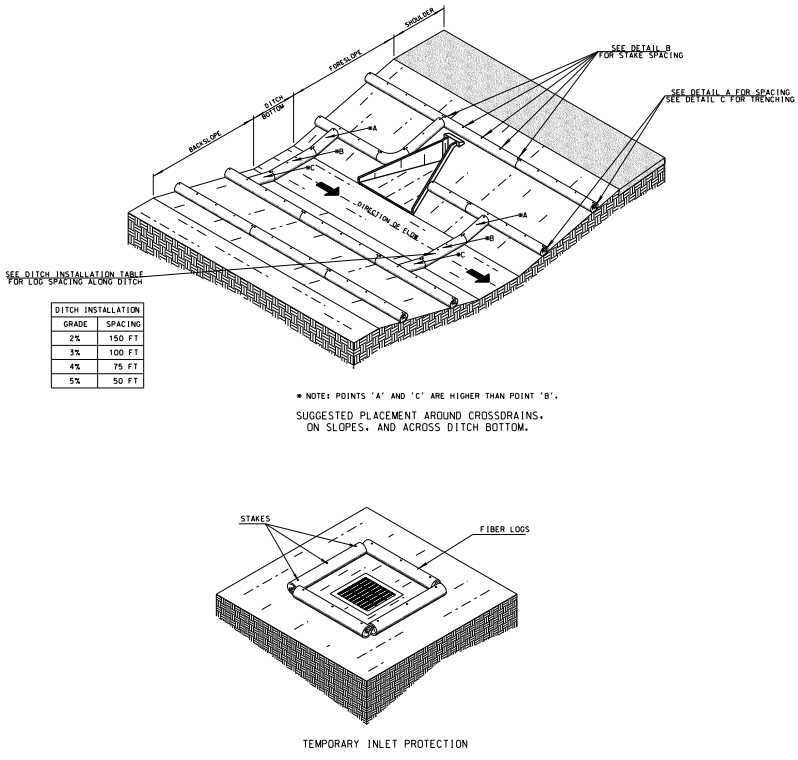
13.7.4 Silt Dike and Fiber Log

ODOT has accepted either silt dike (see Figure 13.7-B) or fiber log (see Figure 13.7-C) as temporary sediment barrier. The installation criteria and procedures of these two temporary sediment barriers are shown in the Figures 13.7-B and 13.7-C. Straw bale barrier as a temporary sediment barrier is not accepted by ODOT or by Oklahoma Department of Environment Quality (DEQ).



Source: ODOT Roadway Standard Drawings

Figure 13.7-B — SILT DIKE



Source: ODOT Roadway Standard Drawings

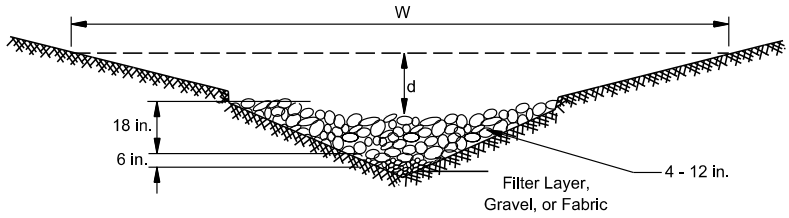
Figure 13.7-C — TEMPORARY FIBER LOG

13.7.5 Channel Lining

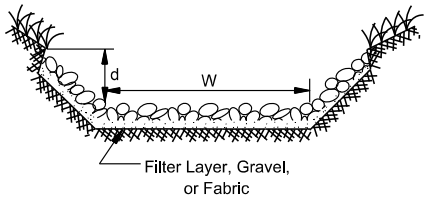
One means of reducing erosion during highway construction and operation is through the use of properly designed linings in drainage channels. Linings may be rigid, (e.g., portland cement, asphaltic concrete) flexible (e.g., vegetation) or rock riprap. Flexible linings of erosion-resistant vegetation and rock riprap should be used where feasible. Where vegetation is chosen as the permanent channel lining, it may be established by seeding or sodding. Installation by seeding usually requires protection by one of a variety of temporary lining materials until the vegetation becomes established. For examples of vegetated and riprap channel linings, see Chapter 8 "Channels."

13.7.5.1 Use Limitations

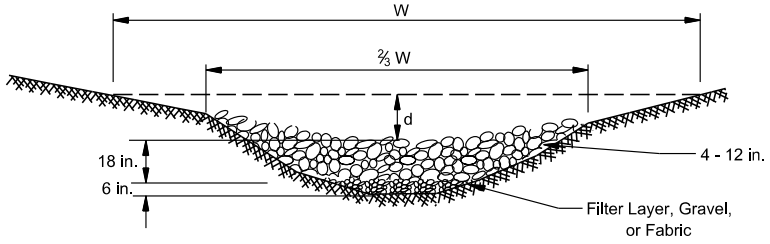
Flexible linings (see Chapter 8 "Channels") are generally less expensive to install than rigid linings, provide a safer roadside and have self-healing qualities that reduce maintenance costs. Flexible linings also permit infiltration and exfiltration, have a natural appearance, especially after vegetation is established, and provide a filtering media for runoff contaminants. Vegetative and rock riprap liners (Figure 13.7-D) provide less improvement in conveyance over natural conditions, and the resultant acceleration of flow volume and peak is less than with rigid liners.



Vegetated V-Shaped Waterway with Stone Center Drain



Trapezoidal Riprap Channel



Vegetated Parabolic-Shaped Waterway with Stone Center Drain

Figure 13.7-D — RIPRAP CHANNEL CROSS SECTION

Flexible linings have the disadvantage of being limited in the flow velocities that they can accommodate without erosion occurring. As a result, the channel may provide a low capacity for a given cross sectional area when compared to a rigid lining. Also, limited right-of-way, unavailability of rock or the inability to establish vegetation may preclude the use of flexible linings. In these instances, rigid linings may be the only alternative.

Rigid linings are generally quite smooth, so that they have a high capacity for a given cross sectional area due to low hydraulic resistance, and thus produce a high-flow velocity. When properly designed and constructed, rigid linings will prevent erosion in steep or difficult channels where other linings cannot be used. They may also be used in areas where the channel width is restricted, because steep sidewall slopes may be constructed. So long as the rigid lining is intact, the underlying soil is protected upon construction of the lining.

However, rigid linings also have a number of inherent disadvantages. They are expensive to construct and maintain, have an unnatural appearance, prevent or reduce natural infiltration and contribute to high velocities and scour at the downstream end of the lining unless roughness elements are added to slow the flow. Many rigid linings fail due to slow undercutting of the lining, channel headcutting or hydrostatic pressure behind the channel walls or floor.

13.7.5.2 Design Detailing

The hydraulics designer should consider the following design detailing:

1. Rigid Channel Linings. For rigid channel linings, such as concrete or soil cement, there is no maximum permissible flow velocities normally encountered in highway drainage work, because nominally no erosion can occur. Thus, the maximum flow depth is based only on the freeboard requirement for the channel.

2. Flexible Channel Linings. For design detailing, the user is referred to Chapter 8 “Channels.”

13.7.6 Outlet Protection

The outlets of pipes and structurally lined channels are points of critical erosion potential. To prevent scour at stormwater outlets, a flow-transition structure will absorb the initial impact of the flow and reduce the flow velocity to a level that will not erode the receiving channel or area.

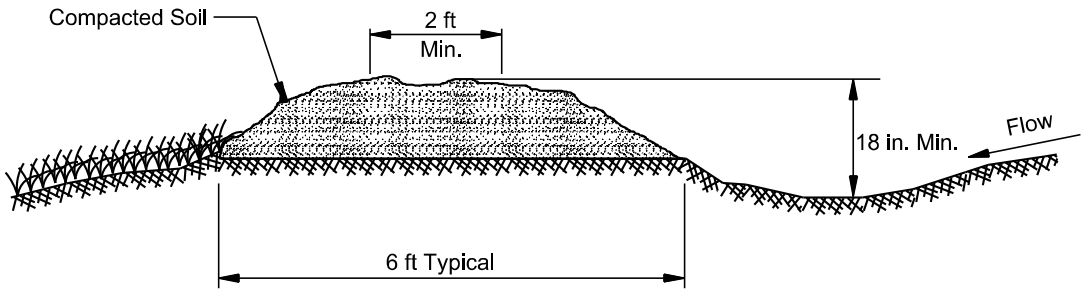
Structurally lined aprons are the most commonly used device for outlet protection. These aprons are generally lined with riprap, grouted riprap or concrete. They are constructed at a zero grade for a distance that is related to the outlet flow rate and the tailwater level. Chapter 11 “Energy Dissipators” provides culvert outlet riprap design guidelines.

13.7.7 Diversion

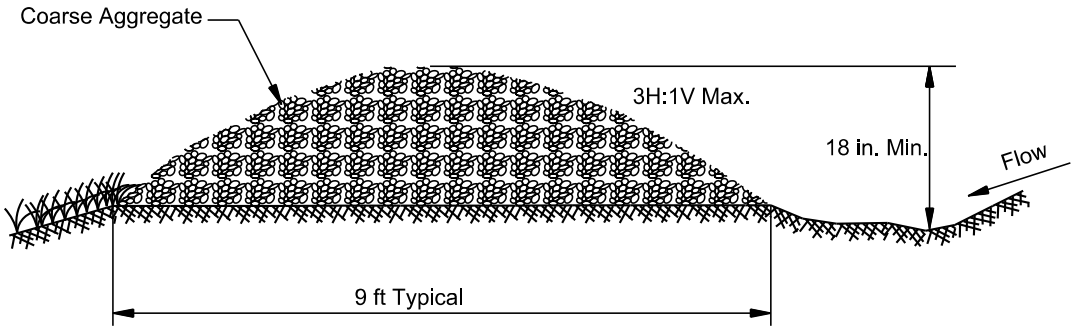
A diversion channel is a channel constructed across a slope with a supporting ridge on the lower side to reduce the slope length and to intercept and divert stormwater runoff to stabilized outlets at non-erosive velocities. Diversions are used where:

- runoff from higher areas may damage property, cause erosion or interfere with the establishment of vegetation on lower areas;
- surface or shallow subsurface flow, or both, is damaging upland slopes; or
- the slope length needs reduction to minimize soil loss.

Figure 13.7-E and Figure 13.7-F illustrate the use of diversions.



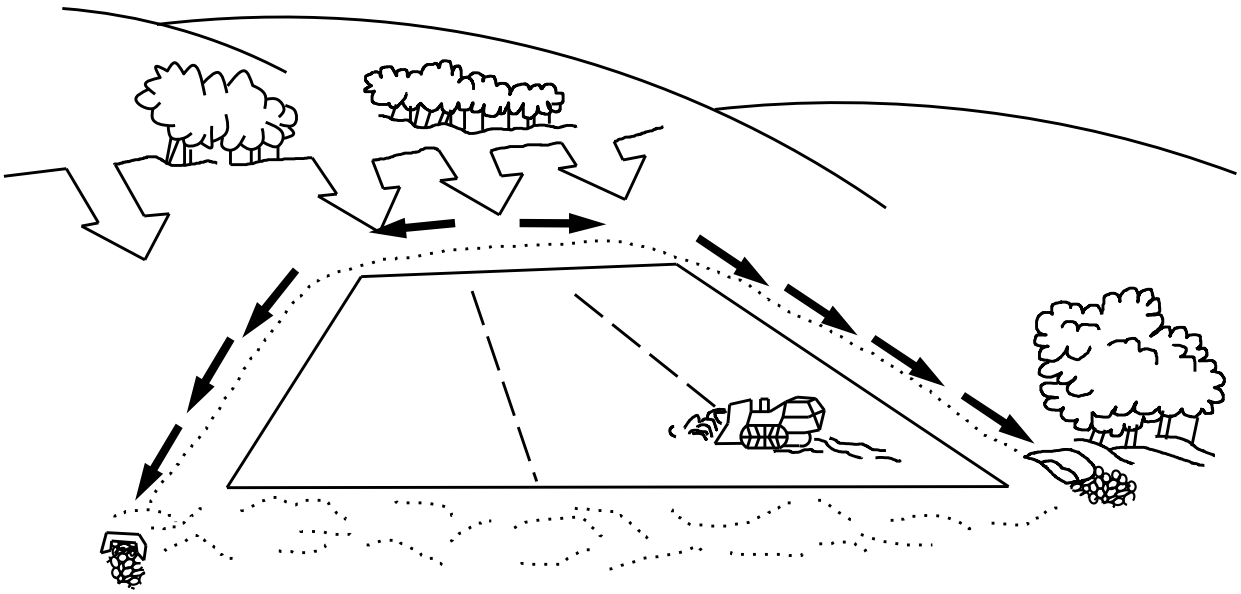
Temporary Earthen Diversion Dike



Temporary Gravel Diversion Dike for Vehicle Crossing (Modified from Va SWCC)

Source: Virginia Erosion & Sediment Control Handbook (4)

Figure 13.7-E — USE OF TEMPORARY DIVERSIONS



Source: NC Erosion and Sediment Control Planning and Design Manual (6)

Figure 13.7-F — USE OF PERIMETER DIKES AS DIVERSIONS

13.7.7.1 Design Detailing

In most instances, diversions are constructed using a standard design or sized for site flow conditions to meet the following guidelines:

- Diversion location should be determined by considering outlet conditions, topography, land use, soil type, length of slope, seepage planes (where seepage is a problem) and the development layout.

- The diversion channel should have a minimum capacity to carry the runoff expected from a 10-year frequency storm with a freeboard of at least 0.3 ft.

- Diversions designed to protect homes, schools, industrial buildings, roads, parking lots and comparable high-risk areas and those designed to function in connection with other structures, should have sufficient capacity to carry peak runoff expected from a storm frequency consistent with the hazard involved.

- The diversion channel may be parabolic, trapezoidal or V-shaped.

- The supporting ridge cross-section should meet the following criteria:

    - The side slopes should be no steeper than 1V:2H.
    - The width at the design water elevation should be a minimum of 4 ft.
    - The minimum freeboard should be 0.3 ft.
    - Include a 10% settlement factor.

13.7.7.2 Construction Guidelines

Diversions should have adequate outlets that will convey concentrated runoff without erosion.

1. Stabilization

    - Unless otherwise stabilized, the ridge and channel should be seeded and mulched within 15 days of installation.

    - Disturbed areas draining into the diversion should be seeded and mulched prior to or at the same time the diversion is constructed.

2. General Considerations

    - All trees, brush, stumps, obstructions and other objectionable material should be removed and disposed of so as not to interfere with the proper functioning of the diversion.

    - The diversion should be excavated or shaped to line, grade and cross section as required to meet the criteria specified, and free of irregularities that will impede flow.

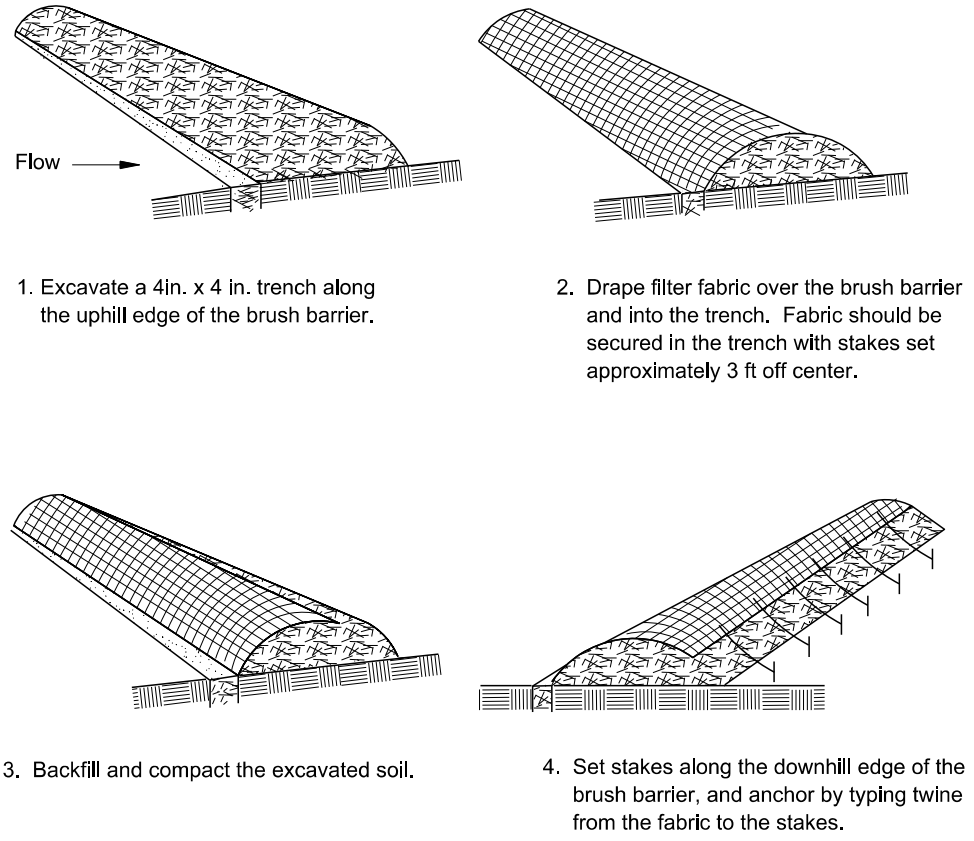
    - Fills should be compacted as needed to prevent unequal settlement that would cause damage in the completed diversion.

    - All earth removed and not needed in construction should be spread or disposed of so that it will not interfere with the functioning of the diversion.

    - Permanent stabilization of disturbed areas should be done in accordance with the applicable standards and specifications.

13.7.8 Brush Barrier

A brush barrier (see Figure 13.7-G) is a temporary sediment barrier that is used to intercept and retain sediment from disturbed areas of limited extent, preventing sediment from leaving the site. Brush barriers are constructed at the time of clearing and grubbing and consist of brush, limbs, root mat, weeds, vines, soil, rock and unmerchantable timber. Where applicable, the brush barrier should be constructed at the perimeter of a disturbed area using the residue materials available from clearing and grubbing the site.



Source: Sherwood and Wyant (7)

Figure 13.7-G — BRUSH BARRIER COVERED BY FILTER FABRIC

13.7.8.1 Use Limitation

The hydraulics designer should consider the following use limitations:

- locate within 500 ft of source of material,
- use only in areas of sheet or very low flow, and
- do not use in a developed area where they could be a visual or other nuisance problem.

13.7.8.2 Design Detailing

States should include design specifications for local agency.

13.7.8.3 Construction Guidelines

The hydraulics designer should consider the following construction guidelines:

- The height of a brush barrier should be 3 ft minimum.

- The width of a brush barrier should be a minimum of 5 ft at its base. The sizes of brush barriers may vary considerably based upon the amount of material available and judgment of hydraulics designer.

- The barrier should be constructed by piling brush, stone, root mat and other material from the clearing process into a mounded row on the contour.

- The filter fabric should be cut into lengths sufficient to lay across the barrier from its upslope base to just beyond its peak. Where joints are necessary, the fabric should be spliced together with a minimum 12 in overlap and securely sealed.

- A trench should be excavated 4 in wide and 4 in deep along the length of the barrier and immediately uphill from the barrier.

- The lengths of filter fabric should be draped across the width of the barrier with the uphill edge placed in the trench and the edges of adjacent pieces overlapping each other.

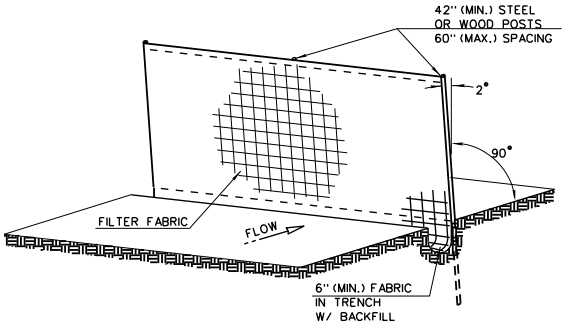
- The filter fabric should be secured in the trench with stakes set approximately 3 ft on center.

- The trench should be backfilled and the soil compacted over the filter fabric.

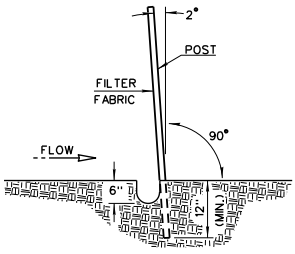
- Set stakes into the ground along the downhill edge of the brush barrier, and anchor the fabric by tying twine from the fabric to the stakes.

13.7.9 Temporary Silt Fence

A silt fence (see Figure 13.7-H) is a temporary linear sediment barrier constructed of a filter fabric stretched across and attached to supporting posts and entrenched. Depending upon the strength of the fabric used, wire fence may be added for support. Silt fence is used for:



TEMPORARY SILT FENCE
RECOMMENDED TOE-IN METHOD



TEMPORARY SILT FENCE
SECTION

Source: ODOT Roadway Design Standard Drawings

Figure 13.7-H — TEMPORARY SILT FENCE

- perimeter control;
- intercepting and detaining small amounts of sediment from disturbed areas during construction operations to prevent sediment from leaving the site;
- decreasing the velocity of sheet flows and low-to-moderate level channel flows;
- high-risk areas, as adjacent to streams, wetlands, reservoirs, lawns, etc.;
- continual barriers at the toe of fill where ground slopes away;
- short lengths at the toe of fill where ground slopes toward the fill;
- perimeter of median and yard inlets as applicable; and
- continual barriers behind curb and gutter to prevent silting of the pavement.

13.7.9.1 Use Limitations

The hydraulics designer should consider the following use limitations:

- Only use where the size of the drainage areas is no more than 0.25 acre per 100 ft of silt fence length; the maximum slope length behind the barrier is 100 ft; and the maximum gradient behind the barrier is 50% (1V:2H).
- Under no circumstances should silt fences be constructed in live streams or in swales or ditch lines where flows are likely to exceed 1 cfs.
- On steep slopes, care should be given to placing alignment of fence perpendicular to the general direction of the flow.

13.7.9.2 Design Detailing

The hydraulics designer should consider the following design detailing:

- No formal design is required.
- Silt fences are limited to sites where only sheet or overland flows are expected. They normally cannot filter the volumes of water generated by channel flows, and many of the fabrics do not have sufficient structural strength to support the weight of water ponded behind the fence line. Their expected usable life is five months.

13.7.9.3 Construction Guidelines

The project engineer should consider the following material considerations:

- Synthetic filter fabric should be a pervious sheet of woven propylene, polyester or polyamide material that is resistant to ultraviolet degradation, mildew and rot.

- Posts for silt fences should be either 2 in diameter wood or 1.00 lb/ft of steel with a minimum length of 4 ft. Steel posts should have projections for fastening wire to them.

- Wire fence reinforcement for silt fences using standard strength filter cloth should be a minimum of 3 ft in height, a minimum of 14 gauge and should have a maximum mesh spacing of 6 in.

- The height of a silt fence should not exceed 3 ft (higher fences may impound volumes of water sufficient to cause failure of the structure).

- The filter fabric should be purchased in a continuous roll cut to the length of the barrier to avoid the use of joints. Where joints are necessary, filter cloth should be spliced together only at a support post, with an approved fastener.

- Posts should be spaced a maximum of 5 ft apart at the barrier location and driven securely into the ground a minimum of 1 ft.

- A trench should be excavated with at least a 6-in depth along the line of post and upslope from the barrier. The trench should be backfilled and the soil compacted over the filter fabric (see ODOT Standard TSC 2-3).

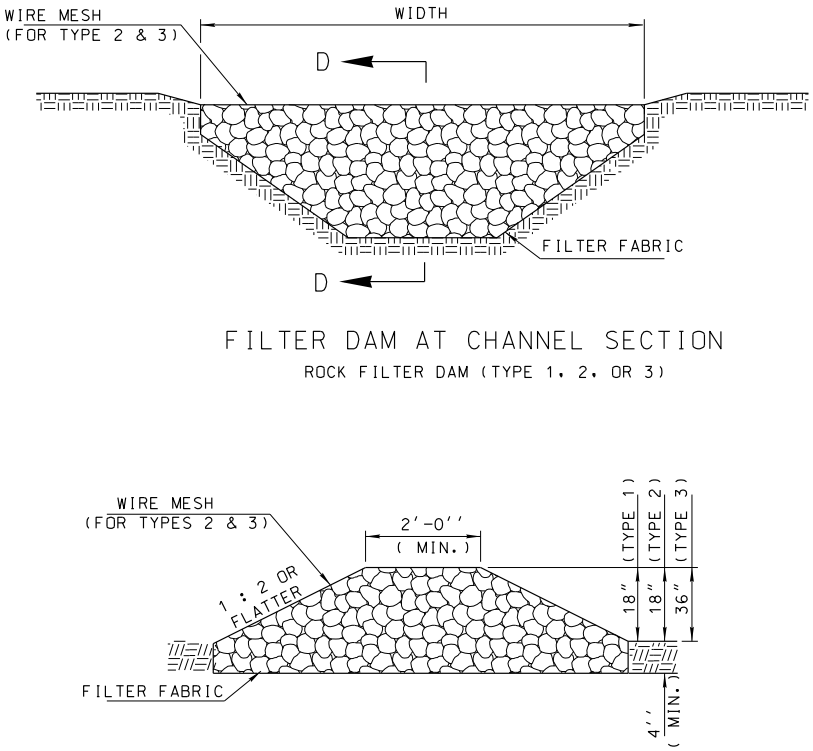
- Silt fences should be removed when they have served their useful purpose, but not before the upslope area has been permanently stabilized.

- Sediment should be removed before depth exceeds 6 in.

- If silt fences are damaged or inadvertently moved during sediment removal process, the contractor should properly replace or re- install at no additional cost to ODOT.

13.7.10 Rock Filter Dam

A rock filter dam is a small temporary dam constructed across a swale or drainage ditch, which reduces the velocity of concentrated stormwater flows, thereby reducing erosion of the swale or ditch (see Figure 13.7-I). This practice also traps small amounts of sediment generated in the ditch. However, this is not a sediment trapping practice and should not be used for this purpose.



Source: ODOT Roadway Design Standard Drawing

Figure 13.7-I — ROCK FILTER DAM

13.7.10.1 Use Limitations

This practice is limited to use in small open channels that drain 10 acres or less. It should not be used in an active stream. Some specific applications include the following:

- temporary ditches or swales that, because of their short length of service, cannot receive a non-erodible lining but still need some protection to reduce erosion;
- permanent ditches or swales that for some reason cannot receive a permanent non-erodible lining for an extended period of time; or
- either temporary or permanent ditches or swales that need protection during the establishment of grass linings.

Other limitations include the following:

- Do not use where high flows or high velocities are expected.
- In locating the check dam, consider the effects and the reach of the impounded water and sediment.
- Storm flows across a deteriorated check dam can result in the loss of the structure and the washout of the accumulated sediment.

13.7.10.2 Design Detailing

The drainage area of the ditch or swale being protected should not exceed 10 acres. The maximum height of the check dam should be 2 ft. The center of the check dam should be at least 6 inches lower than the outer edges. If used in combination, the maximum spacing between the dams should be such that the toe of the upstream dam is at the same elevation as the top of the downstream dam.

13.7.10.3 Construction Guidelines

- Stone check dams should be constructed of 2 in to 3 in stone. Hand or mechanical placement will be necessary to achieve complete coverage of the ditch or swale and to ensure that the center of the dam is lower than the edges.

- Log check dams should be constructed of 4 in to 6 in logs salvaged from clearing operations on site, if possible. The logs should be embedded into the soil at least 1.5 ft. The 6-in lower height required at the center can be achieved either by careful placement of the logs or by cutting the logs after they are in place.

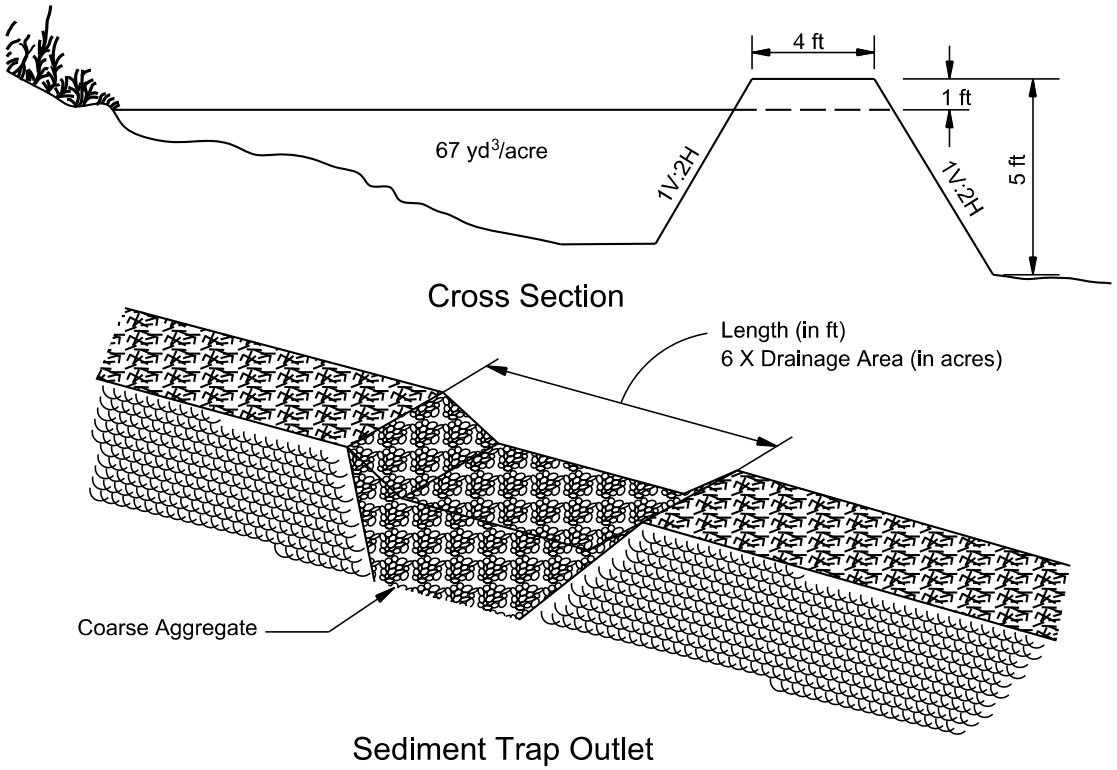
- Logs or brush, or both, should be placed on the downstream side of the dam to prevent scour during high flows.

- Although this practice is not intended to be used primarily for sediment trapping, some sediment will accumulate behind the check dams. Sediment should be removed from behind the check dams when it has accumulated to half of the original height of the dam.

- Check dams should be removed when their useful life has been completed. In temporary ditches and swales, check dams should be removed and the ditch filled in when it is no longer needed. In permanent structures, check dams should be removed where a permanent lining can be installed. For grass-lined ditches, check dams should be removed when the grass has matured sufficiently to protect the ditch or swale. The area beneath the check dams should be seeded and mulched immediately after they are removed.

13.7.11 Temporary Sediment Trap

This is a small, temporary ponding area formed by constructing an earthen embankment with a control outlet, generally constructed of rock or gravel (see Figure 13.7-J). The purpose is to detain sediment-laden runoff from small, disturbed areas long enough to allow the majority of the sediment to settle out.



Source: Virginia Erosion and Sediment Control Handbook (4)

Figure 13.7-J — TEMPORARY SEDIMENT TRAP

13.7.11.1 Use Limitations

The hydraulics designer should consider the following use limitations:

- Use for drainage areas of 5 acres or less.
- Use where the sediment trap will be needed no longer than 18 months. The maximum useful life is 18 months.
- The sediment trap may be constructed either independently or in conjunction with a temporary diversion dike.
- Sediment traps should be used only for small drainage areas. If the contributing drainage area is greater than 5 acres, sediment basins should be used.
- Sediment should be periodically removed from the trap. Plans should detail how this sediment is to be disposed of, such as by use in fill areas on-site or removal to an approved off-site location.
- Sediment traps, along with other perimeter controls, should be installed before any land disturbance occurs in the drainage area.

13.7.11.2 Design Detailing (Trap Capacity)

The sediment trap should have an initial storage volume of 67 yd^3 per acre of drainage area, measured from the low point of the ground to the crest of the gravel outlet. Sediment should be removed from the basin when the volume is reduced by half.

For a natural basin, the volume may be approximated as follows:

$$V = (0.4)(A)(D) \qquad \text{Equation 13.7(1)}$$

Where:

V = the storage volume, ft^3
A = the surface area of the flooded area at the crest of the outlet, ft^2
D = the maximum depth, measured from the low point in the trap to the crest of the outlet, ft

13.7.11.3 Design Detailing

The hydraulics designer should consider the following:

1. Side Slopes. If excavation is necessary to attain the required storage volume, side slopes should be no steeper than 1V:2H.

2. Outlet. The outlet for the sediment trap generally consists of a crushed stone section of the embankment located at the low point in the basin. The minimum length of the outlet crest should be 15 ft times the acre of the drainage area. The crest of the outlet should be at least 1 ft below the top of the embankment to ensure that the flow will travel over the stone and not the embankment.

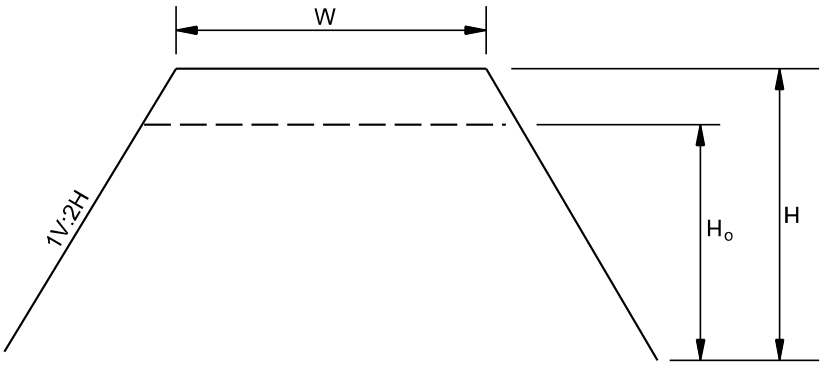
3. Embankment Cross Section. The maximum height of the sediment trap embankment should be 5 ft as measured from the low point. Minimum top widths (W) and outlet heights (H_o) for various embankment heights (H) are shown in Figure 13.7-K. Side slopes of the embankment should be 1V:2H or flatter.

13.7.11.4 Construction Guidelines

The hydraulics designer should consider the following construction guidelines:

- The area under the embankment should be cleared, grubbed and stripped of any vegetation and root mat. To facilitate cleanout, the pool area should be cleared.

- Fill material for the embankment should be free of roots or other woody vegetation, organic material, large stones and other objectionable material. The embankment should be compacted in 8-in layers by traversing with construction equipment.



H_o (ft)	H (ft)	W (ft)
0.2	0.5	0.6
0.4	0.7	0.6
0.6	0.9	0.8
0.8	1.1	0.9
1.0	1.3	1.1
1.2	1.5	1.4

Source: Modified From Virginia Erosion & Sediment Control Handbook (4)

Figure 13.7-K — MINIMUM TOP WIDTH (W) REQUIRED FOR SEDIMENT TRAP EMBANKMENTS ACCORDING TO HEIGHT OF EMBANKMENT

- The earthen embankment should be seeded with temporary or permanent vegetation within 15 days of construction.
- Construction operations should be performed so that erosion and water pollution are minimized.
- The structure should be removed and the area stabilized when the upslope drainage area has been stabilized.
- All cut and fill slopes should be 1V:2H or flatter.
- Plans should show how the site of the sediment trap is to be graded and stabilized after removal.

13.7.12 Temporary Sediment Basin

A storage area is provided to detain sediment-laden runoff from disturbed areas long enough for the majority of the sediment to settle out. The facility is a temporary basin with a controlled stormwater release structure, formed by constructing an embankment of compacted soil across a drainageway.

13.7.12.1 Use Limitations

Temporary sediment basins can be used below disturbed areas generally greater than 5 acres. There should be sufficient space and appropriate topography for the construction of a temporary impoundment. These structures are limited to a useful life of 18 months, unless they are designed as permanent ponds by a qualified professional engineer. Use the following guidelines when considering a sediment basin:

1. Effectiveness. Sediment basins are at best only 70% to 80% effective in trapping sediment that flows into them. Therefore, they should be used in conjunction with

erosion control practices (e.g., temporary seeding, mulching, diversion dikes) to reduce the amount of sediment flowing into the basin.

2. Location. To improve the effectiveness of the basin, it should be located to intercept the largest possible amount of runoff from the disturbed area. The best locations are generally low areas and natural drainageways below disturbed areas. Drainage into the basin can be improved by the use of diversion dikes and ditches. The basin should not be located in a live stream but should be located to trap sediment-laden runoff before it enters the stream. The basin should not be located where its failure would result in the loss of life or interruption of use of public utilities or roads.

3. Multiple Use. Sediment basins may be designed as permanent structures to remain in place after construction is completed. Where these structures are to become permanent, or if they exceed the size limitations of the design criteria, they should be designed as permanent ponds by a qualified professional engineer.

13.7.12.2 Design Detailing

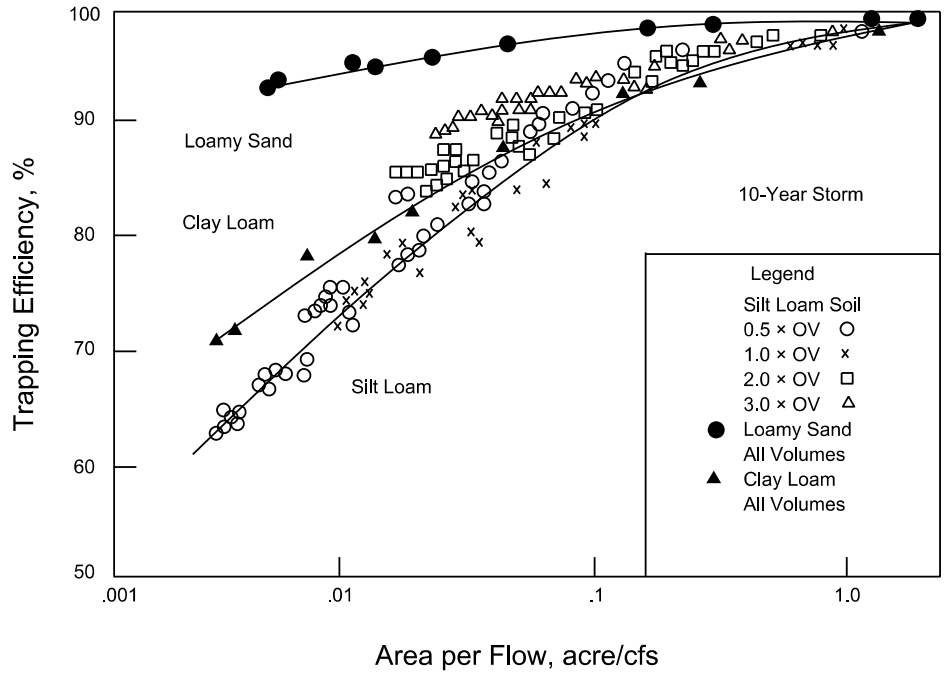
For a detailed discussion of design procedures and specifications for temporary sediment basins, see *Virginia Erosion & Sediment Control Handbook*, Standard and Specification 3.13 (4). The hydraulics designer should consider the following recommended practices:

1. Maximum Drainage Area. Unless the structure is designed as a permanent pond by a professional engineer, the maximum allowable drainage area into the basin should be 150 acres.

2. Basin Capacity. The design capacity of the basin should be at least 67 yd^3 per acre of drainage area, measured from the bottom of the basin to the crest of the principal spillway (riser pipe). Sediment should be removed from the basin when the volume of the basin has been reduced to 34 yd^3 per acre of drainage area. In no case should the sediment cleanout level be higher than 1 ft below the top of the riser. The elevation of the sediment cleanout level should be calculated and clearly marked on the riser. A series of small basins has proven to be in some instances more effective than one large basin and may be better adaptable to the highway right-of-way.

   Sediment trapping efficiency is primarily a function of sediment particle size and the ratio of basin surface area to inflow rate. Therefore, design the basin to have a large surface area for its volume. Figure 13.7-L shows the relationship between the ratio of surface area to peak inflow rate and trap efficiency (6)

   Sediment basins with an expected life greater than 18 months should be designed as permanent structures. In these cases, the structure should be designed by a qualified professional engineer experienced in the design of dams.



Source: NC Erosion and Sediment Control Planning and Design Manual (6)

Figure 13.7-L — SURFACE AREA/PEAK DISCHARGE VS. TRAP EFFICIENCY

3. Basin Shape. To improve sediment trapping efficiency of the basin, the effective flow length should be twice the effective flow width. This basin shape may be attained by properly selecting the site of the basin, by excavation or by the use of baffles.

4. Embankment Cross Section. The embankment should have a minimum top width of 8 ft. The side slopes should be 1V:2H or flatter. The embankment may have a maximum height of 10 ft if the side slopes are 1V:2H. If the side slopes are 1V:$2^{1}/_{2}$H or flatter, the embankment may have a maximum height of 15 ft.

5. Spillway Design. The outlets for the basin may consist of a combination of principal and emergency spillways or a principal spillway alone. In either case, the outlet(s) should pass the peak runoff expected from the drainage area for a 10-year storm without damage to the embankment of the basin. Runoff computations should be based upon the soil cover conditions that are expected to prevail during the life of the basin. To increase the efficiency of the basin, the spillway(s) can be designed to maintain a permanent pool of water.

6. Principal Spillway. The principal spillway should consist of a solid (non-perforated), vertical pipe or box of corrugated metal or reinforced concrete joined by a watertight connection to a horizontal pipe (barrel) extending through the embankment and outletting beyond the downstream toe of the fill. If the principal spillway is used in conjunction with an emergency spillway, the principal spillway should have a minimum capacity of 0.2 cfs per acre of drainage area when the water surface is at the crest of the

emergency spillway. If no emergency spillway is used, the principal spillway should be designed to pass the entire peak flow expected from a 10-year storm.

a. Design Elevations. If the principal spillway is used in conjunction with an emergency spillway, the crest of the principal spillway should be a minimum of 1 ft below the crest of the emergency spillway. If no emergency spillway is used, the crest of the principal spillway should be a minimum of 3 ft below the top of the embankment. In either case, a minimum freeboard of 1 ft should be provided between the design high water and the top of the embankment.

b. Anti-Vortex Device and Trash Rack. A trash rack should be attached to the top of the principal spillway to prevent floating debris from being carried out of the basin. An anti-vortex device should be considered to improve flow into the spillway.

c. Dewatering. At a minimum, provisions should be made to dewater the basin down to the sediment cleanout elevation. This can be accomplished by providing dewatering in the spillway structure. Dewatering holes should be no larger than 4 in in diameter. A stone filter will be required around the spillway structure to prevent loss of stored sediment.

d. Base. The base of the principal spillway should be firmly anchored to prevent its floating. If the riser of the spillway is greater than 10 ft in height, computations should be done to determine the anchoring requirements. At a minimum, a factor of safety of 1.25 should be used (downward forces = 1.25 × upward forces).

e. Barrel. The barrel of the principal spillway, which extends through the embankment, should be designed to carry the flow provided by the riser of the principal spillway with the water level at the crest of the emergency spillway. The connection between the riser and the barrel should be watertight. The outlet of the barrel should be protected to prevent erosion or scour of downstream areas.

f. Anti-seep Collars. If the pond is not provided with means for releasing the stored runoff between inflow storms, anti-seep collars (see **Error! Reference source not found.**) should be used on the barrel of the principal spillway within the normal saturation zone of the embankment to increase the seepage length by at least 10%, if either of the following two conditions is met:

- the settled height of the embankment exceeds 10 ft, or
- the embankment has a low silt-clay content (Unified Soil Class SM or GM).

Anti-seep collars should be installed within the saturated zone. The maximum spacing between collars should be 14 times the projection of the collar above the barrel. Collars should not be closer than 2 ft to a pipe joint. Collars should be placed sufficiently far apart to allow space for hauling and compacting equipment. Connections between the collars and the barrel should be watertight.

7. Emergency Spillway. The emergency spillway (see Figure 13.7-N) should consist of an open channel constructed adjacent to the embankment over undisturbed material (not fill):

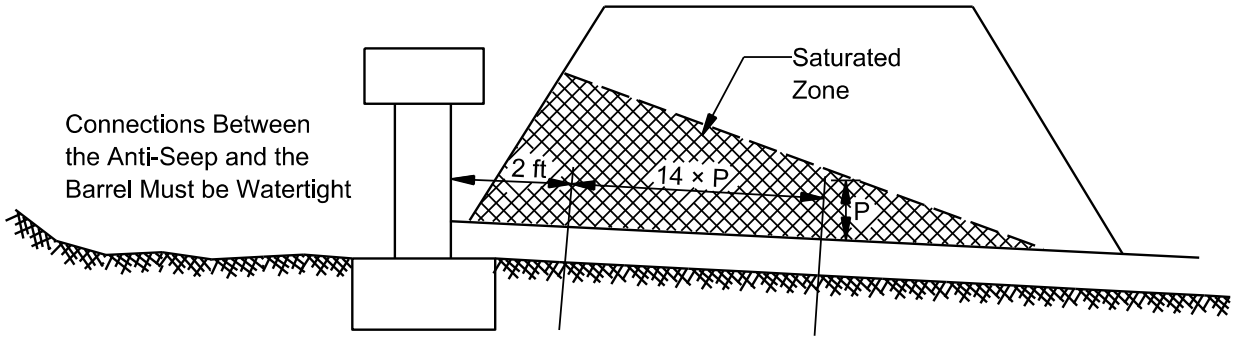


Figure 13.7-M — ANTI-SEEP COLLARS

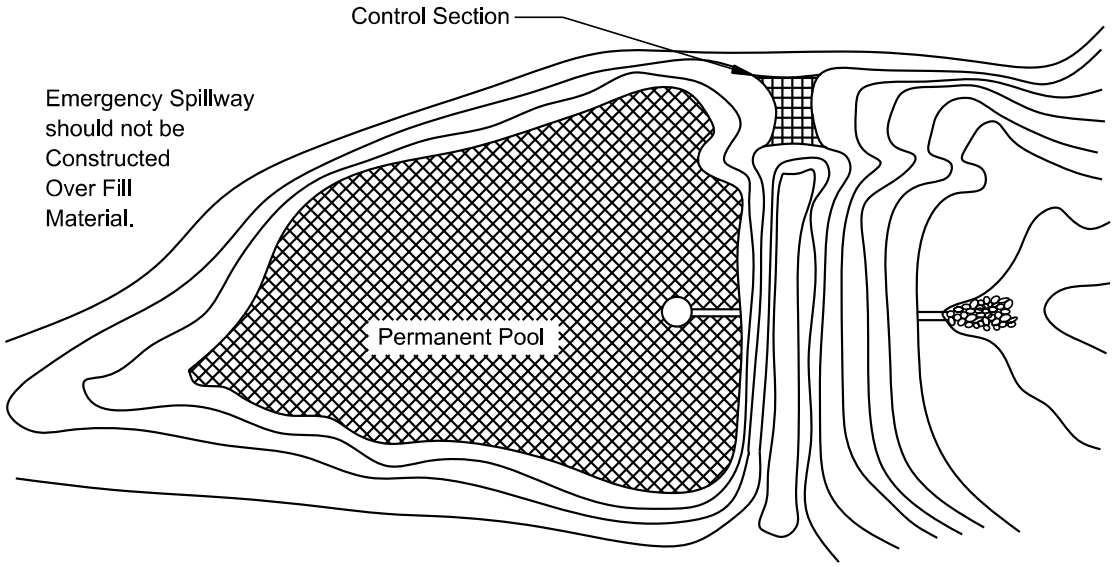


Figure 13.7-N — EMERGENCY SPILLWAY

a. Capacity. The emergency spillway should be designed to carry the peak rate of runoff expected from a 10-year storm, less any reduction due to the flow through the principal spillway.

b. Design Elevations. The design high water through the emergency spillway should be at least 1 ft below the top of the embankment. The crest of the

emergency spillway channel should be at least 1 ft above the crest of the principal spillway.

8. Location. The channel should be located to avoid sharp turns or bends. The channel should return the flow of water to a defined channel downstream from the embankment.

9. Maximum Velocities. The maximum allowable velocity in the emergency spillway channel will depend upon the type of lining used. See Chapter 8 "Channels" for allowable velocities.

10. Cleanout. Sediment should be removed from the basin where the capacity is reduced to 34 yd^3 per acre of drainage area.

13.7.12.3 Construction Guidelines

The hydraulics designer should consider the following:

1. Site Preparation. Areas under the embankment and any structural works should be cleared, grubbed and stripped of topsoil to remove trees, vegetation, roots or other objectionable material. To facilitate cleanout and restoration, the pool area (measured at the top of the principal spillway) will be cleared of all brush and trees.

2. Cutoff Trench. When a cutoff trench is specified, it should be excavated along the centerline of the dam. The minimum depth should be 2 ft. The cutoff trench should extend up both abutments to the riser crest elevation. The minimum bottom width should be 4 ft but wide enough to permit operation of compaction equipment. The side slopes should be no steeper than 1V:1H. Compaction requirements should be the same as those for the roadway embankment. The trench should be drained during the backfilling/compacting operations.

3. Principal Spillway. The riser of the principal spillway should be securely attached to the barrel by a watertight connection. The barrel and riser should be placed on a firm, compacted soil foundation. The base of the riser should be firmly anchored according to design criteria to prevent its floating. Pervious materials (e.g., sand, gravel, crushed stone) should not be used as backfill around the barrel or anti-seep collars. Fill material should be placed around the pipe in 4 in layers and compacted by hand at least to the same density as the embankment. A minimum of 2 ft of fill should be hand compacted over the barrel before crossing it with construction equipment.

4. Emergency Spillway. Design elevations, widths, entrance and exit channel slopes are critical to the successful operation of the spillway and should be adhered to closely during construction.

5. Embankment. The fill material should be taken from approved borrow areas. It should be clean mineral soil and free of roots, woody vegetation, oversized stones, rocks or other objectionable material. Areas on which fill is to be placed should be scarified prior to the placement of fill. Fill material will be placed in 6-in to 8-in continuous layers over the entire length of the fill. Compaction should be obtained by routing the hauling

equipment over the fill so that the entire surface of the fill is traversed by at least one wheel or tread track of the equipment or by using a compactor.

6. Vegetative Stabilization. The embankment and emergency spillway of the sediment basin should be stabilized with temporary vegetation within 15 days of completion of the basin.

7. Erosion and Sediment Control. The construction of the sediment basin should be performed such that it does not result in any undue sediment problems downstream.

8. Safety. All state and local requirements should be met concerning fencing and signs warning the public of the hazards of soft sediment and flood waters.

13.8 REFERENCES

1. **AASHTO.** *Drainage Manual, Chapter 20 Erosion and Sediment Control.* Washington, DC : Technical Committee on Hydrology and Hydraulics, American Association of State Highway and Transportation Officials, 2012.

2. — *Highway Drainage Guidelines, Chapter 3 Erosion and Sediment Control in Highway Construction.* 4th Edition. Washington, DC : Technical Committee on Hydrology and Hydraulics, American Association of State Highway and Transportation Officials, 2007.

3. — *A Policy on Geometric Design of Highways and Streets.* 6th Edition. Washington, DC : American Association of State Highway and Transportation Officials, 2011.

4. **VDCR.** *Virginia Erosion and Sediment Control Handbook.* 3rd Edition. Richmond, VA : Virginia Department of Conservation and Recreation, 1992. Available at: http://www.dcr.virginia.gov/stormwater_management/e_and_s-ftp.shtml.

5. **USEPA.** *Polluted Runoff (nonpoint Source Pollution) - Roads, Highways and Bridges.* Washington, DC : U.S. Environmental Protection Agency. Available at: http:/www.epa.gov/owow_keep/NPS/roadshwys.html.

6. **NCDENR.** *North Carolina Erosion and Sediment Control Planning and Design Manual.* Raleigh, NC : NC Department of Environment and Natural Resouces, 2009. Available at http://portal.ncdenr.org/web/lr/publications.

7. **Sherwood, W. Cullen and David C. Wyant.** *Installation of Straw and Fabric Filter Barriers for Sediment Control.* s.l. : Virginia Highway and Transportation Research Council, 1976. Report No. VHTRC 77-R18.

8. **FHWA.** *Geosynthetic Design and Construction Guidelines, Participant Notebook.* Washington, DC : Federal Highway Administration, U.S. Department of Transportation, 1995. FHWA #HI-95-038.

APPENDIX A
SWPPP PERMIT APPLICATION INSTRUCTIONS

SWPPP Permit Application Instructions

The following subjects shall be included with the plans to satisfy ODEQ's requirements for SWPPP permit application for ODOT Roadway projects:

Erosion Control Detail

- Create site specific erosion and sediment control sheets. Minimize disturbed areas as much as possible by phasing construction.
- Summarize separate disturbed areas according to each outfall. Demonstrate each disturbed area draining to a common location (outfall draining offsite) by station-to-station extents, control devices and disturbed area (in acres) to each outfall. The summary total of this area should closely match the total disturbed area on the SWMP sheet.

Storm Water Management Plan (SWMP)

- Create Storm Water Management Plan sheet to list the pollution prevention measures to be deployed for the project.
- Include project limits and project description as it is shown in ODOT's eight-year construction work plan.
- Include a sequence that is project specific and addresses stabilization measures implemented by phases.
- Designate dominant soil type present on the project. This can be found utilizing the program found at http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm.
- Include TOTAL disturbed area of the project that is consistent with summary of disturbed areas in the erosion control detail sheets.
- Indicate latitude and longitude of the midpoint of the project and the receiving waters for the runoff of the project.
- Indicate whether the receiving waters are sensitive waters, 303(d) impaired waters or in an established TMDL. This can be found at http://www.deq.state.ok.us/mainlinks/gis/index.html.
- Mark all applicable soil stabilization and structural practices for the project.
- If ten disturbed acres are draining to the same outfall, then a sediment basin or equivalent control ~~of~~ measures will have be utilized to address this situation.

Summary Sheet

- A summary sheet will be included giving the stations and quantities for erosion and sediment controls.

Figure 13.A-A — SWPPP APPLICATION INSTRUCTIONS

Drainage Area Map

- A Drainage Area Map with separate drainage areas for each crossing structure.
- A Drainage Structure Design Record will need to be included on this page to depict design data and drainage areas for each cross drain.
- Include the receiving waters on this sheet.

Pay Quantities Sheet and Notes Sheet

- Applicable pay quantity sheet and notes that have any mention of erosion control or storm water management will need to be included.

NOI (at submission)

- It is the responsibility of the design entity to fill in all applicable fields under Section II "Site Information" of the most recent NOI letter.
- Highway construction specific instruction are as follows:
  - Name of Project: "ODOT, JP#"
  - Address: Physical geographic description of the location for the project; e.g., 2.6 miles east of US 81 and SH 100 intersection.
  - City: City that encompasses project or the nearest town to the project.
  - County:
  - Zip Code:
  - Latitude: Latitude of midpoint, center of the project.
  - Longitude: Longitude of midpoint, center of the project.
  - Receiving Waters: All water bodies that receive runoff from the project with their names or Unnamed Tributary to Named Creek.
- Check all boxes under "Site Information" with correct designation. This information can be accessed by using DEQ's Flex Viewer map located at http://www.deq.state.ok.us/mainlinks/gis/index.html
- 303(d) impaired waters can be found at http://www.deq.state.ok.us/WQDnew/305b_303d/index.html

Note: See instructions on page 2 of the most recent NOI letter for specific instructions on each section.

Example plan sheets, which address these instructions, are provided in Figure 13.A-B.

Figure 13.A-A — SWPPP APPLICATION INSTRUCTIONS
(continued)

Figure 13.A-B — EXAMPLE PLANS

STATE OF OKLAHOMA
DEPARTMENT OF TRANSPORTATION

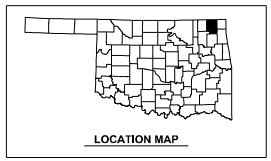
PLAN OF PROPOSED
U. S. HIGHWAY

STATE AID PROJECT NO. STPY-118B(067)SS
BRIDGE AND APPROACHES
U.S. HIGHWAY NO. 59
CRAIG COUNTY
CONTROL SECTION NO. 59 - 18 - 02
STATE JOB NO. 23126(04)

BRIDGE 'A' LOCATION No. 1802 1314X - NBI No. 30555 (NEW), 03387 (OLD)
BRIDGE 'B' LOCATION No. 1802 1340X - NBI No. 30554 (NEW), 03424 (OLD)

SURVEY DATA

See Survey Data Sheets for Survey Control Data.



LOCATION MAP

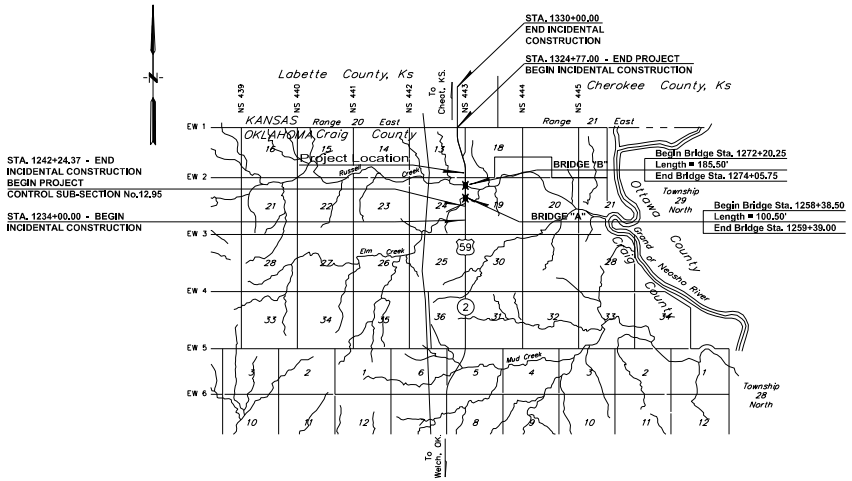
DESIGN DATA	
ADT 2014	1550
ADT 2034	2200
DHV (2-WAY)	242
K (DHV/ADT)	11%
D	55%
T (% DHV)	15%
T (% ADT)	18%
T^3(% ADT)	13%
V	65 MPH
20yr Flex ESALS	2.39M

SCALES

Plan	1:50'
Profile Horizontal	1:50'
Profile Vertical	1:10'
Layout Map	1"= 1 Mile

CONVENTIONAL SYMBOLS

- Proposed Roads
- Railroads
- Township and Range Lines
- Section Lines
- Quarter-section Lines
- Fence
- Ground Line
- Existing Roads
- Base Lines
- Grade Lines
- Telephone & Telegraph Line
- Power Lines
- Oil Wells
- Buildings
- Drainage Structures - Existing
- Drainage Structures - New
- Right-of-Way Lines - Existing
- Right-of-Way Lines - New
- Controlled Access
- Right-of-Way Fence



PROJECT LENGTH BASED ON CRL SH-59 STATIONING

ROADWAY LENGTH	7,961.10 FT	1.507 MI.
BRIDGE LENGTH	286.00 FT	0.054 MI.
PROJECT LENGTH		1.561 MI.

EQUATIONS CRL STA. 1292+98.22 BK. = CRL STA. 1293+03.75 AHD. = 5.53'
EXCEPTIONS NONE

INDEX OF SHEETS

SHEET No.	DESCRIPTION
1	TITLE SHEET
2-4	TYPICAL SECTIONS
5	SUMMARY OF PAY QUANTITIES AND NOTES (ROADWAY)
6	GENERAL NOTES (ROADWAY)
7-8	GENERAL NOTES AND SUMMARY OF PAY QUANTITIES (BRIDGE)
9	SUMMARY OF PAY QUANTITIES AND NOTES (TRAFFIC CONTROL)
10	SUMMARY OF PAY QUANTITIES AND NOTES (SIGNING AND STRIPING)
11-13	SUMMARY SHEET (ROADWAY)
14-16	GEOMETRICS
17-19	EROSION CONTROL DETAILS
20	DISTURBED AREA SUMMARY
21	DRAINAGE MAP
22	STORMWATER MANAGEMENT PLAN
23-24	EARTHWORK - MASS DIAGRAM
25-30	PLAN AND PROFILE SHEETS
31-34	PHASE 1 CONSTRUCTION AND TRAFFIC CONTROL
35-38	PHASE 2 CONSTRUCTION AND TRAFFIC CONTROL
39-42	PHASE 3 CONSTRUCTION AND TRAFFIC CONTROL
43	TRAFFIC CONTROL DETAIL PHASE 1 & 3
44	SUMMARY SHEET (TRAFFIC)
45-47	SIGNING AND STRIPING SHEETS
48	GENERAL PLAN AND ELEVATION - BRIDGE 'A'
49	FOUNDATION REPORT
50	SUBSTRUCTURE STAKING DIAGRAM
51-52	DETAILS OF ABUTMENTS
53-55	DETAILS OF SUPERSTRUCTURE
56-57	DETAILS OF ABUTMENT DIAPHRAGMS
58	DETAILS OF INTERMEDIATE DIAPHRAGM
59-60	DETAILS OF TYPE IV P.C. BEAMS
61	DETAILS OF BEARING ASSEMBLIES
62	DETAILS OF DRAINS AT ENDS OF BRIDGE
63	GENERAL PLAN AND ELEVATION - BRIDGE 'B'
64-66	FOUNDATION REPORT
67	SUBSTRUCTURE STAKING DIAGRAM
68-69	DETAILS OF ABUTMENTS
70-71	DETAILS OF PIERS
72-75	DETAILS OF SUPERSTRUCTURE
76-77	DETAILS OF ABUTMENT DIAPHRAGMS
78	DETAILS OF INTERMEDIATE AND PIER DIAPHRAGMS
79	DETAILS OF TYPE III P.C. BEAMS (55'SPANS)
80	DETAILS OF TYPE III P.C. BEAMS (75'SPANS)
81	DETAILS OF TYPE III P.C. BEAMS
82	DETAILS OF BEARING ASSEMBLIES
83	DETAILS OF DRAINS AT ENDS OF BRIDGE
S1-S10	SURVEY DATA SHEETS
X1-X36	CROSS SECTIONS

STANDARD DRAWINGS

ROADWAY	TRAFFIC	BRIDGE
SSS-1-1	SBS1-1-00	TR4-2-00E
TSC2-3-1	GMS1-1-00	HP1-2-00E
TSD-2-0	SSP1-1-02	B40-I-ABUT-MISC-01E
TFL-1-0	SSA1-1-00	B40-I-TR4-0-PC23-02E
TRFD-1-1	TCS1-1-01	B40-I-TR4-0-PC45-02E
ASCD-5-1	TCS2-1-00	B40-I-AS-03E
LECS-4-1	TCS3-1-01	
PSE-1-0	TCS4-1-01	
CET4S-3-1	TCS5-1-00	
SPI-4-0	TCS6-1-02	
SPB-1-3	TCS7-1-02	
FHTMP-5-0	TCS8-1-00	
FHTCP-3-0	TCS9-1-01	
PUD-3-2	TCS10-1-00	
RDI-3-1	TCS11-1-01	
DC-3-2	TCS12-1-00	
PDT-1-2	TCS13-1-00	
RWF1-2-2	TCS14-1-00	
RWF2-2-1	TCS15-1-00	
SUEL1-3-1	TCS16-1-00	
SUEL3-3-1	TCS18-1-01	
SUEL4-3-1	TCS19-1-01	
	TCS20-1-00	
	TCS21-1-02	
	TCS22-1-00	
	TCS24-1-02	
	RSD1-1-00	
	RSD2-1-00	
	WSD1-1-00	
	WSD2-1-00	
	WSD3-1-00	
	MSD5-1-00	
	THR1-1-02	
	SKT-1-00	
	E131-1-00	
	GHW1-1-00	
	GHW2-1-00	
	RS1-1-00	

For Information Only

OKLAHOMA DEPARTMENT OF TRANSPORTATION	DEPARTMENT OF TRANSPORTATION FEDERAL HIGHWAY ADMINISTRATION
DATE APPROVED :	DATE APPROVED :
BY	BY
CHIEF ENGINEER	DIVISION ADMINISTRATOR

SWO 4556(1) Project No. SSP-118B(067)SS Sheet No. 1
Craig County

2009 OKLAHOMA STANDARD SPECIFICATIONS FOR HIGHWAY CONSTRUCTION - ENGLISH GOVERN. APPROVED BY THE U.S. DEPARTMENT OF TRANSPORTATION, FEDERAL HIGHWAY ADMINISTRATION, JANUARY 4, 2010.

23126(04) 0100 ROADWAY	PAY QUANTITIES			
ITEM	DESCRIPTION		UNIT	QUANTITY
201(A) 0102	CLEARING AND GRUBBING		LSUM	1.00
202(A) 0183	UNCLASSIFIED EXCAVATION	(R–1)	CY	22,366.00
202(D) 0184	UNCLASSIFIED BORROW		CY	43,126.00
205(A) 4229	TYPE A–SALVAGED TOPSOIL	(R–5,R–7)	LSUM	1.00
221(C) 2801	TEMPORARY SILT FENCE	(U–2)	LF	10,810.00
221(F) 0100	TEMPORARY SILT DIKE	(U–2)	LF	1,056.00
221(G) 0153	TEMPORARY ROCK FILTER DAM TYPE 4	(U–2)	CY	4.00
230(A) 2806	SOLID SLAB SODDING	(R–7,R–8)	SY	66,610.00
233(A) 2817	VEGETATIVE MULCHING	(R–11)	AC	14.00
241 2832	MOWING	(R–16)	AC	28.00
303(A) 2100	AGGREGATE BASE TYPE A	(U–1)	CY	6,554.00
307(K) 4300	STABILIZED SUBGRADE		SY	38,330.00
325 5271	SEPARATOR FABRIC		SY	36,988.00
402(E) 0225	TRAFFIC BOUND SURFACE COURSE TYPE E	(R–25)	TON	5,511.00
408 5774	PRIME COAT	(R–28)	GAL	21,830.00
409(A) 4242	FABRIC REINFORCEMENT		SY	13,804.00
409(B) 4268	BITUMINOUS BINDER	(R–29)	GAL	2,762.00
411(B) 5940	SUPERPAVE, TYPE S3(PG 70–28 OK)	(R–30,R–32)	TON	3,650.00
411(B) 5945	SUPERPAVE, TYPE S3 (PG 64–22 OK)	(R–30,R–32)	TON	10,748.00
411(C) 5955	SUPERPAVE, TYPE S4(PG 70–28 OK)	(R–30,R–32)	TON	2,434.00
411(C) 5960	SUPERPAVE, TYPE S4(PG 64–22 OK)	(R–30,R–32)	TON	2,510.00
412 5267	COLD MILLING PAVEMENT		SY	11,190.00
413(B) 4863	RUMBLE STRIP–METHOD HMA–CYC		LF	16,309.00
509(D) 0325	CLASS C CONCRETE		CY	44.00
601(A) 0297	TYPE I PLAIN RIPRAP		TON	494.00
613(A) 0491	18" R.C.PIPE CLASS III		LF	54.00
613(A) 0492	24" R.C.PIPE CLASS III		LF	128.00
613(B) 0689	18" CORR. GALV. STEEL PIPE	(U–3)	LF	374.00
613(B) 0690	24" CORR. GALV. STEEL PIPE		LF	46.00
613(H) 0450	6" PERFORATED PIPE UNDERDRAIN ROUND	(U–4)	LF	500.00
613(M) 7186	TYPE A4 CULVERT END TREATMENT		EA	10.00
613(M) 7187	TYPE B4 CULVERT END TREATMENT		EA	6.00
613(V) 1180	TRENCH EXCAVATION	(R–47)	CY	265.00
619(A) 0920	REMOVAL OF STRUCTURES & OBSTRUCTIONS	(R–48,R–49)	LSUM	1.00
619(B) 4728	REMOVAL OF ASPHALT PAVEMENT	(R–49,R–50)	SY	13,723.00
619(B) 4780	REMOVAL OF GUARDRAIL		LF	1,925.00
619(C) 0924	SAWING PAVEMENT		LF	11,705.00
623(A) 0932	BEAM GUARDRAIL W–BEAM SINGLE		LF	1,887.50
623(G) 8590	GUARDRAIL END TREATMENT (31")		EA	8.00
623(I) 8700	GUARDRAIL BRIDGE CONN–THRIE BEAM (31")		EA	8.00
624(A) 4281	FENCE–STYLE WWF	(R–52)	LF	2,252.00
624(B) 4468	GATES–STYLE WWF (4.5'HIGH X 20'LONG)		EA	1.00
624(C) 4459	FENCE–STYLE SWF (5 BARBED WIRE)	(R–52,R–53)	LF	1,972.00
853 9069	GUARDRAIL DELINEATORS(TYPE 2, CODE 1)		EA	60.00

ROADWAY PAY QUANTITY NOTES

(R–1) PAYMENT FOR THIS ITEM WILL BE BASED ON PLAN QUANTITY ONLY. SEE SECTION 109.01B OF THE STANDARD SPECIFICATIONS.

(R–5) AN ESTIMATED QUANTITY OF 9,250 C.Y. TOPSOIL TO BE RESERVED FOR REPLACEMENT OF APPROXIMATELY 5" ON COMPLETED FORESLOPES, DITCHES, AND BACKSLOPES. THIS QUANTITY IS INCLUDED IN THE EARTHWORK BALANCE. ANY ADDITIONAL EXCAVATION REQUIRED IN CUT SECTIONS TO ALLOW FOR PLACEMENT OF TOPSOIL TO FINAL GRADE, SHALL BE INCLUDED IN THE PRICE BID.

(R–7) FOR SLAB SODDING, PRICE BID TO INCLUDE COST OF 10–20–10 FERTILIZER, ESTIMATED AT 200 POUNDS PER 1000 SY.

(R–8) PRICE BID TO INCLUDE COST OF WATERING, ESTIMATED AT 40 GALLONS PER SY.

(R–11) THE QUANTITIES ESTIMATED FOR TEMPORARY EROSION AND SEDIMENT CONTROL IS 13.76 ACRES.

(R–16) QUANTITY BASED ON TWO APPLICATIONS.

(R–25) ESTIMATED AT 120 LBS. PER CU. FT.

(R–28) PRIME COAT SHALL BE APPLIED AT AN ESTIMATED RATE OF 0.35 GAL. PER SQ. YD. WHEN APPLIED TO SUBGRADE, AND 0.25 GAL. PER SQ. YD. WHEN APPLIED TO AGGREGATE BASE. THE ACTUAL CUTBACK PRIME COAT REQUIRED FOR PLACEMENT OPERATIONS WILL BE DETERMINED BY THE CONTRACTOR, AND SHALL CONSIDER THE RESIDUE FROM DISTILLATION PERCENTAGE SHOWN IN SECTION 708.03 OF THE STANDARD SPECIFICATIONS.

(R–29) TO BE APPLIED AT A TARGET RATE OF 0.20 GAL. OF RESIDUAL ASPHALT PER SQ. YD. OF FABRIC REINFORCEMENT, OR AS RECOMMENDED BY THE FABRIC MANUFACTURER.

(R–30) PRICE BID TO INCLUDE COST OF TACK COAT, MEETING THE REQUIREMENTS OF SECTION 407 OF THE STANDARD SPECIFICATIONS.

(R–32) ESTIMATED AT 112 LBS. PER SQ. YD. PER 1" THICK.

(R–47) PRICE BID TO INCLUDE COST OF AN ESTIMATED 93 CU. YD. FOR PIPE UNDERDRAIN.

(R–48) INCLUDES REMOVAL OF ALL EXISTING ROADWAY DRAINAGE STRUCTURES, HEADWALLS (UNLESS OTHERWISE SPECIFIED), INLETS, FENCES, AND OTHER STRUCTURES WITHIN THE RIGHT OF WAY.

(R–49) TO BECOME THE PROPERTY OF AND BE DISPOSED OF BY THE CONTRACTOR IN A MANNER APPROVED BY THE ENGINEER.

(R–50) MATERIALS REMOVED SHALL NOT BE MEASURED FOR PAYMENT UNDER SECTION 202.06 UNCLASSIFIED EXCAVATION.

(R–52) INCLUDES 2% FOR GROUND MEASUREMENT.

(R–53) ALL GATES AND GATE END POSTS FOR STRANDED WIRE FENCE (SWF) SHALL BE CONSTRUCTED AT THE SAME WIDTH AS THE EXISTING, UNLESS OTHERWISE DIRECTED BY THE ENGINEER.

(U–1) MEASUREMENT WILL BE BASED ON THE THEORETICAL CROSS–SECTION SHOWN ON THE TYPICAL SECTION, MULTIPLIED BY THE ACTUAL LENGTH.

(U–2) PRICE BID TO INCLUDE COST OF TEMPORARY SEDIMENT REMOVAL.

(U–3) QUANTITY INCLUDES 156 LF OF PIPE FOR TEMPORARY USE. PRICE BID TO INCLUDE COST OF TRENCH EXCAVATION AND SHALL BE REMOVED BY AND BECOME THE PROPERTY OF THE CONTRACTOR AFTER COMPLETION OF THE PROJECT.

(U–4) ESTIMATED QUANTITY. PRICE BID TO INCLUDE COST OF CLASS C STANDARD BEDDING MATERIAL AND PIPE UNDERDRAIN COVER MATATERIAL.

SUGGESTED SEQUENCE OF CONSTRUCTION

PHASE 1

- INSTALL ALL MAINLINE & SIDE STREET ADVANCE WARNING SIGNS.
- CONSTRUCT TEMPORARY WIDENING STA. 1238+42.50 TO STA. 1257+57.50 ℄ OF SURVEY
- CONSTRUCT RIGHT SHOULDER WIDEING STA. 1293+03.75 TO STA. 1324+77.00. EXCLUDE 3" SUPERPAVE AND 2" SUPERPAVE LIFTS FROM THIS PHASE.
- CONSTRUCT AS MUCH GRADING TO SUBGRADE FOR TRAFFIC LANES AND WEST SHOULDER FROM STA 1250+25 TO 1276+00(SOUTH OF E. 20 RD).
- BEGIN CONSTRUCTION ON BRIDGE "A" AND "B"
- CONSTRUCT TEMPORARY WIDENING STA. 1278+43.00 TO STA. 1293+03.75 ℄ OF SURVEY.
- INSTALL TRAFFIC CONTROL AND STRIPING FOR PHASE 2 CONSTRUCTION.

PHASE 2

- FROM STA 1238+42.50 TO STA 1324+77.00 SHIFT TRAFFIC TO NORTHBOUND LANE AND TEMPORARY OR RIGHT SHOULDER WIDENING.
- COMPLETE BRIDGE "A" AND "B"
- COMPLETE GRADING AND PAVEMENT FOR TRAFFIC LANES AND WEST SHOULDER FROM STA 1250+25.65 TO 1284+00.00. EXCLUDE 3" SUPERPAVE AND 2" SUPERPAVE LIFT FROM THIS PHASE.
- CONSTRUCT LEFT SHOULDER WIDENING STA. 1239+40.00 TO STA. 1250+25.65 AND STA. 1284+00.00 TO 1292+98.22. EXCLUDE 3" SUPERPAVE AND 2" SUPERPAVE LIFTS FROM THIS PHASE.
- CONSTRUCT LEFT SHOULDER WIDENING STA. 1293+03.75 TO STA. 1324+77.00. EXCLUDE 3" SUPERPAVE AND 2" SUPERPAVE LIFTS FROM THIS PHASE.
- INSTALL TRAFFIC CONTROL AND STRIPING FOR PHASE 3 CONSTRUCTION.

PHASE 3

- FROM STA 1239+40.00 TO STA 1324+77.00 SHIFT TRAFFIC TO THE NEW SOUTHBOUND LANE AND LEFT SHOULDER.
- REMOVE PHASE 1 TEMPORARY WIDENING.
- REMOVE EXISTING PAVEMENT AND BRIDGES.
- COMPLETE GRADING AND PAVEMENT FOR EAST SHOULDER FROM STA 1250+25.65 TO 1284+00.00. EXCLUDE 3" SUPERPAVE AND 2" SUPERPAVE LIFT FROM THIS PART OF THE PHASE.
- CONSTRUCT RIGHT SHOULDER WIDENING STA. 1239+40.00 TO STA. 1250+25.65 AND STA. 1284+00.00 TO 1292+98.22. EXCLUDE 3" SUPERPAVE AND 2" SUPERPAVE LIFTS FROM THIS PART OF THE PHASE.
- MILL EXISTING PAVEMENT TO REMAIN STA. 1239+40.00 TO STA. 1250+25.65 AND 1284+00.00 TO 1324+77.00 (LANE–BY–LANE).
- COMPLETE FINAL LIFTS OF ASPHALT STA. 1239+40.00 TO STA. 1324+77.00 (LANE–BY–LANE).
- SIGN, STRIPE & NORMALIZE TRAFFIC.

NOTE: CONTRACTOR MAY SUBMIT, IN WRITING, AN ALTERNATE SEQUENCE OF CONSTRUCTION TO BE APPROVED BY THE ENGINEER.

For Information Only

Figure 13.A-B — EXAMPLE PLANS
(continued)

ROADWAY GENERAL CONSTRUCTION NOTES

THIS PROJECT SHALL BE CONSTRUCTED WITHOUT CLOSING THE EXISTING ROAD TO LOCAL AND THROUGH TRAFFIC. SEE STANDARD SPECIFICATIONS FOR MAINTENANCE OF LOCAL AND THROUGH TRAFFIC.

MAINTENANCE OF THROUGH TRAFFIC INCLUDES THE MAINTENANCE OF THE EXISTING ROAD IN CLOSE PROXIMITY TO THE NEW CONSTRUCTION AS SHOWN ON THE PLANS.

THIS PROJECT SHALL BE CONSTRUCTED WITHOUT CLOSING THE EXISTING SECTION LINE ROADS TO LOCAL AND THROUGH TRAFFIC. SEE STANDARD SPECIFICATIONS FOR MAINTENANCE OF LOCAL AND THROUGH TRAFFIC.

FOR PROJECTS THAT INCLUDE WIDENING AND/OR RESURFACING, THE CONTRACTOR SHALL SCHEDULE OPERATIONS TO MINIMIZE POTENTIAL DROP-OFF HAZARDS AND SHALL SUBMIT A SEQUENCE OF CONSTRUCTION OPERATIONS TO THE RESIDENT ENGINEER FOR APPROVAL BEFORE OPERATIONS BEGIN. ANY PORTION OF THE CONSTRUCTION OPERATIONS, SUCH AS SUPERPAVE LAYING OPERATIONS, EXCAVATION FOR PAVEMENT WIDENING, OR EXTENSION OF ROADWAY STRUCTURES, SHALL BE LIMITED TO ONE SIDE AT A TIME, AND THE PROCEDURES OUTLINED IN THE ROADWAY PAVEMENT DROP-OFF TREATMENT STANDARD PDT-1 SHALL BE IMPLEMENTED.ONLY THAT AMOUNT OF OPEN TRENCH WILL BE ALLOWED THAT CAN BE SURFACED IN 1 (ONE) DAY'S TIME WITHOUT APPROVAL BY THE ENGINEER. LIGHTS, SIGNS AND BARRICADES SHALL BE MOVED AS WORK PROGRESSES.

ALL TREES, BRUSH, AND OTHER DEBRIS THAT MIGHT INTERFERE WITH THE FLOW OF WATER SHALL BE CLEANED OUT TO THE RIGHT-OF-WAY LINE, AT EACH STRUCTURE AND BRIDGE, IN A MANNER APPROVED BY THE ENGINEER. ALL COST TO BE INCLUDED IN OTHER ITEMS OF WORK.

THE CONTRACTOR SHALL PROVIDE ALL TEMPORARY RIGHT-OF-WAY FENCE AS REQUIRED. WHEN THE PORTION OF THE PROJECT THAT REQUIRED THIS FENCE IS COMPLETED, THE TEMPORARY FENCE SHALL BE REMOVED, AND PERMANENT RIGHT-OF-WAY FENCING SHALL BE RESTORED OR INSTALLED IN A MANNER APPROVED BY THE ENGINEER. ALL COST TEMPORARY FENCING SHALL BE INCLUDED IN OTHER ITEMS OF WORK.

ALL FLOWLINES THAT ARE TO BE FILLED SHALL BE THOROUGHLY TAMPED BEFORE CONSTRUCTION OR EXTENSION OF DRAINAGE STRUCTURES. ALL COST TO BE INCLUDED IN OTHER ITEMS OF WORK.

IN ORDER TO ALLEVIATE DUST CONDITIONS DURING GRADING OPERATIONS AND BEFORE PAVEMENT WORK IS COMPLETED, THE CONTRACTOR SHALL SPRINKLE GRADING AT INTERVALS APPROVED BY THE ENGINEER. ALL COST TO BE INCLUDED IN OTHER ITEMS OF WORK.

THE CONTRACTOR SHALL NOT WASTE ANY EXCESS EXCAVATION UNTIL ALL PLANNED EMBANKMENTS AND BACKFILLS ARE COMPLETED. EXCESS UNCLASSIFIED EXCAVATION MATERIAL DETERMINED BY THE ENGINEER TO BE SUITABLE FOR BACKFILL SHALL BE USED TO REDUCE ANY UNCLASSIFIED BORROW NEEDED. COST OF SECOND HANDLING SHALL BE INCLUDED IN OTHER ITEMS OF WORK. ANY REMAINING EXCESS EXCAVATION SHALL BECOME THE PROPERTY OF THE CONTRACTOR AND BE DISPOSED OF IN A MANNER APPROVED BY THE ENGINEER.

PRIME COAT SHALL BE APPLIED TO THE SUBGRADE IMMEDIATELY AFTER FINAL COMPACTION AND SHAPING TO RETAIN MOISTURE FOR PROPER CHEMICAL REACTION OF THE SOIL ADDITIVE.

THE CONTRACTOR SHALL KEEP THE OPEN TRENCH DRAINED. COST TO BE INCLUDED IN OTHER ITEMS OF WORK.

VEGETATIVE MULCHING: THE VEGETATIVE MULCH SHALL BE ANCHORED IN ACCORDANCE WITH THE "MULCHING-TILLER METHOD", AS SPECIFIED IN 233.04B(1) OF THE STANDARD SPECIFICATIONS.

AREAS ON WHICH SALVAGED TOPSOIL IS TO BE REPLACED SHALL HAVE 0 – 46 – 0 FERTILIZER APPLIED, AT THE RATE OF 150 POUNDS PER ACRE, JUST PRIOR TO THE REPLACEMENT OF SALVAGED TOPSOIL.

PIPE UNDERDRAIN QUANTITIES ESTIMATED ONLY. LOCATION, IF AND WHERE REQUIRED, TO BE DETERMINED BY THE ENGINEER.

THE CONTRACTOR SHALL REMOVE AND RESET MAILBOXES AS NECESSARY. MAILBOXES ARE TO BE MAINTAINED IN AN UPRIGHT POSITION AND ACCESSIBLE TO MAIL CARRIER'S CAR DURING CONSTRUCTION. ANY DAMAGE TO BOXES OR SUPPORTS SHALL BE REPAIRED BY THE CONTRACTOR. ALL COST TO BE INCLUDED IN OTHER ITEMS OF WORK.

AGGREGATE BASE ON DETOUR ROADS, REMOVED AND RELAID FOR SHOULDERS, DRIVEWAYS AND/OR RETURNS ON MAIN ROADWAY, SHALL MEET THE SPECIFICATIONS FOR "AGGREGATE BASE" WHEN RELAID, NO PLANT MIXING WILL BE REQUIRED FOR THIS MATERIAL.

BITUMINOUS SURFACING ON AGGREGATE BASE WHICH IS TO BE RELAID SHALL BE SCARIFIED AND INCORPORATED INTO THE AGGREGATE BASE MATERIAL. IN ALL OTHER RESPECTS, THE MATERIAL TO BE RELAID SHALL MEET THE SPECIFICATIONS FOR "AGGREGATE BASE".

SURFACING OF RETURNS, UNLESS OTHERWISE SHOWN ON THE PLANS, SHALL BE OF THE SAME MATERIAL (BASE AND SURFACE) AS THAT OF THE ABUTTING SHOULDER OF THE MAINLINE. BASE AND SURFACE THICKNESS SHALL BE THE THICKNESS SHOWN ON PLANS.

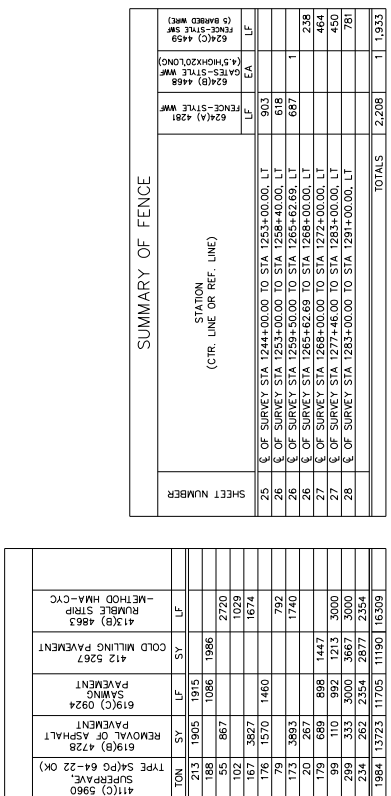
T.B.S.C. SURFACES SHALL BE SPRINKLED WITH WATER AND ROLLED WITH A PNEUMATIC ROLLER IN A MANNER APPROVED BY THE ENGINEER.

PRIOR TO FINAL ACCEPTANCE, ALL EXPOSED CURB SURFACES SHALL BE CLEANED OF ALL DISCOLORATION SUCH AS ASPHALT STAIN, TIRE MARKS, OR OTHER DISFIGUREMENT.

IN ACCORDANCE WITH THE OKLAHOMA UNDERGROUND FACILITIES DAMAGE PREVENTION ACT THE CONTRACTOR SHALL NOTIFY THE OKLAHOMA ONE-CALL SYSTEM, INC. 48 HOURS PRIOR TO BEGINNING EXCAVATION. OKLAHOMA ONE-CALL SYSTEM, INC. "CALL OKIE" 1-800-522-6543 OR 811.

For Information Only

Figure 13.A-B — EXAMPLE PLANS
(continued)



SUMMARY OF SURFACING AND RELATED QUANTITIES

SHEET NUMBER	LOCATION: STATION (CTR. LINE OR REF. LINE)	303 0192 AGGREGATE BASE CY	STABILIZED SUBGRADE 307(K) 4300 SY	325 5271 SEPARATOR FABRIC SY	402(E) 0225 TRAFFIC BOUND SURFACE COURSE TYPE E TON	TACK COAT (FOR INFORMATION ONLY) (INCLUDE IN OTHER ITEMS OF WORK) GAL	408 5774 PRIME COAT GAL	409(A) 4242 FABRIC REINFORCEMENT SY	BITUMINOUS BINDER 409(B) 4268 GAL	411(B) 5940 SUPERPAVE, TYPE S3(PG 70-28 OK) TON	411(B) 5945 SUPERPAVE, TYPE S3(PG 64-22 OK) TON	411(C) 5955 SUPERPAVE, TYPE S4(PG 70-28 OK) TON	411(C) 5960 SUPERPAVE, TYPE S4(PG 64-22 OK) TON	REMOVAL OF ASPHALT PAVEMENT 619(B) 4728 SY	619(C) 0924 SAWING PAVEMENT LF	COLD MILLING PAVEMENT 412 5267 SY	RUMBLE STRIP -METHOD HMA-CYC 413(B) 4863 LF
25–26	℄ OF SURVEY STA 1238+42.50 TO STA 1257+57.50 TEMP. WIDENING	.	2472	.	89	286	494				533		213	1905	1915		
25	CRL STA 1239+40.00 TO STA 1250+25.65	723	3481	3884	632	798	2028	2424	485	486	1006	324	188		1086	1986	
25	CRL STA 1250+25.65 TO STA 1253+00.00	309	1555	1666	191	274	931			123	423	82	55	867			2720
26	CRL STA 1253+00.00 TO STA 1258+14.50	580	2916	3125	358	514	1746			230	794	154	102				1029
26	CRL STA 1259+63.00 TO STA 1268+00.00	944	4743	5084	582	837	2841			375	1292	250	167	3827			1674
27–28	℄ OF SURVEY STA 1278+43.00 TO STA 1293+03.75 TEMP. WIDENING	.	2001	.	68	235	400				439		176	1570	1460		
27	CRL STA 1268+00.00 TO STA 1271+96.25	447	2245	2407	276	396	1345			178	611	118	79	3893			792
27	CRL STA 1274+29.75 TO STA 1283+00.00	981	4931	5286	606	870	2954			390	1343	260	173				1740
28	CRL STA 1283+00.00 TO STA 1284+00.00	113	567	607	70	100	339			45	154	30	20	267			
28	CRL STA 1284+00.00 TO STA 1292+98.22	594	3194	3527	523	681	2140	2213	443	402	981	268	179	689	898	1447	
28	CRL STA 1293+03.75 TO STA 1298+00.00	291	1599	1783	289	306	886	1434	287	222	426	148	99	110	992	1213	3000
28	CRL STA 1298+00.00 TO STA 1313+00.00	881	4833	5390	873	925	2678	4333	867	672	1288	448	299	333	3000	3667	3000
30	CRL STA 1313+00.00 TO STA 1324+77.00	691	3793	4229	685	726	2101	3400	680	527	1011	352	234	262	2354	2877	2354
	TOTALS	6554	36330	36988	5242	6948	20883	13804	2762	3650	10301	2434	1984	13723	11705	11190	16309

SUMMARY OF DRIVES AND RETURNS

SHEET NUMBER	LOCATION: STATION (CTR. LINE OR REF. LINE)	TYPE	LENGTH FT	WIDTH FT	RADIUS FT	TACK COAT (FOR INFORMATION ONLY) (INCLUDE IN OTHER ITEMS OF WORK) GAL	408 5774 PRIME COAT GAL	411(B) 5945 SUPERPAVE, TYPE S3(PG 64-22 OK) TON	411(C) 5960 SUPERPAVE, TYPE S4(PG 64-22 OK) TON	402(E) 0225 TRAFFIC BOUND SURFACE COURSE TYPE E TON
25	CRL STA 1250+89.17, RT	RURAL DRIVE	129.14	12.00	15.00	27	64	51	20	137.00
26	CRL STA 1261+50.00, LT	RURAL DRIVE	265.76	16.00	15.00	70	163	130	52	294.00
26	CRL STA 1264+23.35, LT	RURAL DRIVE	265.13	12.00	15.00	69	163	130	52	294.00
27	CRL STA 1277+22.16, LT	RURAL S. L. RETURN	78.83	20.00	25.00	30	71	57	23	126.00
27	CRL STA 1277+21.48, RT	RURAL S. L. RETURN	80.00	20.00	25.00	30	71	57	23	126.00
28	CRL STA 1284+62.00, LT	RURAL DRIVE	58.29	25.00	25.00	31	73	58	23	118.00
28	CRL STA 1284+62.38, RT	RURAL S. L. RETURN	104.29	20.00	25.00	39	92	73	29	104.00
28	CRL STA 1284+82.20, RT	RURAL DRIVE	24.58	12.00	15.00	9	22	18	7	24.56
29	CRL STA 1304+31.82, LT	RURAL DRIVE	31.06	12.00	15.00	8	18	12	5	31.06
29	CRL STA 1310+71.69, RT	RURAL DRIVE	30.12	14.00	15.00	9	20	16	6	30.00
	TOTALS					240	559	447	178	32

TEMP. RETURNS

402(E) 0225 TRAFFIC BOUND SURFACE COURSE TYPE E TON
26
54
54
39
39
35
6
7
7
TOTAL 237
TOTAL TONS 269

NOTE: DRIVES AND RETURNS SHALL BE CONSTRUCTED IN ACCORDANCE WITH STANDARD RDI-3 WITH 5" OF SUPERPAVE TYPE S3 (PG 64-22 OK) BASE COURSE IN TWO 2 1/2" LIFTS, AND 2" SUPERPAVE TYPE S4 (PG 64-22 OK) SURFACE COURSE.

SUMMARY OF FENCE

SHEET NUMBER	STATION (CTR. LINE OR REF. LINE)	624(A) 4281 FENCE-STYLE WWF LF	624(B) 4468 GATES-STYLE WWF (4.5'HIGHX20'LONG) EA	624(C) 4459 FENCE-STYLE BWF (5 BARBED WIRE) LF
25	℄ OF SURVEY STA 1244+00.00 TO STA 1253+00.00, LT	903		
26	℄ OF SURVEY STA 1253+00.00 TO STA 1258+40.00, LT	618		
26	℄ OF SURVEY STA 1259+50.00 TO STA 1265+62.69, LT	687	1	
26	℄ OF SURVEY STA 1265+62.69 TO STA 1268+00.00, LT			238
27	℄ OF SURVEY STA 1268+00.00 TO STA 1272+00.00, LT			464
27	℄ OF SURVEY STA 1277+46.00 TO STA 1283+00.00, LT			450
28	℄ OF SURVEY STA 1283+00.00 TO STA 1291+00.00, LT			781
	TOTALS	2,208	1	1,933

SUMMARY OF EARTHWORK QUANTITIES

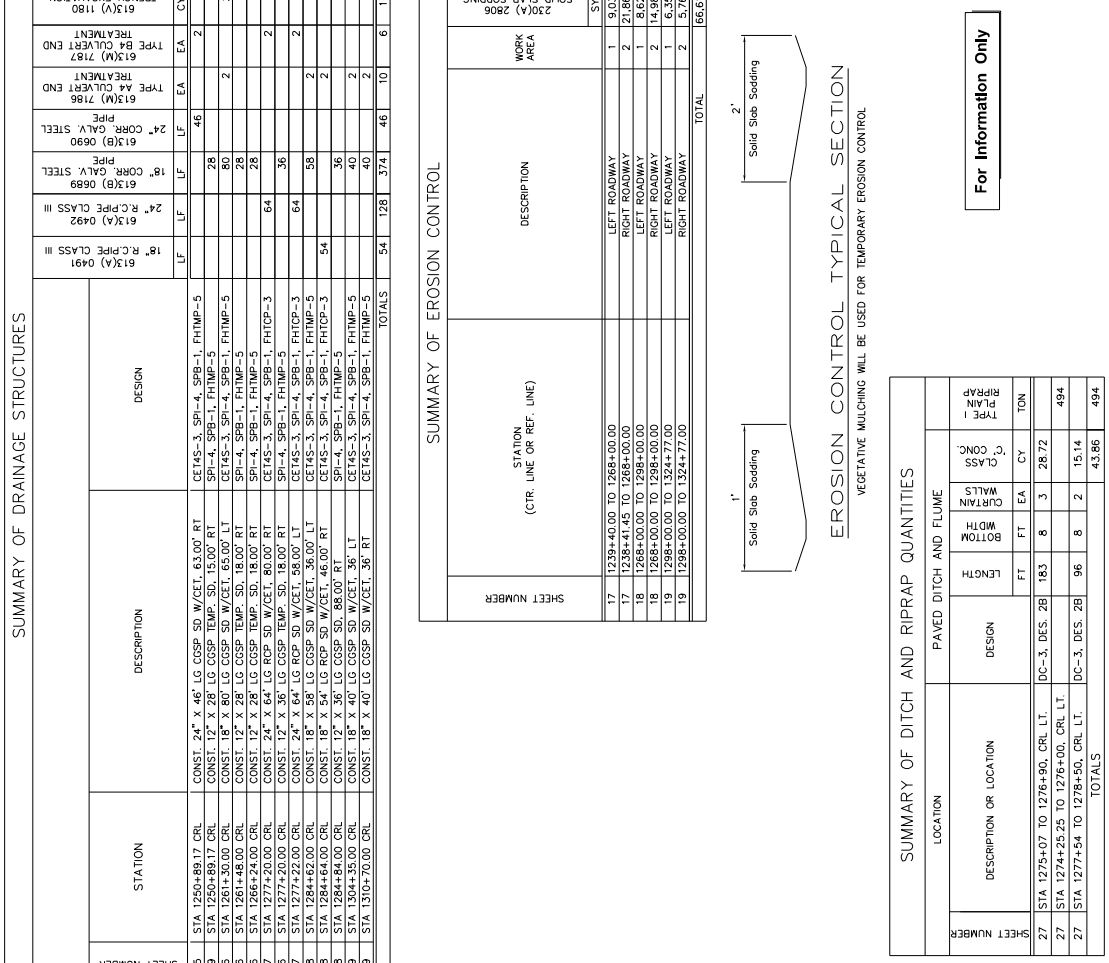
SHEET NUMBER	LOCATION: STATION (CTR. LINE OR REF. LINE)	202(A) 0183 UNCLASSIFIED EXCAVATION CY	EMBANKMENT +15% (NOT A PAY QTY.) CY	202(D) 0184 UNCLASSIFIED BORROW CY	① WASTE (NOT A PAY QTY.) CY
25	CRL STA 1239+40.00 TO STA 1253+00.00 PHASE 1 & 2	638	2,943	2,305	
26	CRL STA 1253+00.00 TO STA 1268+00.00 PHASE 1 & 2	202	25,848	25,646	
27	CRL STA 1268+00.00 TO STA 1284+00.00 PHASE 1 & 2	2,316	17,347	15,031	
28	CRL STA 1284+00.00 TO STA 1298+00.00 PHASE 1 & 2	1,141	1,776	635	
29	CRL STA 1298+00.00 TO STA 1313+00.00 PHASE 1 & 2	917	850	-67	
30	CRL STA 1313+00.00 TO STA 1324+77.00 PHASE 1 & 2	868	444	-424	
25	CRL STA 1239+40.00 TO STA 1253+00.00 PHASE 3	1,441	7		1,434
26	CRL STA 1253+00.00 TO STA 1268+00.00 PHASE 3	7,409	197		7,212
27	CRL STA 1268+00.00 TO STA 1283+00.00 PHASE 3	5,320	395		5,525
28	CRL STA 1283+00.00 TO STA 1298+00.00 PHASE 3	1,484	70		1,414
29	CRL STA 1298+00.00 TO STA 1313+00.00 PHASE 3	0	0		0
30	CRL STA 1313+00.00 TO STA 1324+77.00 PHASE 3	0	0		0
	TOTALS	22,336		43,126	

EARTHWORK NOTES

① WASTE = 15,585 CY. DURING PHASE 3, THIS MATERIAL IS TO BECOME THE PROPERTY OF AND DISPOSED BY THE CONTRACTOR IN A MANNER APPROVED BY THE ENGINEER.

For Information Only

Figure 13.A-B — EXAMPLE PLANS
(continued)



SUMMARY OF TEMPORARY EROSION CONTROL

SHEET NUMBER	STATION (CTR. LINE OR REF. LINE)	DESCRIPTION	221(C) 2801 TEMPORARY SILT FENCE		221(G) 0153 TEMPORARY ROCK FILTER DAM TYPE 4		221(F) 0100 TEMPORARY SILT DIKE	
			LF	CY	LF		LF	
17	1241+00 CRL, RT & LT	ACROSS PROPOSED OR EXISTING DITCH						32
17	1242+00 CRL, RT & LT	ACROSS PROPOSED OR EXISTING DITCH						32
17	1243+00 CRL, RT & LT	ACROSS PROPOSED OR EXISTING DITCH						32
17	1244+00 CRL, RT & LT	ACROSS PROPOSED OR EXISTING DITCH						32
17	1245+00 CRL, RT & LT	ACROSS PROPOSED OR EXISTING DITCH						32
17	1246+00 CRL, RT & LT	ACROSS PROPOSED OR EXISTING DITCH						32
17	1247+00 CRL, RT & LT	ACROSS PROPOSED OR EXISTING DITCH						32
17	1248+00 CRL, RT & LT	ACROSS PROPOSED OR EXISTING DITCH						32
17	1249+00 CRL, RT & LT	ACROSS PROPOSED OR EXISTING DITCH						32
17	1249+00 TO 1258+75 CRL, LT	ALONG TOE OF SLOPE	1,150					
17	1250+60 CRL, RT	ACROSS PROPOSED OR EXISTING DITCH						16
17	1251+00 TO 1258+75 CRL, RT	ALONG TOE OF SLOPE OR EXISTING TOE OF SLOPE	860					
17	1259+10 TO 1272+75 CRL, RT	ALONG EXISTING TOE OF SLOPE OR TOP OF BANK	1,520					
17, 18	1260+90 TO 1265+80 CRL, LT	ALONG EDGE OF WETLANDS	540					
17, 18	1266+30 TO 1272+75 CRL, LT	ALONG TOE OF SLOPE OR TOP OF BANK	810					
18	1273+55 TO 1274+45 CRL, LT	ALONG TOE OF SLOPE OR TOP OF BANK	150					
18	1273+55 TO 1274+45 CRL, RT	ALONG EXISTING TOE OF SLOPE OR TOP OF BANK	450					
18	1274+20 CRL, RT	ACROSS EXISTING CHANNEL		2				
18	1274+80 CRL, LT & LT	ACROSS EXISTING CHANNEL		2				
18	1277+60 CRL, RT & LT	ACROSS PROPOSED OR EXISTING DITCH						32
18	1278+00 TO 1284+00 CRL, RT	ALONG EXISTING TOE OF SLOPE	600					
18	1279+00 CRL, RT & LT	ACROSS PROPOSED OR EXISTING DITCH						32
18	1281+00 CRL, RT & LT	ACROSS PROPOSED OR EXISTING DITCH						32
18	1283+00 CRL, RT & LT	ACROSS PROPOSED OR EXISTING DITCH						32
18	1285+00 CRL, RT & LT	ACROSS PROPOSED OR EXISTING DITCH						32
18	1285+00 TO 1296+00 CRL, RT	ALONG TOE OF FILL OR TOE OF DITCH FORESLOPE	1,110					
18	1287+00 CRL, RT & LT	ACROSS PROPOSED OR EXISTING DITCH						32
18	1289+00 CRL, RT & LT	ACROSS PROPOSED OR EXISTING DITCH						32
18, 19	1289+00 TO 1304+00 CRL, LT	ALONG TOE OF FILL OR TOE OF DITCH FORESLOPE	1,500					
18	1291+00 CRL, RT & LT	ACROSS PROPOSED OR EXISTING DITCH						32
18	1293+00 CRL, RT & LT	ACROSS PROPOSED OR EXISTING DITCH						32
18	1295+00 CRL, RT & LT	ACROSS PROPOSED OR EXISTING DITCH						32
18	1297+00 CRL, RT & LT	ACROSS PROPOSED OR EXISTING DITCH						32
19	1299+00 CRL, RT & LT	ACROSS PROPOSED OR EXISTING DITCH						32
19	1301+00 CRL, RT & LT	ACROSS PROPOSED OR EXISTING DITCH						32
19	1303+00 CRL, RT & LT	ACROSS PROPOSED OR EXISTING DITCH						32
19	1305+00 CRL, RT & LT	ACROSS PROPOSED OR EXISTING DITCH						32
19	1305+00 TO 1317+00 CRL, LT	ALONG TOE OF FILL OR TOE OF DITCH FORESLOPE	1,210					
19	1307+00 TO 1310+50 CRL, RT	ALONG TOE OF FILL OR TOE OF DITCH FORESLOPE	350					
19	1307+00 CRL, RT & LT	ACROSS PROPOSED OR EXISTING DITCH						32
19	1309+00 CRL, RT & LT	ACROSS PROPOSED OR EXISTING DITCH						32
19	1311+00 CRL, RT & LT	ACROSS PROPOSED OR EXISTING DITCH						32
19	1313+00 CRL, RT & LT	ACROSS PROPOSED OR EXISTING DITCH						32
19	1315+00 CRL, RT & LT	ACROSS PROPOSED OR EXISTING DITCH						32
19	1316+00 CRL, RT & LT	ACROSS PROPOSED OR EXISTING DITCH						32
19	1321+00 TO 1325+00 CRL, LT	ALONG TOE OF FILL OR TOE OF DITCH FORESLOPE	400					
19	1321+00 CRL, RT & LT	ACROSS PROPOSED OR EXISTING DITCH						32
19	1325+00 CRL, RT & LT	ACROSS PROPOSED OR EXISTING DITCH						32
		TOTAL	10,810	4	1,056			

SUMMARY OF DRAINAGE STRUCTURES

STR. NO.	SHEET NUMBER	STATION	DESCRIPTION	DESIGN	613(A) 0491 18" R.C.PIPE CLASS III		613(A) 0492 24" R.C.PIPE CLASS III		613(B) 0689 18" CORR. GALV. STEEL PIPE		613(B) 0690 24" CORR. GALV. STEEL PIPE		613(M) 7186 TYPE A4 CULVERT END TREATMENT		613(M) 7187 TYPE B4 CULVERT END TREATMENT		613(Y) 1180 TRENCH EXCAVATION	
					LF		LF		LF		LF		EA		EA		CY	
1	25	STA 1250+89.17 CRL	CONST. 24" X 46' LG CGSP SD W/CET, 63.00' RT	CE14S-3, SPI-4, SPB-1, FHTMP-5						46				2		19		
T1	39	STA 1250+89.17 CRL	CONST. 12" X 28' LG CGSP TEMP. SD, 15.00' RT	SPI-4, SPB-1, FHTMP-5						28								
2	26	STA 1261+30.00 CRL	CONST. 18" X 80' LG CGSP SD W/CET, 65.00' LT	CE14S-3, SPI-4, SPB-1, FHTMP-5						80				2				
T2	36	STA 1261+48.00 CRL	CONST. 12" X 28' LG CGSP TEMP. SD, 18.00' RT	SPI-4, SPB-1, FHTMP-5						28								
T3	36	STA 1266+24.00 CRL	CONST. 12" X 28' LG CGSP TEMP. SD, 18.00' RT	SPI-4, SPB-1, FHTMP-5						28								
3	27	STA 1277+20.00 CRL	CONST. 24" X 64' LG RCP SD W/CET, 80.00' RT	CE14S-3, SPI-4, SPB-1, FHTCP-3								64				2		31
T4	36	STA 1277+20.00 CRL	CONST. 12" X 36' LG CGSP TEMP. SD, 18.00' RT	SPI-4, SPB-1, FHTMP-5						36								
4	27	STA 1277+20.00 CRL	CONST. 24" X 64' LG RCP SD W/CET, 58.00' LT	CE14S-3, SPI-4, SPB-1, FHTCP-3								64				2		31
5	28	STA 1284+62.00 CRL	CONST. 18" X 58' LG CGSP SD W/CET, 46.00' RT	CE14S-3, SPI-4, SPB-1, FHTMP-5						58				2				
6	28	STA 1284+84.00 CRL	CONST. 18" X 54' LG CGSP SD W/CET, 46.00' RT	CE14S-3, SPI-4, SPB-1, FHTCP-3	54													18
7	28	STA 1284+84.00 CRL	CONST. 12" X 36' LG CGSP SD W/CET, 36' LT	SPI-4, SPB-1, FHTMP-5						36				2				13
8	29	STA 1304+35.00 CRL	CONST. 18" X 40' LG CGSP SD W/CET, 36' RT	CE14S-3, SPI-4, SPB-1, FHTMP-5						40				2				10
9	29	STA 1310+70.00 CRL	CONST. 18" X 40' LG CGSP SD W/CET, 36' RT	CE14S-3, SPI-4, SPB-1, FHTMP-5						40				2				13
				TOTALS	54	128	374	46	10	6	172							

SUMMARY OF EROSION CONTROL

SHEET NUMBER	STATION (CTR. LINE OR REF. LINE)	DESCRIPTION	WORK AREA	230(A) 2806 SOLID SLAB SODDING
				SY
17	1239+40.00 TO 1268+00.00	LEFT ROADWAY	1	9,030
17	1238+41.45 TO 1268+00.00	RIGHT ROADWAY	2	21,860
18	1268+00.00 TO 1298+00.00	LEFT ROADWAY	1	8,625
18	1268+00.00 TO 1298+00.00	RIGHT ROADWAY	2	14,985
19	1298+00.00 TO 1324+77.00	LEFT ROADWAY	1	6,350
19	1298+00.00 TO 1324+77.00	RIGHT ROADWAY	2	5,760
		TOTAL		66,610

EROSION CONTROL TYPICAL SECTION

VEGETATIVE MULCHING WILL BE USED FOR TEMPORARY EROSION CONTROL

SUMMARY OF DITCH AND RIPRAP QUANTITIES

SHEET NUMBER	LOCATION		PAVED DITCH AND FLUME						
	DESCRIPTION OR LOCATION	DESIGN	LENGTH	BOTTOM WIDTH	CURTAIN WALLS	C, CLASS CONC.	TYPE - PLAIN RIPRAP		
			FT	FT	EA	CY	TON		
27	STA 1275+07 TO 1276+90, CRL LT.	DC-3, DES. 2B	183	8	3	28.72			
27	STA 1274+25.25 TO 1276+00, CRL LT.						494		
27	STA 1277+54 TO 1278+50, CRL LT.	DC-3, DES. 2B	96	8	2	15.14			
	TOTALS					43.86	494		

For Information Only

Figure 13.A-B — EXAMPLE PLANS
(continued)

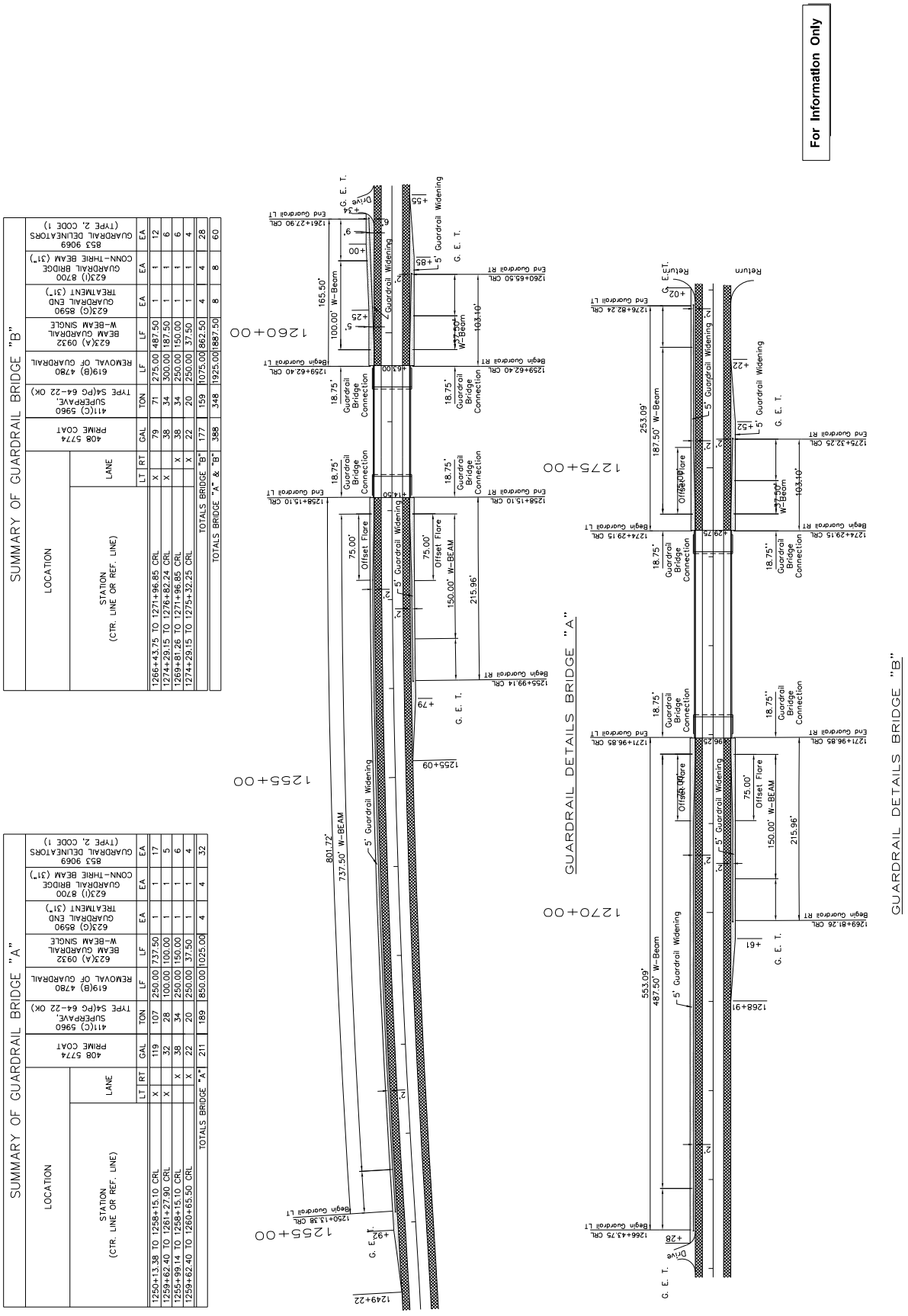


Figure 13.A-B — EXAMPLE PLANS
(continued)

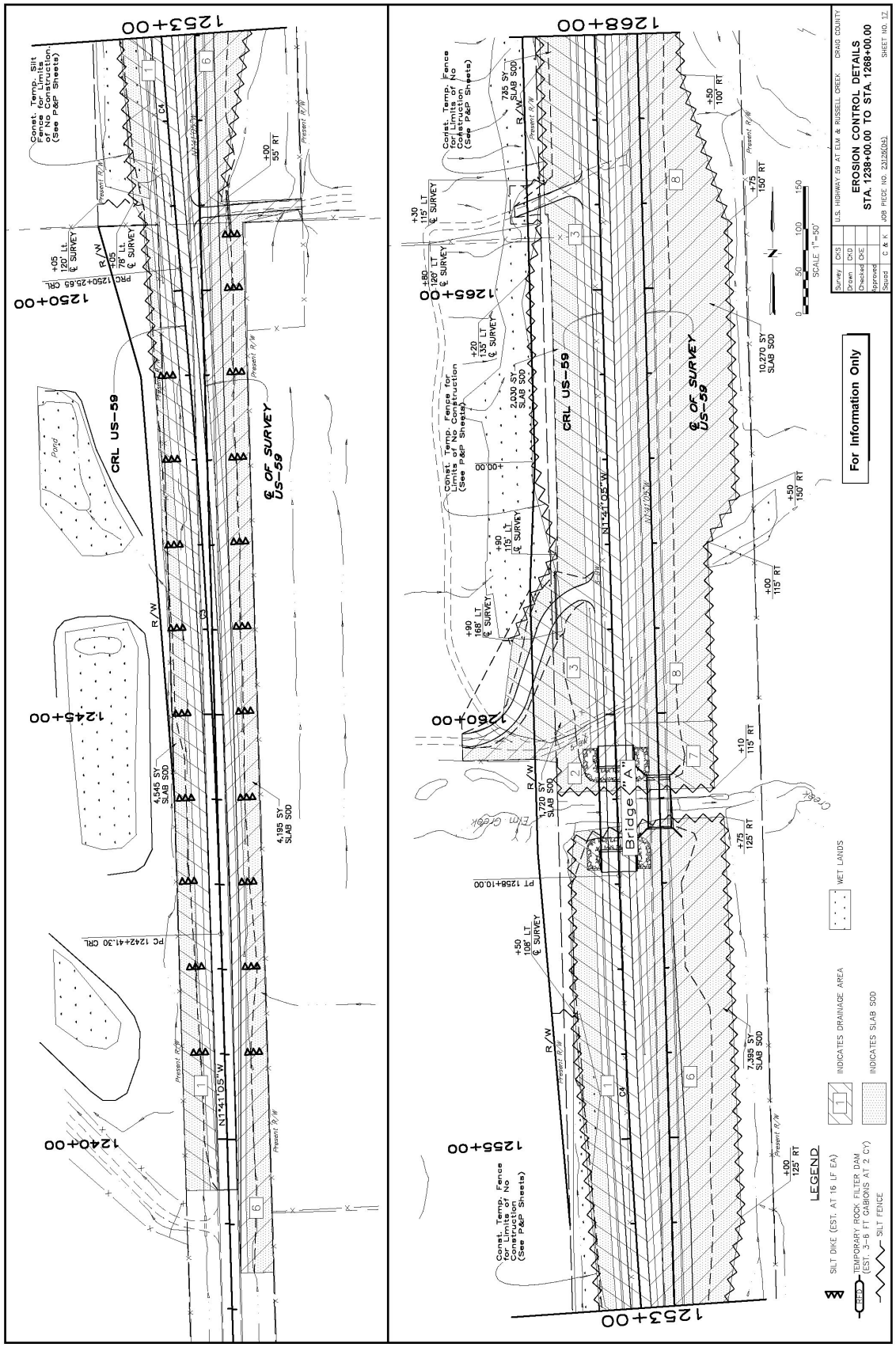


Figure 13.A-B — EXAMPLE PLANS
(continued)

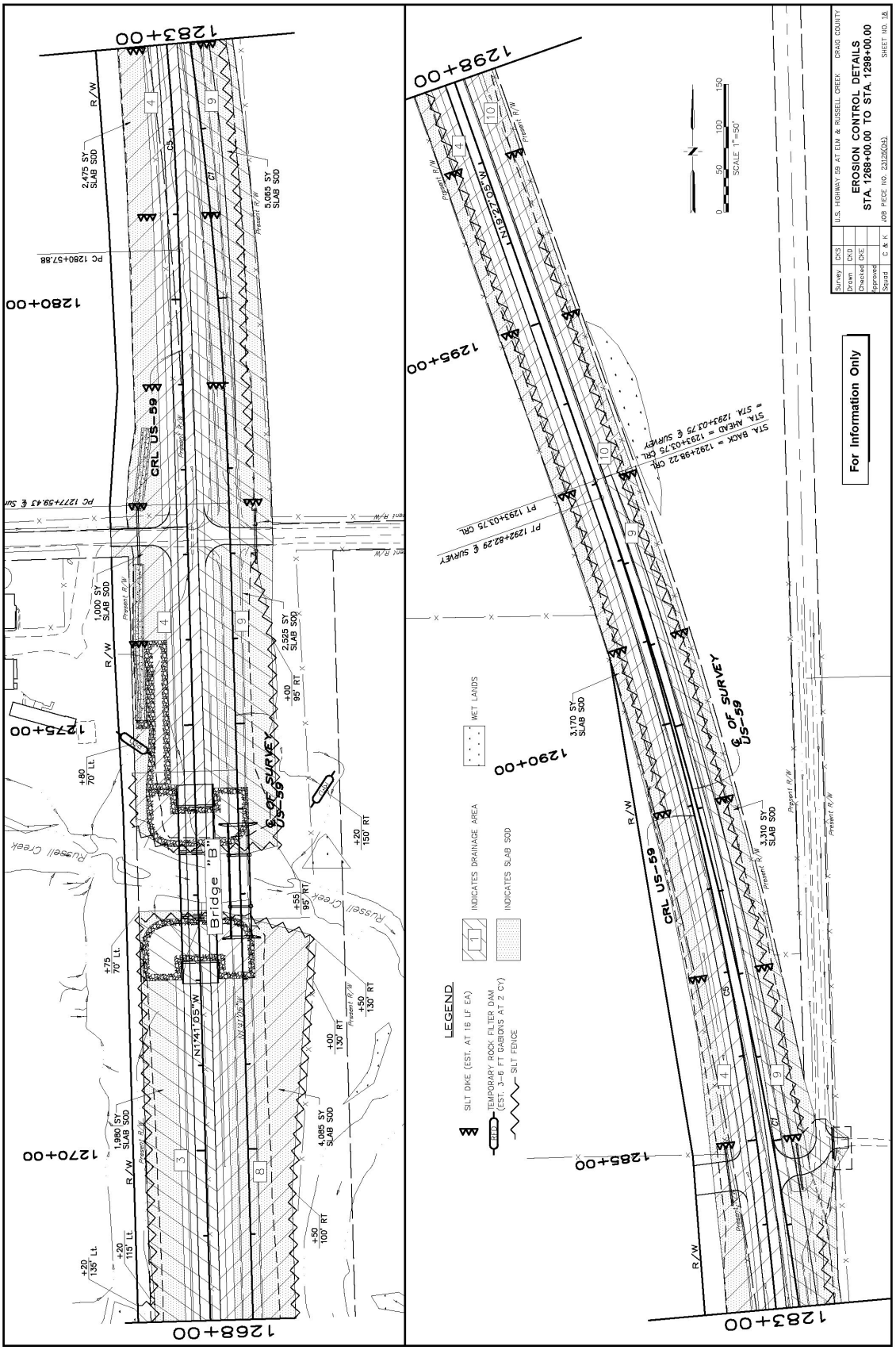


Figure 13.A-B — EXAMPLE PLANS
(continued)

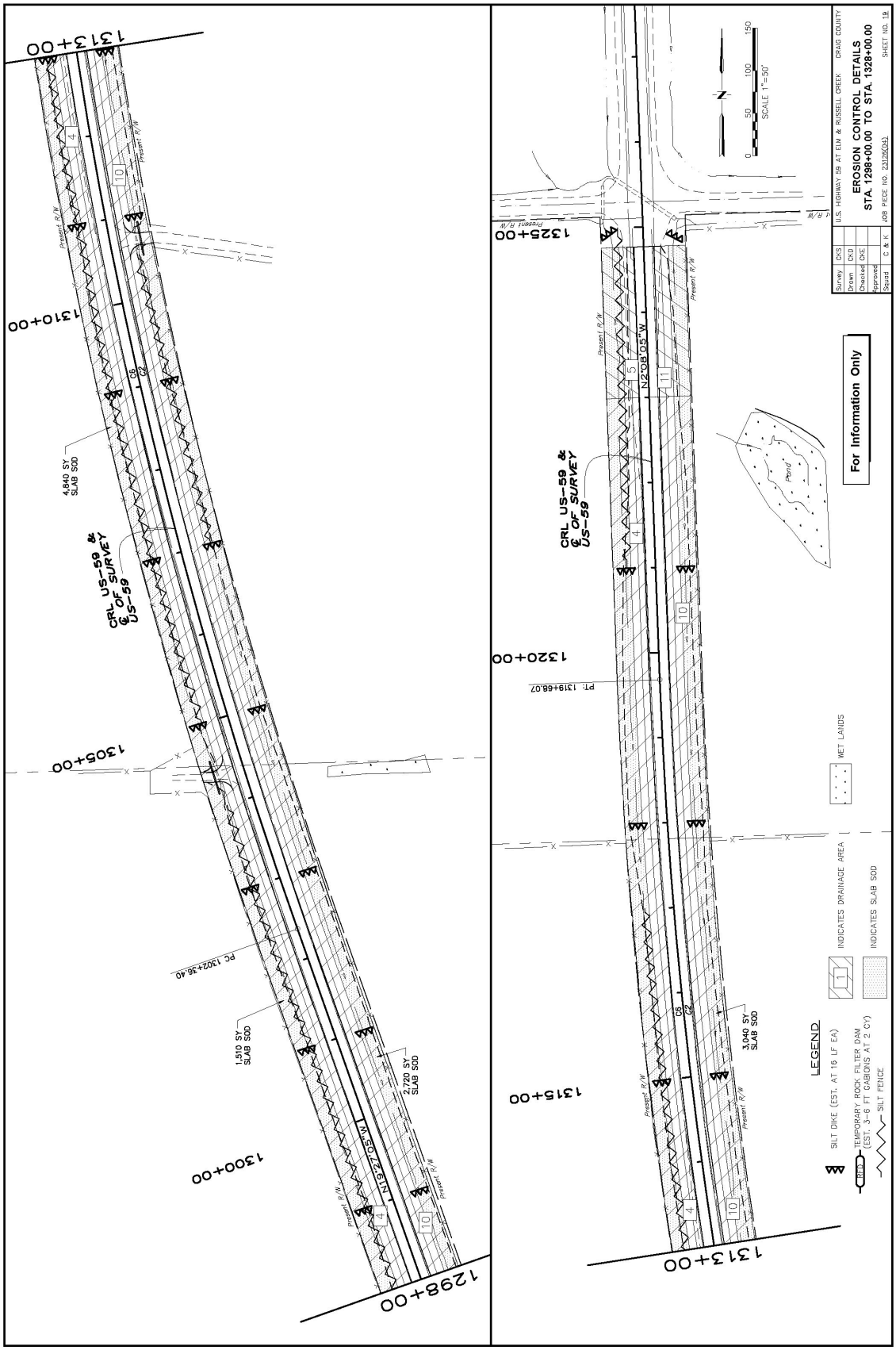


Figure 13.A-B — EXAMPLE PLANS
(continued)

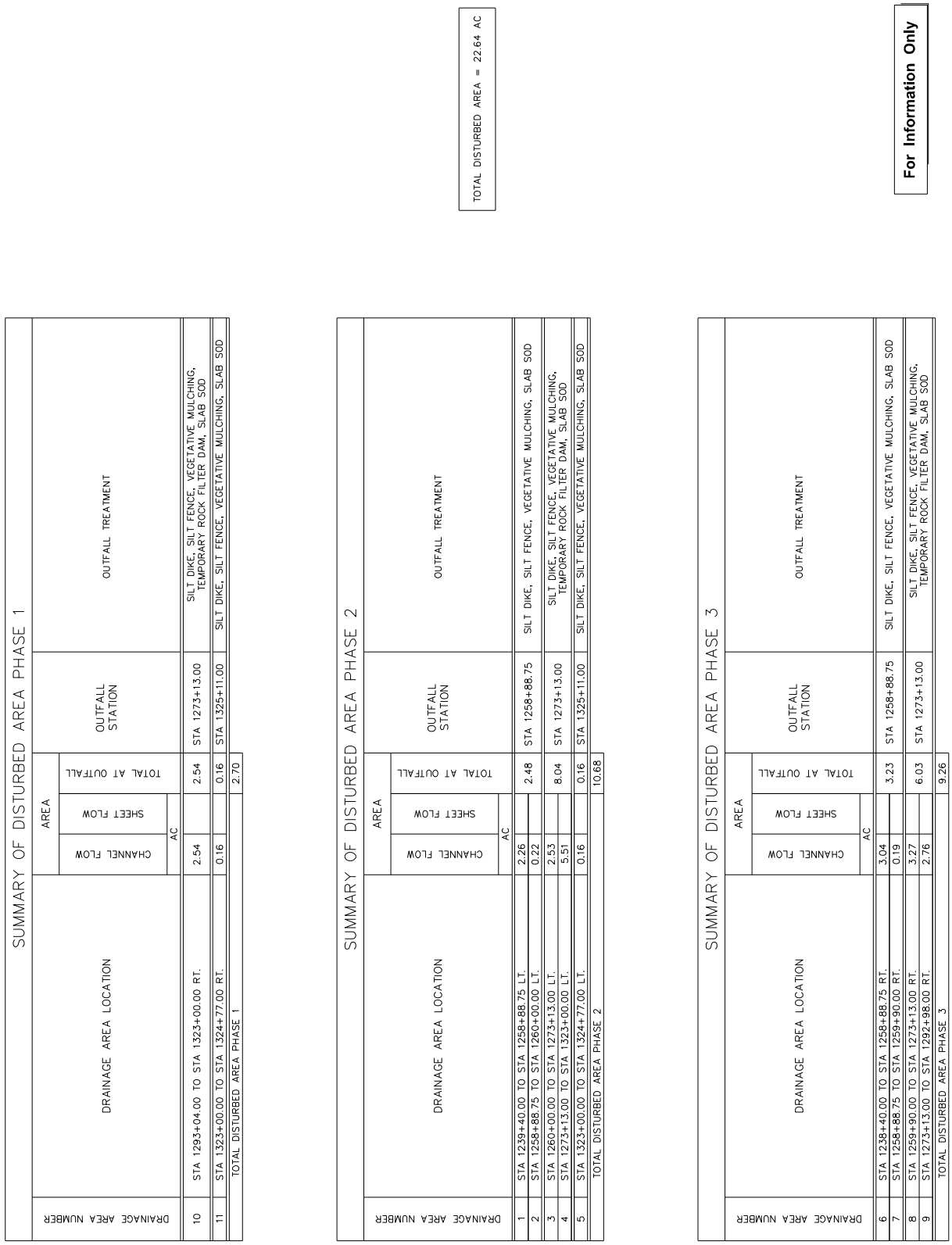


Figure 13.A-B — EXAMPLE PLANS
(continued)

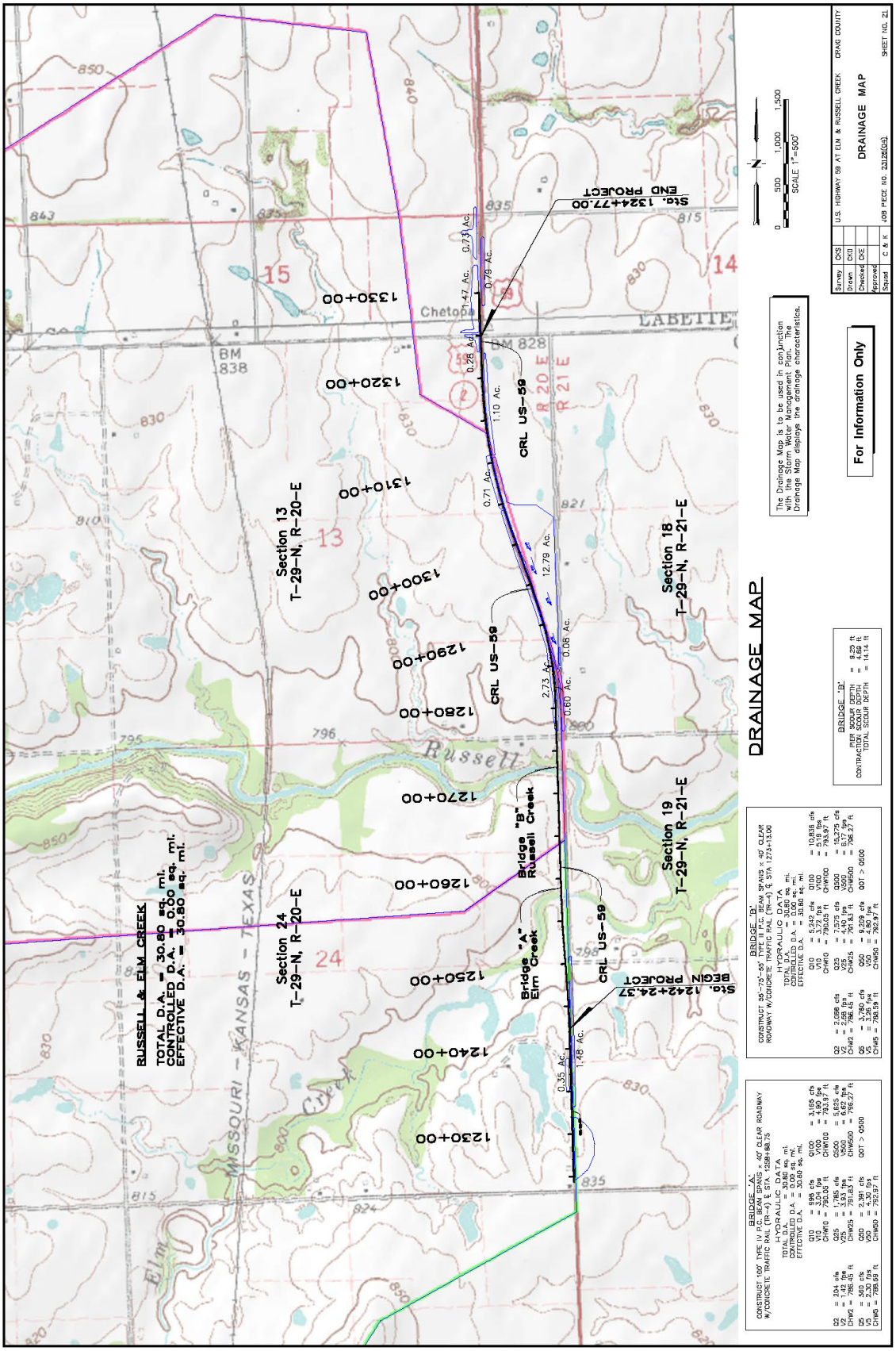


Figure 13.A-B — EXAMPLE PLANS
(continued)

Figure 13.A-B — EXAMPLE PLANS
(continued)

PROJECT LIMITS: US 59: BEGIN APPROX 1.56 MILES SOUTH OF THE KANSAS STATE LINE AND EXTEND NORTH 1.56 MILES.

PROJECT DESCRIPTION: BRIDGE AND APPROACHES

SUGGESTED SEQUENCE OF EROSION CONTROL ACTIVITIES:
PRIOR TO INITIATING SOIL DISTURBING ACTIVITIES, THE CONTRACTOR WILL INSTALL ALL PERIMETER TEMPORARY SEDIMENT CONTROLS SPECIFIED. STRIP, STOCKPILE AND STABILIZE TOPSOIL. CLEAR AND GRUB ONLY IN NECESSARY AREAS, PRESERVING AS MUCH NATIVE VEGETATION AS POSSIBLE. INSTALL, MAINTAIN AND/OR MOVE TEMPORARY SEDIMENT ITEMS WITH CONSTRUCTION OPERATIONS AS PRACTICAL. IF DIRECTED BY THE ENGINEER, PLANT TEMPORARY SEEDING. REPLACE SALVAGED TOPSOIL AND DEVICES WHEN AN ACCEPTABLE VEGETATIVE COVER (AT LEAST 70%) HAS BEEN ATTAINED. AS SITE CONDITIONS WARRANT, THE CONTRACTOR MAY CHOOSE TO MODIFY THE TYPE OR ARRANGEMENT OF SPECIFIED PRACTICES TO IMPROVE THEIR EFFECTIVENESS AS APPROVED BY THE ENGINEER. THE CONTRACTOR WILL MAINTAIN A LOG OF THE DATES OF MAJOR SOIL DISTURBANCE ACTIVITIES, AND ALSO THE DATES OF INSTALLATION OF EROSION CONTROL MEASURES.

SOIL TYPE: LEAN CLAY WITH SAND

AREA TO BE DISTURBED: 22.64 ACRES

OFFSITE AREA TO BE DISTURBED: ______
(FOR CONTRACTOR USE)

MAXIMUM ACRES TO BE DISTURBED AT ANY ONE TIME: (FOR CONTRACTOR USE) ______

LATITUDE & LONGITUDE OF CENTER OF PROJECT: LAT 36° 59' 18"N LONG 95° 05' 00"W

NAME OF RECEIVING WATERS: ELM CREEK & RUSSELL CREEK

SENSITIVE WATERS OR WATERSHEDS: YES [ ] NO [X]

303(d) IMPAIRED WATERS: YES [X] NO [ ]

NOTE:
THIS SHEET SHOULD BE USED IN CONJUNCTION WITH A DRAINAGE MAP THAT ILLUSTRATES THE DRAINAGE PATTERNS/PATHWAYS AND RECEIVING WATERS FOR THIS PROJECT. THIS SHEET SHOULD ALSO BE USED WITH THE EROSION CONTROL SUMMARIES, PAY ITEMS, & NOTES.

SOIL STABILIZATION PRACTICES:

- ___ TEMPORARY SEEDING
- _X_ PERMANENT SODDING, SPRIGGING OR SEEDING
- _X_ VEGETATIVE MULCHING
- ___ SOIL RETENTION BLANKET
- _X_ PRESERVATION OF EXISTING VEGETATION

NOTE: TEMPORARY EROSION CONTROL METHODS MUST BE USED ON ALL DISTURBED AREAS WHERE CONSTRUCTION ACTIVITIES HAVE CEASED FOR OVER 14 DAYS. METHODS USED WILL BE AS SHOWN ON PLANS, OR AS DIRECTED BY THE ENGINEER.

STRUCTURAL PRACTICES:

- ___ STABILIZED CONSTRUCTION EXIT
- _X_ TEMPORARY SILT FENCE
- _X_ TEMPORARY SILT DIKES
- ___ TEMPORARY FIBER LOG
- ___ DIVERSION, INTERCEPTOR OR PERIMETER DIKES
- ___ DIVERSION, INTERCEPTOR OR PERIMETER SWALES
- _X_ ROCK FILTER DAMS
- ___ TEMPORARY SLOPE DRAIN
- _X_ PAVED DITCH W/ DITCH LINER PROTECTION
- ___ TEMPORARY DIVERSION CHANNELS
- ___ TEMPORARY SEDIMENT BASINS
- _X_ TEMPORARY SEDIMENT TRAPS
- ___ TEMPORARY SEDIMENT FILTERS
- _X_ TEMPORARY SEDIMENT REMOVAL
- _X_ RIP RAP
- ___ INLET SEDIMENT FILTER
- ___ TEMPORARY BRUSH SEDIMENT BARRIERS
- ___ SANDBAG BERMS
- ___ TEMPORARY STREAM CROSSINGS

OFFSITE VEHICLE TRACKING:

- _X_ HAUL ROADS DAMPENED FOR DUST CONTROL
- _X_ LOADED HAUL TRUCKS TO BE COVERED WITH TARPAULIN
- _X_ EXCESS DIRT ON ROAD REMOVED DAILY

NOTES:
RUSSELL CREEK IS INDICATED AS IMPAIRED WATERS.
ELM CREEK IS NOT INDICATED AS IMPAIRED WATERS.

THE CONTRACTOR SHALL ALSO BE RESPONSIBLE FOR THE FOLLOWING:

MAINTENANCE AND INSPECTION:
ALL EROSION AND SEDIMENT CONTROLS WILL BE MAINTAINED IN GOOD WORKING ORDER FROM THE BEGINNING OF CONSTRUCTION UNTIL AN ACCEPTABLE VEGETATIVE COVER IS ESTABLISHED. INSPECTION BY THE CONTRACTOR AND ANY NECESSARY REPAIRS SHALL BE PERFORMED ONCE EVERY 7 CALENDAR DAYS AND WITHIN 24 HOURS AFTER ANY STORM EVENT GREATER THAN 0.5 INCH AS RECORDED BY A NON-FREEZING RAIN GAUGE TO BE LOCATED ON SITE. POTENTIALLY ERODIBLE AREAS, DRAINAGEWAYS, MATERIAL STORAGE, STRUCTURAL DEVICES, CONSTRUCTION ENTRANCES AND EXITS ALONG WITH EROSION AND SEDIMENT CONTROL LOCATIONS ARE EXAMPLES OF SITES THAT NEED TO BE INSPECTED.

WASTE MATERIALS:
PROPER MANAGEMENT AND DISPOSAL OF CONSTRUCTION WASTE MATERIAL IS REQUIRED BY THE CONTRACTOR. MATERIALS INCLUDE STOCKPILES, SURPLUS, DEBRIS AND ALL OTHER BY-PRODUCTS FROM THE CONSTRUCTION PROCESS. PRACTICES INCLUDE DISPOSAL, PROPER MATERIALS HANDLING, SPILL PREVENTION AND CLEANUP MEASURES. CONTROLS AND PRACTICES SHALL MEET THE REQUIREMENTS OF ALL FEDERAL, STATE AND LOCAL AGENCIES.

HAZARDOUS MATERIALS:
PROPER MANAGEMENT AND DISPOSAL OF HAZARDOUS WASTE MATERIALS IS REQUIRED. THE CONTRACTOR IS RESPONSIBLE FOR FOLLOWING MANUFACTURER'S RECOMMENDATIONS, STATE AND FEDERAL REGULATIONS TO ENSURE CORRECT HANDLING, DISPOSAL, SPILL PREVENTION AND CLEANUP MEASURES. EXAMPLES INCLUDE BUT ARE NOT LIMITED TO: PAINTS, ACIDS, CLEANING SOLVENTS, CHEMICAL ADDITIVES, CONCRETE CURING COMPOUNDS AND CONTAMINATED SOILS.

GENERAL NOTES:
A STORM WATER POLLUTION PREVENTION PLAN (SWPPP) IS REQUIRED TO COMPLY WITH THE OKLAHOMA POLLUTION DISCHARGE ELIMINATION SYSTEM (OPDES) REGULATIONS. THIS PLAN IS INITIATED DURING THE DESIGN PHASE, CONFIRMED IN THE PRE-WORK MEETINGS AND AVAILABLE ON THE JOB SITE ALONG WITH COPIES OF THE NOTICE OF INTENT (NOI) FORM AND PERMIT CERTIFICATE THAT HAVE BEEN FILED WITH THE OKLAHOMA DEPARTMENT OF ENVIRONMENTAL QUALITY (ODEQ). THE PLAN MUST BE KEPT CURRENT WITH UP-TO-DATE AMENDMENTS DURING THE PROGRESSION OF THE PROJECT. ALL CONTRACTOR OFF-SITE OPERATIONS ASSOCIATED WITH THE PROJECT MUST BE DOCUMENTED IN THE SWPPP, I.E. BORROW PITS, WORK ROADS, DISPOSAL SITES, ASPHALT/CONCRETE PLANTS, ETC. THE BASIC GOAL OF STORM WATER MANAGEMENT IS TO IMPROVE WATER QUALITY BY REDUCING POLLUTANTS IN STORM WATER DISCHARGES. RUNOFF FROM CONSTRUCTION SITES HAS A POTENTIAL FOR POLLUTION DUE TO EXPOSED SOILS AND THE PRESENCE OF HAZARDOUS MATERIALS USED IN THE CONSTRUCTION PROCESS. THE PREVENTION OF SOIL EROSION, CONTAINMENT OF HAZARDOUS MATERIALS AND/OR THE INTERCEPTION OF THESE POLLUTANTS BEFORE LEAVING THE CONSTRUCTION SITE ARE THE BEST PRACTICES FOR CONTROLLING STORM WATER POLLUTION.

THE FOLLOWING SECTIONS OF THE 2009 ODOT STANDARD SPECIFICATIONS SHOULD BE NOTED:

103.05	BONDING REQUIREMENTS
104.10	FINAL CLEANING UP
104.12	CONTRACTOR'S RESPONSIBILITY FOR WORK
104.13	ENVIRONMENTAL PROTECTION
106.08	STORAGE AND HANDLING OF MATERIAL
107.01	LAWS, RULES AND REGULATIONS TO BE OBSERVED
107.20	STORM WATER MANAGEMENT
220	MANAGEMENT OF EROSION, SEDIMENTATION AND STORM WATER POLLUTION PREVENTION AND CONTROL
221	TEMPORARY SEDIMENT CONTROL

IN ADDITION:
"ODEQ GENERAL PERMIT (OKR10) FOR STORM WATER DISCHARGES FROM CONSTRUCTION ACTIVITIES WITHIN THE STATE OF OKLAHOMA." ODEQ, WATER QUALITY DIVISION, SEPTEMBER 13, 2012.

For Information Only

NOTICE OF INTENT

See Reverse Side for Instructions

DEQ FORM 606-002A
Sept, 13, 2012

Oklahoma Department of Environmental Quality
Notice of Intent (NOI) for Storm Water Discharges Associated with CONSTRUCTION ACTIVITY on Sites of One or More Acres Under the OPDES General Permit OKR10

SUBMISSION OF THIS NOTICE OF INTENT CONSTITUTES NOTICE THAT THE PARTY IDENTIFIED IN Part I OF THIS FORM INTENDS TO BE AUTHORIZED BY AN OPDES PERMIT ISSUED FOR STORM WATER DISCHARGES ASSOCIATED WITH CONSTRUCTION ACTIVITY IN THE STATE OF OKLAHOMA. BECOMING A PERMITTEE OBLIGATES SUCH DISCHARGER TO COMPLY WITH THE TERMS AND CONDITIONS OF THE PERMIT. IN ORDER TO OBTAIN AUTHORIZATION, ALL REQUESTED INFORMATION MUST BE PROVIDED ON THIS FORM. SEE INSTRUCTIONS ON BACK OF FORM.

IF YOUR FACILITY OR SITE IS ON INDIAN COUNTRY LAND, FILE YOUR NOI WITH THE EPA, USING EPA FORM 3510-9.

☐ **NEW APPLICATION** ☐ **RENEWAL** ☐ **MODIFICATION Enter Authorization Number: OKR10**_____

I. Facility Operator Information

Name: _____Phone: (_____)_____

Address: _____

City: _____ State: _____ Zip Code: _____ E-mail Address: _____

II. Site Information

Name of the project: _____Address: _____

City:_____ County: _____ ZIP Code: _____

Location: Latitude: _____ Longitude: _____

Name of Receiving Water Body: _____

Is the discharge to an impaired water body on the DEQ 303(d) list? ☐ Yes ☐ No

Is there an approved TMDL or watershed plan applicable to this site? ☐ Yes ☐ No Purpose of Project _____ (See Instructions)

Is this site a part of the common plan of development or sale? ☐ Yes ☐ No Estimated area to be disturbed (to nearest acre): _____
(If 40 or more acres, then SWP3 must be submitted.)

ENDANGERED SPECIES

Based on the instructions provided in Part 11 and Addendum A of the permit, is the proposed construction or land disturbing activity within the corridor of any of the listed Aquatic Resources of Concern (ARC)? ☐ Yes ☐ No (If yes, then SWP3 must be submitted)

If the answer is yes, please refer to Part 11.2 Step 2.
All permit eligibility requirements with regard to protection of endangered species through the indicated Section of Part 1.3.2.E.2 of the permit have been complied with. (check one or more boxes):

a. ◯ b. ◯ c. ◯ d. ◯ e. ◯

III. Certification

_____ (Initial) "I certify that this facility is registered with the Secretary of State of Oklahoma." Please provide the full name of company/corporation if different than that listed in Section I above.

_____ (Initial) "I certify that a Storm Water Pollution Prevention Plan (SWP3) has been prepared for this facility in accordance with Part 4.5 of this permit."

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage this system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.
I understand that continued coverage under this permit is contingent upon maintaining eligibility as provided for in Part 1.3."

Name (Please Print):_____ Date: _____

Signature:_____ Title_____

For DEQ use only: Assigned Authorization Number: OKR10 _____

Figure 13.A-B — EXAMPLE PLANS
(continued)

Instructions – DEQ Notice of Intent (NOI) for Storm Water Discharges Associated with Construction Activity to be Covered Under the OPDES General Permit OKR10

Who Must File a Notice of Intent Form

Under the provisions of the Clean Water Act, as amended, (33 U.S. 1251 et.seq.the Act), Oklahoma Environmental Code, Title 27A of the Oklahoma Statutes, Section 2-6-201 et. seq. and the rules OAC 252:606-1-3(b), discharge of storm water from construction activities is prohibited without an Oklahoma Pollutant Discharge Elimination System Permit. The operator of a construction site that has such a storm water discharge must submit an NOI to obtain coverage under an OPDES Storm Water General Permit (OKR10). If you have questions about whether you need a permit under the OPDES Storm Water program, or if you need information, write to the address listed below or telephone the Environmental Complaints and Local Services Division, Department of Environmental Quality (DEQ), at (405) 702-6100 and ask for the Storm Water Unit.

Where to File an NOI Form:

DEQ/Environmental Complaints and Local Services (ECLS)
Storm Water Unit
P.O. Box 1677
Oklahoma City, OK 73101-1677
FAX (405) 702-6226

Note: do not submit an SWP3 with the NOI, unless the project is located (1) within Outstanding Resource Waters, or (2) within a Federal and State ARC, or (3) within a larger site which is disturbing land of 40 or more acres.

Completing The Form

You must type or print, using upper-case letters, in the appropriate areas only. If you have any questions on this form, call DEQ-ECLS at (405) 702-6100 and ask for the Storm Water Unit.

Section I. Facility Operator Information
Provide the legal name, mailing address, and telephone number of the person, firm, public organization, or any other entity that either individually or together meet either of the following two criteria: (1) have operational control over the site specifications (including the ability to make modifications in specifications); and (2) have the day-to-day operational control of those activities at the site necessary to ensure compliance with plan requirements and permit conditions. If you are a Co-Permittee, check the appropriate box. Do not use a colloquial name.

Section II. Site Information
Enter the Project's official or legal name and complete street address, including city, county, state, ZIP code and phone number. If the site lacks a street address, indicate with a general statement the location of the site (e.g., Intersection of State Highways 61 and 34). The applicant must also provide the latitude and longitude of the facility in degrees, minutes, and seconds to the nearest 15 seconds (45° 7' 24" = 45.1234 decimal latitude) of the approximate center of the site.

The latitude and longitude of your facility can be located on USGS quadrangle maps. The quadrangle maps may be obtained at 1-888-ASK-USGS. Longitude and latitude may also be obtained at the Census Bureau Internet site: http://www.census.gov/cgi-bin/gazetteer. Only one location description is needed: address; section, township, and range; or latitude and longitude.

Enter the name of the closest predominant receiving water body. The Oklahoma 303(d) list can be found online at http://www.deq.state.ok.us/WQDnew/305b_303d/index.html or the DEQ GIS Map and Data Viewer at http://maps.deq.ok.gov/deq_wq/
If your facility or site is on Indian Country land, do not complete this form. File your NOI with the EPA online at http://cfpub.epa.gov/npdes/stormwater/enoi.cfm

Enter the description of the purpose of your project, such as residential subdivision, commercial building, road and bridge, wind farm etc.

Indicate whether your discharge will be consistent with the conditions and requirements of EPA approved or established TMDLs. An approved TMDL report can be found online on the DEQ website at http://www.deq.state.ok.us/WQDnew/tmdl/index.html.

Indicate whether your site is a part of the common plan of development or sale, which is a contiguous area where multiple separate and distinct construction activities may be taking place at different times on different schedules under one plan.

Enter the estimated area to be disturbed including but not limited to: grubbing, excavation, grading, and utilities and infrastructure installation. Indicate to the nearest acre.

Indicate if the proposed construction site or land disturbing activity is within the corridor of a listed Aquatic Resource of Concern (ARC), Addendum A of the General Permit, and associated with the discharges and requirements to be covered by this permit as follows, Part 1.3.2.E.2:

a The proposed construction site or land disturbing activity is not located within any of the corridors of the Federal or State identified ARC, and further investigation is not required.
b The proposed construction site or land disturbing activity is located within a corridor of a Federal or State identified ARC (Addendum A). The SWP3 describes this area in relation to the listed water or watershed and specifies the measures to be employed to protect the endangered or threatened species or their critical habitat.
c If one of those eligibility criteria cannot be met, applicants may use Addendum I (Buffer Guidance) for equivalent sediment controls or contact DEQ for further assistance; or
d The applicant's federally approved activities are authorized by the appropriate Federal or State agency and that authorization addresses the Endangered Species Act Section 7 consultation for the applicant's storm water discharge or storm water discharge-related activities; or
e The applicant's storm water discharges and storm water discharge-related activities were already addressed in another operator's certification of eligibility under Part 1.3.2.E.2 a, b, c, or d that included the applicant's project area. By certifying eligibility under Part 1.3.2.E.2 e, the applicant agrees to comply with applicable measures or controls upon which the other operator's certification under Part 1.3.2.E.2 a, b, c or d was based.

Section III. Certification
Certify that this company/corporation is registered with the Secretary of State of Oklahoma;

Certify that a Storm Water Pollution Prevention Plan (SWP3) has been prepared for this facility in accordance with Part 4.5 of this permit;

Federal Statutes provide for severe penalties for submitting false information on this application form. Federal regulations require this application to be signed as follows:
For a corporation: by a responsible corporate officer, which means: (i) president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or their designee, or any other person who performs similar policy or decision-making functions for the corporation, or (ii) the manager of one or more manufacturing, production, or operating facilities, provided, the manager is authorized to make management decisions which govern the operation of the regulated facility, including having the explicit or implicit duty of making major capital investment recommendations, and initiating and directing other comprehensive measures to assure long term environmental compliance with environmental laws and regulations; the manager can ensure that the necessary systems are established or actions taken to gather complete and accurate information for permit application requirements; and where authority to sign had been assigned or delegated to the manager in accordance with corporate procedures.
For a partnership or sole proprietorship: by a general partner of the proprietor, or; For a municipality, state, Federal, or other public agency: by either a principal executive or ranking elected official.

PLEASE MAKE SURE YOU ACQUIRE A COPY OF THIS PERMIT AND CAREFULLY READ ALL THE TERMS AND CONDITIONS

Figure 13.A-B — EXAMPLE PLANS
(continued)

APPENDIX B
SECTION 404 PERMIT APPLICATION

INSTRUCTIONS FOR COMPLETING A SECTION 404 PERMIT APPLICATION

Date: Date Application submitted
Project No: Federal Aid Project or other number assigned
J/P: Job Piece No.
Facility: State Highway, County Road, County Bridge, Route No., etc.
County, Near: County name and nearest town or city to project
Description: Briefly describe type of work and extent
Let Date: Construction let date
Division: ODOT Division

Sta or Str No.:
Structure name and station from plans.

Location:
Latitude and longitude in decimal degrees. Under Legal, list the Township, Range, and Section.

Waterbody:
Name of river, creek, channel, etc. If the creek is unnamed, give the name of the downstream receiving water in the notes. Also state whether the waterbody is a Designated **Critical Resource Water (CRW).** The CRW list can be found at:
http://www.swt.usace.army.mil/permits/Documents%20%20Nationwide%20Permits/Encl_3_to_9-pdf.pd

Type:

BP Bank Protection. List the total length of the project in the notes.

CC Channel Change. Any altering, moving, or changing the physical location of the stream or channel which will require fill or excavation within the existing channel.

Chan Channel Work. Any work in an existing channel which does not alter its physical location and is not associated with construction of a facility or structure.

RCB Reinforced Concrete Box. Any fill and/or excavation in the existing channel due to replacing, lengthening, etc., of the box structure. The lengthened portion of the box and apron is considered fill.

SB Span Bridge. Includes abutments, piers, and work done in the channel while construction the bridge.

Misc Miscellaneous. Anything not covered by another type. Include description in the notes.

Revised October 27, 2009

Figure 13.B-A — 404 PERMIT FORM

OKLAHOMA DEPARTMENT OF TRANSPORTATION
SECTION 404 PRE-CONSTRUCTION NOTIFICATION FORM

DATE:

Project No.:		J/P:		Facility:		County, Near:	
Description:							
Let Date:				Division:			

Sta or Str. No.	Location			Waterbody		Description		Calculations	
	Latitude	Longitude	Legal	Critical Resource Water?	Type	Existing Structure/Condition	New Structure	Area acre	Notes

AVOIDANCE AND MINIMIZATION:
R/W was minimized to allow for the highway construction and utility relocations as necessary. The proposed fill in the channel is the minimum necessary to allow for the proposed highway while acommodating the existing channel geometry and providing safe slopes for the traveling public.

Types: BP--Bank Protection, CC—Channel Change, Chan--Channel Work, RCB--Reinforced Concrete Box, SB--Span Bridge, Wet--Wetlands, Misc—Miscellaneous

Notes:

1. The impact consists of fill with a reinforced concrete box.
2. The assumed Ordinary High Water Mark is xxx.xx'.

FHWA Approved Clearance type: CE: ____ FONSI/EA: ____ EIS: ____ Date: ____ Pending: X None: ____

Applicant: Name: Oklahoma Department of Transportation Phone No: (405) 522-0734

Address: 200 Northeast 21st Street, Oklahoma City, OK 73105-3204

Application Prepared By: Name: ____ Phone No: ____

Processing Agent: ____

This is not an official United States Army Corps of Engineers form. It is for use by the Oklahoma Department of Transportation only.

Revised October 27, 2009

Figure 13.B-A — 404 PERMIT FORM
(continued)

Description of Structure:

Existing — Describe existing structure, size, and condition (such as degradation of the structure, missing apron, scour, etc.).

New — Describe proposed structure. If type is bank protection, give length in notes.

Calculations:

Area in acres.

- Provide separate quantities for area of fill and area of excavation and designate fill and excavation in the notes.
- Designate whether area of fill and area of excavation is within the existing channel or in a completely new channel.
- Do not cancel out area of fill with area of excavation. Fill must be treated as a separate quantity from excavation.
- Fill and excavation areas should be calculated below the ordinary high water mark (OHWM) for channels.
- Include in the notes the OHWM elevation used.
- OHWM elevation can be obtained from the General Plan and Elevation plan sheets as the lowest bank or OHWM can be obtained from the ODOT biologist. The Q2 or Q5 elevation may give a more conservative OHWM elevation when a biologist elevation or profile elevation is not available.
- Temporary fills do not need to be included in the quantities if the area will be returning to its original state after project completion.
- If wetlands are identified in the NEPA document, consult ODOT Environmental Programs Division to obtain the area of fill and/or excavation in wetlands.

Notes.

- State whether impact is fill or excavation
- State type of fill (rip rap, drilled shafts, dirt, etc.)
- State Ordinary High Water Mark (OHWM) elevation.
- State whether the impact is to stream or wetlands.
- Note any other important information pertaining to the calculations and impacts.

Avoidance and Minimization Statement:

Provide a brief explanation describing how impacts to waters of the United States are being avoided and minimized on the project site. Also provide a brief description of how impacts to waters of the United States will be compensated for, or a brief statement explaining why compensatory mitigation should not be required for those impacts.

Revised October 27, 2009

Figure 13.B-A — 404 PERMIT FORM
(continued)

HELPFUL INFORMATION

- If the loss of waters is within a Critical Resource Water, a Pre-construction Notification (PCN) **IS** required.
- If the loss of waters is less than 0.1 acres, a PCN is not required.
- If the loss of wetlands is less than 0.1 acres, a PCN **IS** required.
- If the loss of waters and wetlands is between 0.1 acres and 0.5 acres a PCN is required and mitigation may be required.
- If the loss of waters and wetlands is greater than 0.5 acres, an Individual Permit is required and mitigation is required.
- Loss of waters of the United States are Waters of the United States that are permanently adversely affected by filling, flooding, excavation, or drainage because of a regulated activity…it is not a net threshold that is calculated after considering compensatory mitigation that may be used to offset losses of aquatic functions and services…Waters of the United States temporarily filled, flooded, excavated, or drained, but restored to pre-construction contours and elevations after construction, are not included in the measurement of loss of waters of the United States.

Figure 13.B-A — 404 PERMIT FORM
(continued)