

SECTION 114 - EROSION & SEDIMENT CONTROL

114.1 PURPOSE

114.2 GENERAL GUIDELINES

114.3 GRADING PERMITS

114.3.1 Grading Permit Requirements

114.3.2 Permit Procedure

114.3.3 Sediment & Erosion Control Plan (SECP)

114.3.4 Bond Requirements

114.4 OTHER PERMITS

114.4.1 NPDES Stormwater Permit

114.4.2 "404" Permit

114.4.3 Floodplain Development Permit

114.4.4 Industrial Mineral Mines Permit

114.5 DESIGN STANDARDS & CRITERIA

114.5.1 Grading

114.5.2 Sediment Control

114.5.3 Erosion Protection

114.5.4 Temporary Construction Entrance

114.5.5 Cleaning Streets

114.5.6 Dust Control

114.5.7 Sequencing and Scheduling

Figure 114.1	Hay Bale Dike
Figure 114.2	Silt Fence
Figure 114.3	Temporary Silt Containment Berm
Figure 114.4A	Sandbag Sediment Trap for Curb Inlets
Figure 114.4B	Area Inlet Protection
Figure 114.5	Temporary Diversion Berm - Curbed Street
Figure 114.6	Temporary Sandbag Diversion - Curbed Street
Figure 114.7A	Gravel Filter Dam
Figure 114.7B	Riprap Overflow Spillway
Figure 114.8	Temporary Sediment Basin
Figure 114.9	Typical Section - Berm & Outlet Structure
Figure 114.10	Perforated Riser Pipe
Figure 114.11	Diversion Dikes & Swales
Figure 114.12	Riprap Chute Cross-Section
Figure 114.13	Rock Check Dam
Figure 114.14	Sandbag Check Dam

SECTION 114 - EROSION & SEDIMENT CONTROL

114.1 PURPOSE

The Greene County Sediment and Erosion Control Regulation is set forth in Article IV of the Greene County Zoning Regulations. The purpose of this section is to provide detailed design criteria and standards to supplement the regulation.

114.2 GENERAL GUIDELINES

The goal of the regulation is to effectively minimize erosion and discharge of sediment from construction sites by application of relatively simple and cost effective Best Management Practices (BMPs). General guidelines for erosion and sediment control are listed below. Sediment and erosion control plans must demonstrate consistency with these guidelines.

- ▶ Minimize the area disturbed by construction at any given time.
- ▶ Stabilize disturbed areas as soon as possible by re-establishing sod, other forms of landscaping, and completing proposed structures, pavements, and permanent storm drainage systems.
- ▶ Provide for containment of sediment until areas are stabilized.
- ▶ Provide permanent erosion control by constructing and maintaining the permanent storm drainage system and maintaining vegetative cover, pavements, and other surface coverings in good condition.
- ▶ Avoid environmentally sensitive areas. Streams, springs, sinkholes, lakes, or wetlands are easily affected by sediment from construction sites. Careful planning and additional controls are needed when construction site are located in, or in close proximity, to these areas.
- ▶ Recognize sheet flow vs. concentrated flow. In areas where runoff occurs primarily as sheet flow, containment of sediment is relatively simple. In these areas, straw or hay bales, silt fences, and vegetative filter areas can be very effective. Where flow is concentrated, containment of sediment becomes more difficult as the rate and volume of flow increase. In these areas, more elaborate controls such as sedimentation basins must be provided.
- ▶ Recognize temporary vs. permanent controls. The greatest potential for soil erosion occurs during construction. Temporary controls are those which are provided for the purpose of controlling erosion and containing sediment until construction is complete. Temporary controls include straw or hay bale dikes, silt fences, erosion control blankets, etc., which are not needed after the area is stabilized. Permanent controls consist of vegetative cover, riprap, concrete trickle channels, detention basins, etc., which will remain in place through the life of the development. It is possible for the same feature to serve both a temporary and permanent purpose. The difference between temporary and permanent erosion control should

be clearly recognized in preparing an erosion and sediment control plan.

114.3 GRADING PERMITS

114.3.1 Grading Permit Requirements.

A Grading Permit must be obtained before any land is graded for non-agricultural purposes.

Grading is defined as any excavation or filling or combination thereof. Grading of agricultural land is considered non-agricultural whenever soil is excavated for sale off the site or soil from other properties is brought onto the site.

The Resource Management Department may waive the requirement for a Grading Permit in the following cases:

1. Sites where one (1) acre or less is graded, provided the graded area is located a distance of twenty-five feet (25') or more from a spring, sinkhole, cave, wetland, watercourse, or floodplain, and where the proposed construction does not include the construction of stormwater detention basins or other drainage facilities.

NOTE: Lots in new subdivisions will be considered part of the entire subdivision site area.

2. The following activities, provided they are not located within twenty-five feet (25') of a spring, sinkhole, cave, wetland, or watercourse:

- a. Grading for single family residences.

NOTE: Lot grading done as a part of an overall subdivision plan in order to make lots buildable or prepare lots for sale is not exempt.

- b. Grading and repair of existing roads or driveways.
- c. Cleaning and routine maintenance of roadside ditches or utilities.
- d. Utility construction where the width of the disturbed area for trench excavation and backfill is twenty feet (20') or less.

3. Emergency construction required to repair or replace roads, utilities, or other items affecting the general safety and well being of the public.

For emergency construction sites which would otherwise be required to obtain a permit and for which remedial construction will take more than fourteen (14) calendar days, application for the permit must be made within three (3) calendar days from the start of construction.

114.3.2 Permit Procedure

The following items must be submitted prior to issuance of a Grading Permit:

1. Completed grading permit application signed by the property owner or his legally authorized agent.
2. Grading permit fee. Checks must be made payable to Greene County Treasurer.
3. An approved sediment and erosion control plan (SECP).
4. Performance bond or other required security.
5. For sites where five (5) acres or more of land are disturbed the following additional items are required:
 - a. A copy of the Missouri State Operating Permit.
 - b. An approved Stormwater Pollution Prevention Plan (SWPPP).
6. Other State or Federal permits, if required (see Section 114.4).

The submittal and approval procedure is as follows:

A. Subdivisions

A sediment and erosion control plan (SECP) shall be submitted for review along with the plans for the subdivision improvements.

Grading permits for subdivisions can be issued after approval of the plans for the subdivision improvements by the Highway Administrator and the Stormwater Engineer, and the items listed above are received.

B. Buildings

Two (2) copies of the sediment and erosion control plan (SECP) shall be submitted to the Building Regulations Department along with the building plans.

Grading permits can be issued after approval of the SECP and storm drainage plans by the Stormwater Engineer and the items listed above are received.

For sites served by septic systems or other individual on-site wastewater systems, the wastewater systems plans must also be approved prior to issuance of the grading permit.

C. Other Sites

Other sites include borrow and spoil areas, gravel mining areas, and any other sites where a subdivision plat or a building permit is not required.

Two (2) copies of the sediment and erosion control plan (SECP) shall be submitted to the Stormwater Engineer for review.

A grading permit can be issued after approval of the SECP by the Stormwater Engineer and the items listed above are received.

114.3.3 Sediment & Erosion Control Plan (SECP)

A. Professional Qualifications

Sediment and Erosion Control plans must be prepared by and bear the seal of an engineer, land surveyor, architect, landscape architect, or geologist registered to practice in the State of Missouri or by a Certified Professional in Erosion and Sediment Control (CPESC) who has attained certification by the Soil & Water Conservation Society. When the total area of the site exceeds five (5) acres, or the drainage area of any watershed for which an element of the plan must be designed exceeds five (5) acres, the plan must be prepared under the supervision of an engineer registered in Missouri.

B. Plan Requirements

The sediment & erosion control plan must be drawn to scale and must include the following items:

- 1) Location map at a scale of 1" = 2000'.
- 2) Legal description of property.
- 3) North arrow and scale.
- 4) One-Call utility notification symbol.
- 5) Title block.
- 6) Signature block for Stormwater Engineer.
- 7) Design professional's seal.
- 8) Existing topographic contours at five feet (5') maximum intervals.

NOTE: Contours cannot be interpolated from U.S.G.S. maps. Each fifth (5th) contour (index contour) shall be labeled and shown in heavier line weight. Index contours must be labeled in a sufficient number of locations to allow the plan to be followed. Labels for existing and finish grade contours shall be distinguished by use of different symbols or fonts.

- 9) Proposed grades.
- 10) Existing and proposed utilities.

- 11) Existing ground covering (open areas, tree masses, etc.).
- 12) Existing buildings, drives and pavements.
- 13) Proposed buildings or other structures, drives, and pavements.
- 14) Limits of area to be disturbed (shading preferred).
- 15) Location of erosion and sediment controls.
- 16) Details of non-standard erosion and sediment controls.
- 17) Seeding & mulching requirements.
- 18) Total site area, total disturbed area.
- 19) Location of stockpile areas, staging areas, etc.
- 20) Location of temporary construction entrance.

114.3.4 Bond Requirements

A. Subdivisions

A security agreement or other form of security acceptable to the County in the amount of the value of the required sediment and erosion controls, including the storm drainage system, must be received prior to issuance of the grading permit.

B. Buildings

If the grading permit is issued prior to the building permit, the only type of bond accepted will be a cash bond. After issuance of the building permit, the cash bond can be converted to an escrow, security agreement, or other form of bond allowed in the Zoning Regulations.

C. Other Sites

Only cash bonds will be accepted for sites where a subdivision plat or building permit is not required. A cash bond is obtained by submitting the required bond amount to the Greene County Treasurer's office in the form of cash, cashier's check or money order, and obtaining a receipt. The Treasurer's receipt is then submitted to the Greene County Planning & Zoning Office.

D. Amount of Security

The amount of security will be one thousand dollars (\$1,000.00) per graded acre for seeding and mulching, plus the estimated construction cost for permanent sediment and erosion control measures specified on the SECP. This includes all elements of the storm drainage system.

E. Release of Bond

Bond will be released one (1) year after seeding and mulching is complete, provided vegetation is firmly established. If vegetation is not firmly established at this time, the bond will be forfeited and the work will be completed under the direction of the County.

Bonds may be released sooner if vegetation is firmly established. Vegetation will be considered firmly established when it has survived from the permanent seeding season in which it is placed to the next permanent seeding season and growth has been established on all eroded areas which have been noted for repair.

114.4 OTHER PERMITS

114.4.1 NPDES Stormwater Permit

When the area of land disturbance is five (5) acres or more, an application for a stormwater discharge permit must be submitted to the Missouri Department of Natural Resources. Permit requirements are set forth in 10 CSR 20-6.200 of the Missouri Clean Water Laws.

General permit MO-R100A applies to "construction or land disturbance activity that are performed in a city, county, or other governmental jurisdiction that has a stormwater control program for land disturbance activities that has been approved by the Missouri Department of Natural Resources" (MDNR). Greene County's stormwater control program is approved by MDNR.

For sites requiring a State permit, the following procedure applies:

1. The sediment and erosion control plan is submitted to the Stormwater Engineer.
2. If the plan is in substantial compliance with Greene County requirements, the Stormwater Engineer will issue a letter of "Conditional Approval of Stormwater Management Plan". The conditions of approval are the items noted by the Stormwater Engineer in the letter as being deficient on the first submittal.
3. The applicant submits MDNR forms E and G, the MDNR fee (with check made payable to "Director of Revenue"), and the Greene County Stormwater Engineer's letter of conditional approval to MDNR.
4. MDNR reviews the application.
5. A County permit can be issued upon receipt of a copy of the State permit. Construction can commence only after issuance of the County grading permit.

County Projects

County-funded projects are covered under general permit MO-R1000. Separate applications are not required for each project.

114.4.2 "404" Permit

Grading activities in streams or wetlands may require a Department of the Army Permit under Section 404 of the Clean Water Act. It is the obligation of the property owner or operator to contact the Corps of Engineers to determine whether a permit is required whenever working in these areas. A copy of the Corps of Engineers written determination, where applicable, shall be provided prior to issuance of the grading permit.

114.4.3 Floodplain Development Permit

A Floodplain Development Permit must be obtained for development within Special Flood Hazard Areas designated on the Flood Insurance Rate Maps for unincorporated Greene County. Floodplain Development Permit procedures are set forth in Section 101 and in Article XIX of the Zoning Regulations.

114.4.4 Industrial Mineral Mines Permit

Sand and gravel excavation, quarries, and gravel mines must obtain a permit from the Missouri Department of Natural Resources, Land Reclamation Division. Contact the Division of Land Reclamation at P.O. Box 176, Jefferson City, MO 65102 for information concerning these permits.

114.5 DESIGN STANDARDS & CRITERIA

114.5.1 Grading

A. Maximum grades

Cut or fill slopes shall not exceed three (3) horizontal to one (1) vertical (3:1).
4:1 slopes are preferred where possible.

B. Maximum height

Cut or fill slopes shall not exceed fifteen feet (15') feet in vertical height unless a horizontal bench area at least five feet (5') in width is provided for each fifteen feet (15') in vertical height.

C. Minimum slope

Slope in grassed areas shall not be less than one percent (1%).

D. Construction Specifications

Construction of private and public streets must comply with specifications set forth by the Greene County Highway Department.

For all other areas, construction specifications stating requirements for stripping, materials, subgrade compaction, placement of fills, moisture and density control, preparation, and maintenance of subgrade must be included or referenced on the plans or accompanying specifications.

E. Spoil Areas

Broken concrete, asphalt, and other spoil materials may not be buried in fills within proposed building or pavement areas.

Outside of proposed building and pavement areas, broken concrete, asphalt or stone may be buried in fills, provided it is covered by a minimum of two feet (2') of earth.

Burying of other materials in fills is prohibited.

F. Stockpile Areas

Location of proposed stockpile areas shall be outlined on the plans and specifications for proper drainage included.

G. Borrow Areas

The proposed limits of temporary borrow areas shall be outlined in the plans and a proposed operating plan described on the SECP.

At the time borrow operations are completed, the area shall be graded in accordance with the criteria set forth above and vegetation re-established.

114.5.2 Sediment Control

A. Existing Vegetative Filter Area

Existing vegetative filter areas may be used where:

- 1) unconcentrated sheet flow occurs,
- 2) an area of existing vegetation a minimum of twenty-five feet (25') in width can be maintained between the area to be graded and a property line, watercourse, sinkhole, spring, wetland, or waterbody,
- 3) existing ground slope is no greater than five to one (5:1) or twenty percent (20%),
- 4) the existing vegetative growth is of sufficient density and in sufficiently good condition to provide for filtration of sediment.

The minimum width of the vegetative filter area shall be twenty percent (20%) of the width of the tributary area. Vegetative filter areas can be used as both a temporary and permanent practice.

B. Straw bale dike or silt fence

Containment areas constructed of hay or straw bales or silt fence may be provided in areas where:

- 1) unconcentrated sheet flow occurs.
- 2) an area of existing vegetation a minimum of twenty-five feet (25') in width cannot be maintained between the area to be graded and a property line, watercourse, sinkhole, spring, wetland, or classified lake.
- 3) the maximum width of cleared area upslope of the bale dike or silt fence is as set forth below:

Slope of cleared area (%)	Maximum width upslope of dike/silt fence (feet)
2 to 5	100
5 to 20	50
> 20	25

Either cereal grain straw or hay may be used for bale dikes. Straw bale dikes shall be constructed as shown in Figure 114.1.

Silt fence may be used in lieu of hay or straw bales. Silt fence shall be constructed as shown in Figure 114.2.

Straw bale dikes must be installed level, that is, "along the contour", in order to avoid creating points of concentrated overflow. Straw/hay bale dikes and silt fences must be periodically inspected and replaced as necessary if deteriorated.

Hay bale dikes and silt fences are temporary practices.

C. Temporary Containment Berm

Temporary containment berms may be used in lieu of straw bale dikes or silt fence, under the same conditions set forth above. An overflow area six inches (6") below the top of the berm and five feet (5') in length or an approved alternative must be provided for each two hundred feet (200') of berm length. The overflow area shall be lined with six (6) mil or thicker polyethylene plastic, six (6) ounces or heavier non-woven filter fabric, or other approved lining. Plastic and fabric liners shall be held in place by covering the perimeter with earth or weighting down with

large rock or sandbags.

Containment berms and swales must be installed level, "along the contour".

Accumulated sediment must be removed when it reaches one-third (1/3) of the berm height.

Temporary containment berms and accumulated sediment must be completely removed after the tributary area is stabilized.

Temporary containment berms shall be constructed as shown in Figure 114.3.

D. Inlet Protection

This practice consists of protecting the inlet perimeter or opening with straw bales, silt fence or sandbags. The purpose of this practice is to keep sediment from collecting in storm drains. This practice is also useful when site conditions prevent locating a sediment basin downstream of the storm sewer outfall.

NOTE: Inlet protection described in this paragraph cannot be used where blockage of the inlet opening would result in flooding of residential dwellings, buildings, streets or roads, or off-site property.

1. Curb Inlets

Curb inlets can be protected from sediment entry by placing sand bags over the inlet opening. Sand bags must be replaced when deteriorated and removed when the area has been stabilized. Curb inlet protection is shown in Figure 114.4.

Accumulated sediment must be removed from the street after each rainfall.

2. Area Inlets

In paved areas, area inlets can be protected by placing gravel filled sandbags up to two (2) courses high around the perimeter of the inlet.

Outside of paved areas or before pavement is placed, area inlets can be protected by installing a silt fence of straw bale dike around the inlet perimeter.

Type DI-1 inlets can be protected by placing sandbags over the openings.

Accumulated sediment must be removed prior to final approval.

Area inlet protection is shown in Figure 114.4.

E. Diversion

Where flow must be diverted into sediment basins or other sediment retaining facilities, diversion berms or swales or other approved means of diverting runoff may be specified.

Where sediment enters a street which is up-grade from an existing street, means must be provided to divert runoff to a sediment basin before discharge from the site. The method of diversion will vary depending upon the phase of construction. After initial grading, an earth berm can be used. This is no longer possible after the street subgrade is completed and curbs are installed. After the street pavement is completed, sand bags can be used to divert the runoff into inlets for discharge into the sediment basin. Diversion of street runoff is shown in Figures 114.5 and 114.6.

F. Gravel Filter Dam

Where concentrated flow occurs and less than two (2) acres of tributary drainage area are graded (i.e. a sediment basin is not required) or where construction of a sediment basin is not feasible, a gravel filter dam shall be provided prior to discharge of runoff from the property.

Gravel filter dams consist of a layer of filter fabric and crushed rock covering the upstream side of a riprap dike. Riprap shall be six and twelve inches (6"and12") in size. Filter fabric may be woven or non-woven, Mirafi 500X, Mirafi 150NL, or equal. The purpose of the filter fabric is to remove sediment particles as water flows through it. The layer of crushed rock provides additional filtration protects the filter fabric, and holds it in place.

Where gravel filter dams are used as sediment basin outlets, one (1) square foot of filter fabric area shall be provided for each one thousand (1,000) cubic feet of storage. The minimum area provided shall be four (4) square feet.

Where gravel filter dams are used as ditch checks in channels, the gravel filter area shall extend throughout the width of the dam.

Riprap stilling basins shall be provided downstream of the filter dam where discharge is to a grass channel.

Gravel filter dam details are shown in Figures 114.7A and 114.7B.

G. Sediment Basin

Sediment basins shall be provided for all areas where concentrated flow occurs from an area of five (5) or more acres and vegetative cover has been stripped from more than two (2) acres. Sediment basins shall be designed to detain the first one-half inch (1/2") of runoff from the graded area for a period of at least twenty-four (24) hours (approximately two thousand (2,000) cubic feet per acre graded).

Sediment basins shall have an outflow control structure capable of providing the required detention time. Outflow control structures shall consist of a gravel filter dam meeting the requirements of Section 114.5.2.F, or a perforated riser pipe.

Sediment basins shall also be provided with an overflow structure capable of passing the peak flow rate for storms up to and including the 10% AEP (10-year) storm. The required sediment control volume shall be provided below the elevation of the overflow structure. One foot (1') of freeboard shall be maintained over the 10-year high water elevation.

Perforated riser pipes shall have a minimum diameter of eight inches (8") and shall be constructed of schedule SDR35 or stronger PVC pipe, galvanized corrugated metal pipe, or other approved pipe material. Riser pipes must be provided with a cap. Plans shall specify the height of the riser pipe above the basin floor, the number and spacing of rows of perforations, and the number and diameter of perforations per row. One and one-half inch (1 ½ ") crushed rock shall be placed around the riser pipes to act as a filter. A typical riser pipe detail is shown in Figure 114.10.

Outlet pipes shall have a minimum diameter of eight inches (8") and may be constructed of corrugated polyethylene pipe, corrugated metal pipe, SDR 35 or stronger PVC or reinforced concrete pipe.

Overflow spillways must be constructed of riprap, concrete or other approved, non-erodible material.

Typical sediment basin details are shown in Figures 114.08, 114.09 and 114.10.

Sedimentation basins can be provided as temporary or permanent practices and can also serve as a permanent water quality BMP with appropriate design modifications to meet the criteria set forth in Section 115.

Detention ponds can be used for temporary sediment basins, provided it can be demonstrated that flood control requirements can be met as well as sediment control requirements.

Accumulated sediment must be removed and vegetation established prior to final release of security.

114.5.3 Erosion Protection

A. Seeding and mulching

All disturbed areas must be re-vegetated before temporary sediment controls can be removed. Requirements for re-vegetated areas are as follows:

- 1) Topsoil

Spreading of topsoil is required for permanent seeding areas only. Topsoil stripped from the site shall be stockpiled for reuse. A minimum of four inches (4") loose depth (before rolling or compacting) of topsoil must be spread on the area to be seeded.

2) Lime

After topsoil is spread, lime shall be spread at the rate of eight hundred to nine hundred (800 to 900) pounds effective neutralizing material (ENM) per acre.

3) Fertilizer

Fertilizer shall be 13-13-13, (thirteen (13) pounds each of nitrogen, phosphorus, and potassium per one hundred (100) pounds) and shall be applied at a rate of four hundred to five hundred (400 to 500) pounds per acre.

4) Seed

Seed mix shall consist of sixty percent to eighty percent (60% to 80%) Kentucky 31 tall fescue and twenty percent to forty percent (20% to 40%) annual ryegrass. Purity shall be at least ninety-seven percent (97%), germination shall be at least eighty-five percent (85%). Seed mixture shall be applied at a rate of four hundred to five hundred (400 to 500) pounds per acre.

5) Mulch

Type 1 Mulch

Where slopes are less than 4:1, cereal grain mulch is required at the rate of one hundred (100) pounds per one thousand (1,000) square feet (forty-five hundred (4,500) pounds per acre). Cereal grain mulch shall meet the requirements of Section 802 of the Missouri State Specifications for Highway Construction (State specifications) for Type 1 mulch. Mulch may be applied by hand, however it must be evenly spread. It is preferred that mulch be applied with a mechanical blower.

Type 1 mulch must be thoroughly wetted after application.

Type 3 Mulch

Where slopes are 4:1 or greater Type 3 mulch ("hydromulch") meeting the requirements of Section 802 of the State specifications. Type 3 mulch shall be applied at a minimum rate of two thousand (2,000) pounds per acre.

6) Permanent seeding season

Permanent seeding seasons run from March 1 to June 1 and from August 15 to November 1.

Where possible, operations shall be scheduled to allow final seeding during these periods. When seeding cannot be completed during these times, areas shall be seeded and mulched upon completion of grading with the amounts of lime, fertilizer, seed, and mulch specified above, regardless of the season. Any areas where growth has not been established shall be re-seeded during the next seeding season.

7) Temporary seeding

Temporary seeding shall be applied to lot areas, building areas and other areas planned to receive other permanent coverings. Spreading of topsoil is not required in temporary seeding areas. Lime, fertilizer, seed, and mulch shall be applied at the rates specified above.

8) Maintenance

Areas seeded between March 1 - June 1 or between August 15 - November 1 must be maintained until growth is firmly established as set forth in Section 114.3.4.E.

9) Other specifications

Other seeding and mulching specifications may be used with the written approval of the Stormwater Engineer.

B. Cut and Fill Slopes

Cut and fill slopes shall be protected from erosion by construction of straw bale dikes, silt fences, diversion berms, or swales along the top of the slope.

Where drainage must be carried down the slopes, pipe drains, concrete flumes, riprap chutes, or other impervious areas must be provided. Suitable erosion control measures such as riprap stilling basins, must be provided at the bottom of the slope.

Diversions shall be maintained until permanent growth is firmly established on the slopes.

Typical diversion details are shown in Figure 114.11. Riprap chute details are shown in Figure 114.12.

C. Channels and Swales.

Permanent channels and swales shall be provided with a stabilized invert, as provided in Section 111.

D. Storm Sewer and Culvert Outlets

Erosion protection shall be provided at storm sewer and culvert outlets as provided in Sections 109.4 and 110.1.8.

E. Ditch Checks

Straw bale ditch checks have proven to be generally ineffective due to improper installation and inability of bales to withstand the force of concentrated flow of water. Ditches, channels, and swales should be stabilized as soon as possible after grading by lining with erosion control blanket, sod, or installing permanent linings as described in Section 111.

Where ditches, channels, or swales cannot be stabilized within thirty (30) days after grading, rock check dams or sand bag check dams must be provided. Rock check dams may be used in ditches with a design water depth of up to two feet (2') for the 2-year storm. Sand bag check dams may be used in ditches with a design water depth of up to one foot (1') for the 2-year storm.

Rock check dams are shown in Figure 114.13. Sand bag check dams are shown in Figure 114.14.

114.5.4 Temporary Construction Entrance

A minimum of one (1) temporary construction entrance is required at each site. Additional temporary entrances may be provided if approved. The location of each construction entrance shall be shown on the SECP.

Only construction entrances designated on the sediment and erosion control plan may be used. Barricades shall be maintained if necessary to prevent access at other points until construction is complete.

Construction entrances shall be constructed of one and one-half inches (1 ½") clean crushed limestone and shall be a minimum of twenty-five feet (25') wide and fifty (50') feet long. Minimum thickness of crushed limestone surface shall be six inches (6"). Additional two inch (2") lifts of crushed limestone shall be added at the discretion of the County if the surface of the initial drive deteriorates or becomes too muddy to be effective.

In locations where an existing drive or street extends at least fifty feet (50') into the site, the existing drive may be designated as the construction entrance, and construction of a new gravel entrance is not required, unless job conditions warrant.

A permit must be obtained from the Greene County Highway Department for temporary construction entrances on County roads. A permit must be obtained from the Missouri Department of Transportation (MODOT) whenever the entrance is located on State right-of-way.

114.5.5 Cleaning Streets

Streets, both interior and adjacent to the site, shall be cleaned of sediment after each rainfall of one-half inch (½") or more and at the end of construction and prior to release of escrow.

114.5.6 Dust Control

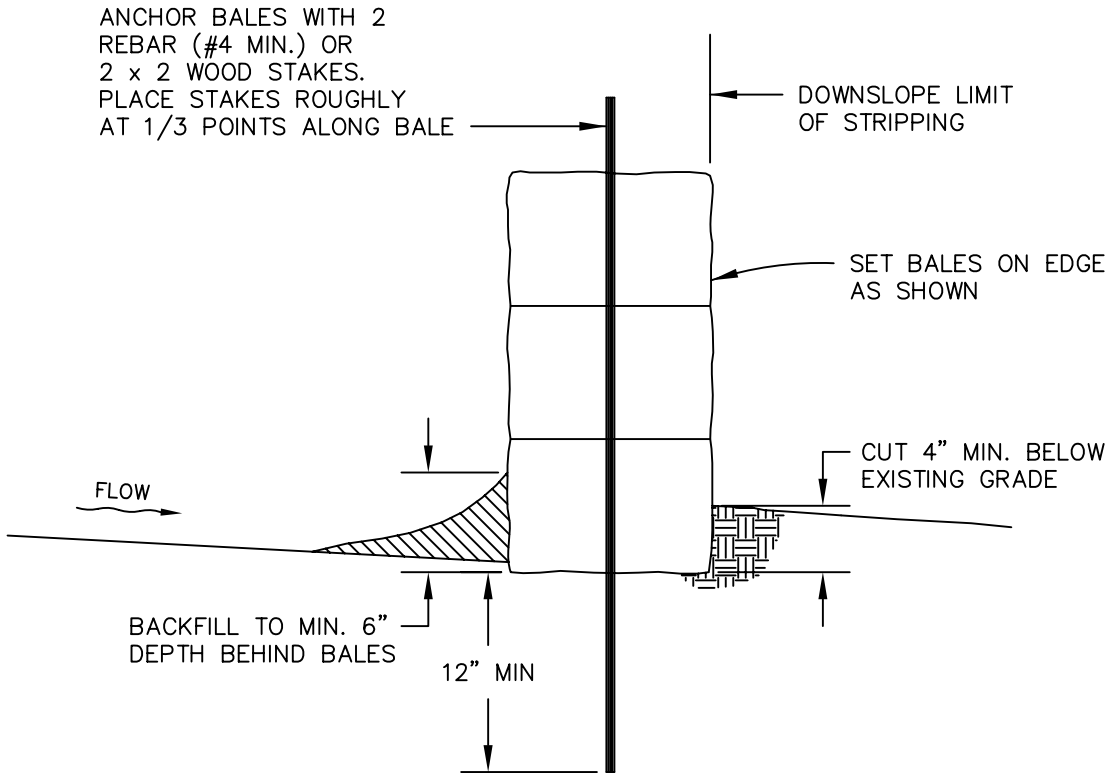
The contractor will be required to use water trucks to wet haul roads and construction areas to minimize dust leaving the site when conditions warrant.

114.5.7 Sequencing and Scheduling

Costs of sediment and erosion control can be minimized if proper consideration is given to sequencing and scheduling construction.

Any special sequencing and scheduling considerations must be noted on the SECP. The contractor must provide a sequence of construction activities as a part of the SWPPP.

m:\data\wp51\storm2\swregs\section 114.wpd



NOTES:

1. PLACE HAY BALE DIKE AT DOWNSLOPE LIMIT OF AREA TO BE GRADED.
2. BALES SHALL BE PLACED IN A ROW WITH ENDS TIGHTLY ABUTTING THE ADJACENT BALES.
3. BALES SHALL BE PLACED ALONG A LEVEL CONTOUR WITH AN ALLOWANCE OF ± 4 INCHES.
4. SEDIMENT TRAPPED SHALL BE DISPOSED IN AN APPROVED LOCATION IN A MANNER WHICH WILL NOT CONTRIBUTE ADDITIONAL SILTATION.
5. EACH BALE SHALL BE EMBEDDED IN THE SOIL A MINIMUM OF FOUR INCHES.
6. BALES SHALL BE SECURELY ANCHORED IN PLACE BY STAKES OR RE-BARS DRIVEN THROUGH THE BALES. THE FIRST STAKE IN EACH BALE SHALL BE ANGLED TOWARD PREVIOUSLY LAID BALE TO FORCE BALES TOGETHER.
7. INSPECTION SHALL BE FREQUENT AND REPAIR OR REPLACEMENT SHALL BE MADE PROMPTLY AS NEEDED BY CONTRACTOR.
8. BALES SHALL BE REMOVED WHEN THEY HAVE SERVED THEIR USEFULNESS SO AS NOT TO BLOCK OR IMPEDE STORM FLOW OR DRAINAGE.
9. ACCUMULATED SILT SHALL BE REMOVED WHEN IT REACHES A DEPTH OF 6 INCHES.
10. AT EACH END OF DIKE, TURN DIKE UPSLOPE AND EXTEND UNTIL GROUND SURFACE RISES 18 INCHES.

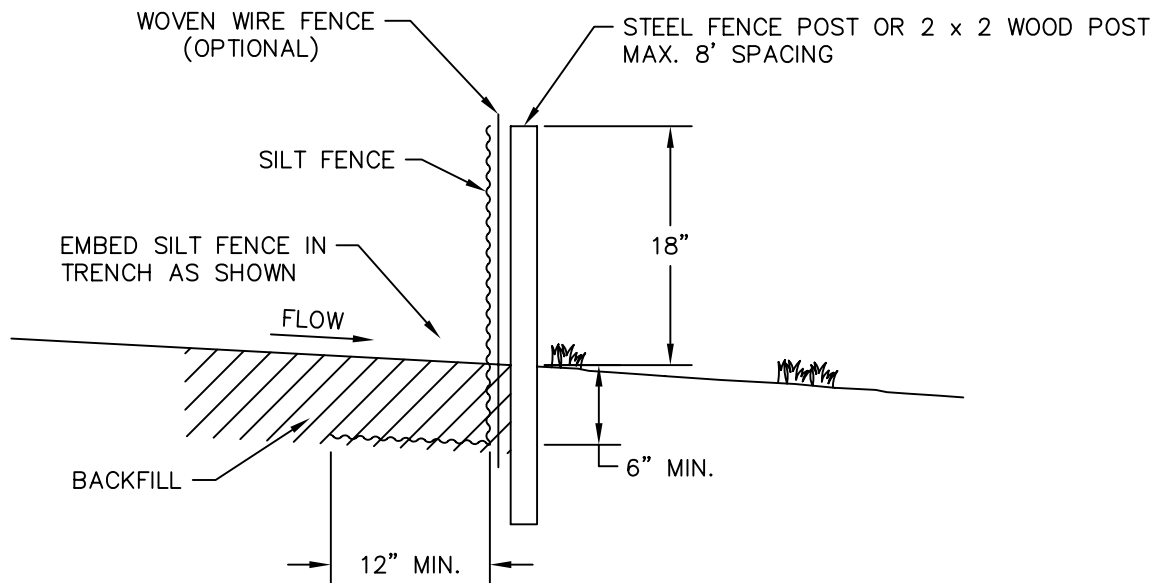
REFERENCE: Adapted from City of Austin & City of Tulsa Erosion and Sedimentation Control Manuals

GREENE COUNTY MISSOURI – STORM WATER DESIGN STANDARDS

HAY BALE DIKE

FIGURE 114.1

FILE: f11401.dwg
DATE: 04/05/99



NOTES:

1. PLACE SILT FENCE AT DOWNSLOPE LIMIT OF AREA TO BE GRADED.
2. SILT FENCE SHALL BE PLACED ALONG A LEVEL CONTOUR WITH AN ALLOWANCE OF ± 4 INCHES.
3. SEDIMENT TRAPPED BY THIS PRACTICE SHALL BE DISPOSED OF IN AN APPROVED SITE IN A MANNER THAT WILL NOT CONTRIBUTE TO ADDITIONAL SILTATION.
4. SILT FENCE SHOULD BE SECURELY FASTENED TO EACH SUPPORT POST OR TO WOVEN WIRE, WHICH IS IN TURN ATTACHED TO THE STEEL FENCE POSTS.
5. INSPECTION SHALL BE FREQUENT AND REPAIR OR REPLACEMENT SHALL BE MADE PROMPTLY AS NEEDED.
6. SILT FENCE SHALL BE REMOVED WHEN IT HAS SERVED ITS USEFULNESS SO AS NOT TO BLOCK OR IMPEDE STORM FLOW OR DRAINAGE.
7. ACCUMULATED SILT SHALL BE REMOVED WHEN IT REACHES A DEPTH OF 6 INCHES.
8. AT EACH END OF SILT FENCE, TURN FENCE UPSLOPE AND EXTEND UNTIL GROUND SURFACE RISES 18 INCHES.

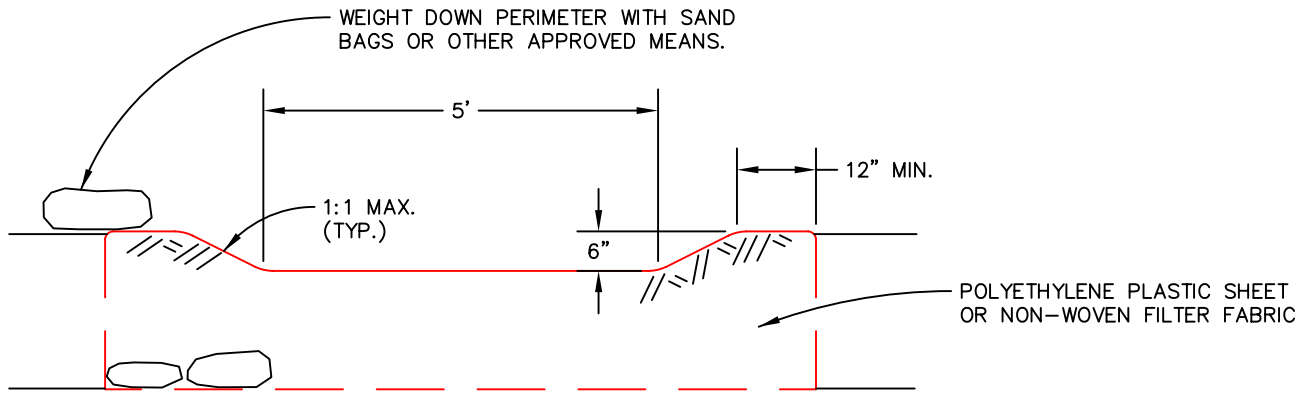
REFERENCE: Adapted from City of Austin & City of Tulsa Erosion and Sedimentation Control Manuals

GREENE COUNTY MISSOURI – STORM WATER DESIGN STANDARDS

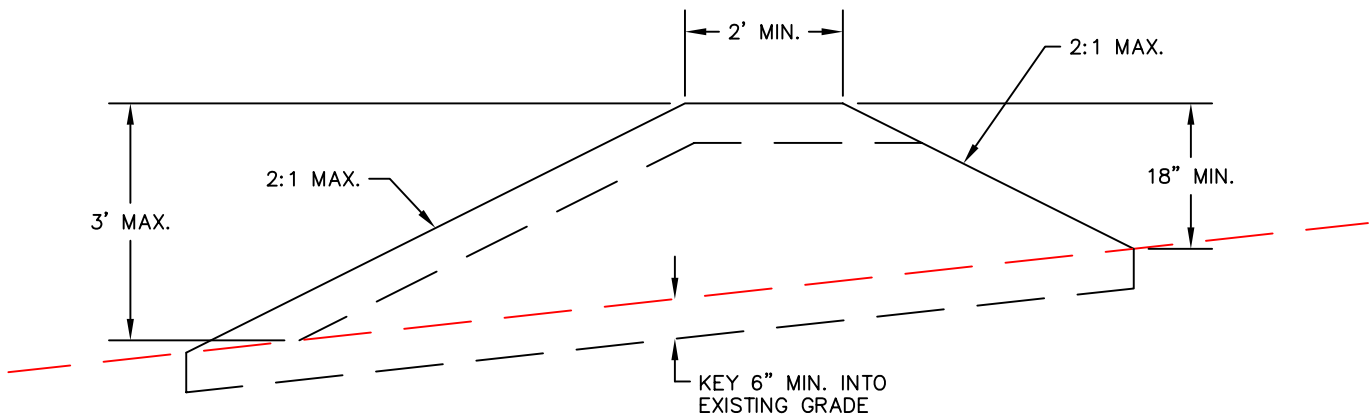
SILT FENCE

FIGURE 114.2

FILE: f11402.dwg
DATE: 04/05/99



OVERFLOW AREA



NOTES:

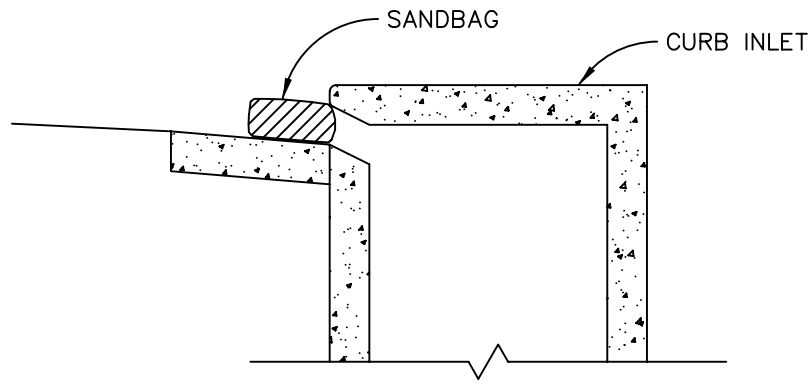
1. SOIL IN BERM SHALL BE FIRMLY COMPACTED.
2. AT EACH END OF BERM, TURN BERM UPSLOPE AND EXTEND UNTIL GROUND SURFACE RISES TO TOP OF BERM ELEVATION.
3. PROVIDE OVERFLOW AREAS AT 200 FT. MAX. INTERVALS.

GREENE COUNTY MISSOURI - STORM WATER DESIGN STANDARDS

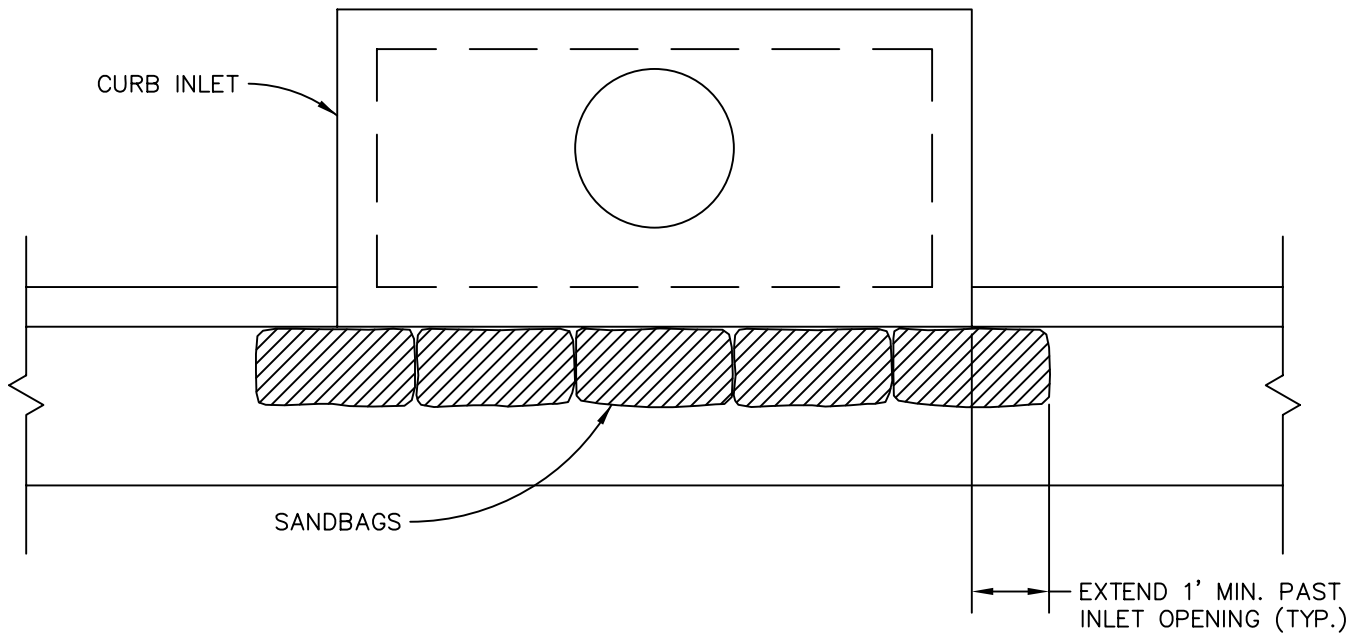
TEMPORARY SILT CONTAINMENT BERM

FIGURE 114.3

FILE: f11403.dwg
DATE: 04/05/99



CROSS-SECTION



PLAN

NOTES:

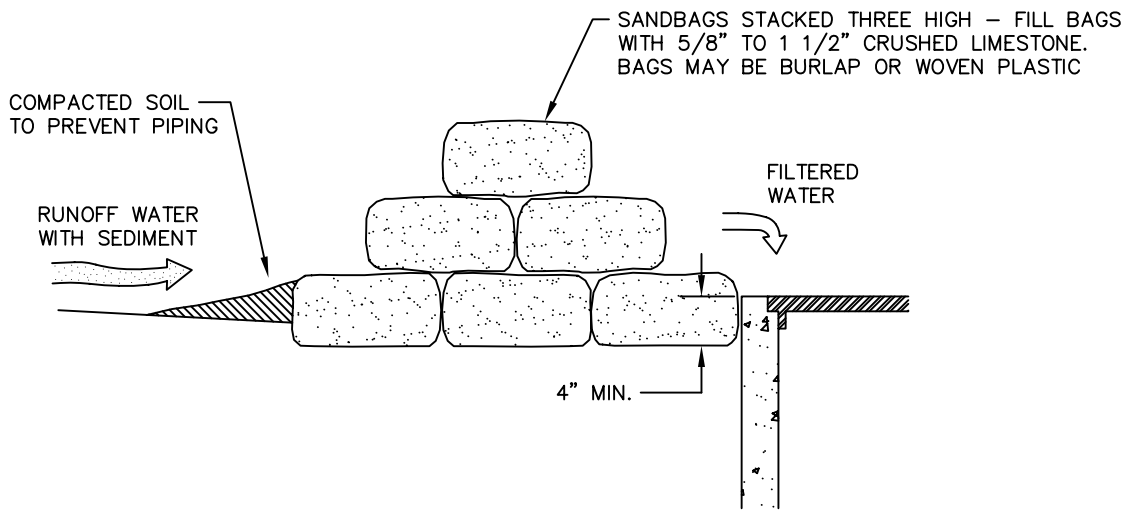
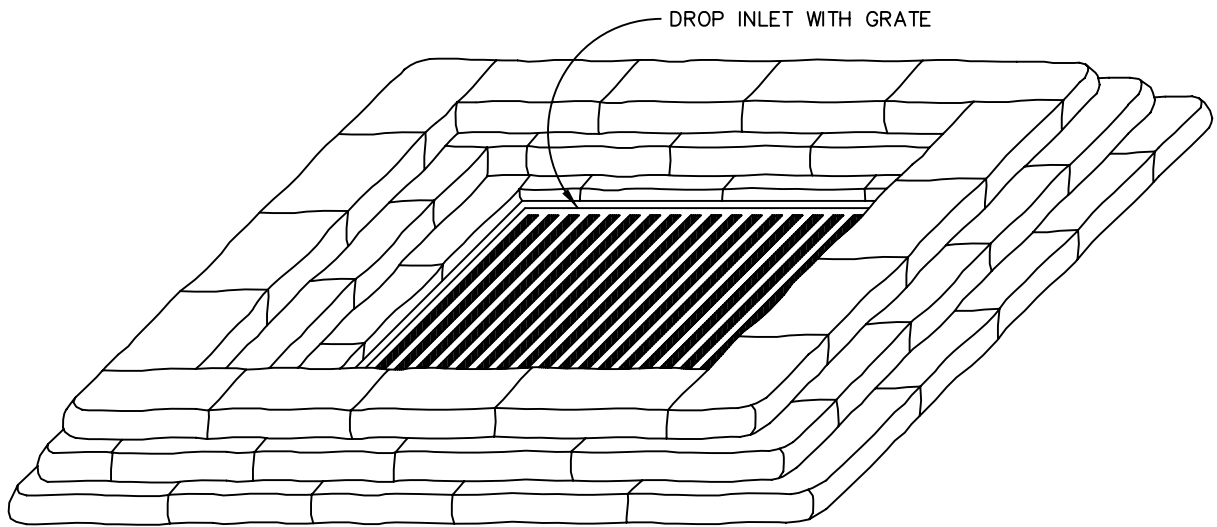
1. FILL BAGS WITH 5/8" CRUSHED LIMESTONE.
2. BAGS SHALL BE BURLAP OR BIODEGRADABLE PLASTIC.
3. BAGS SHALL BE INSPECTED AND REPLACED AS NEEDED.

GREENE COUNTY MISSOURI – STORM WATER DESIGN STANDARDS

SAND BAG SEDIMENT TRAP
FOR CURB INLETS

FIGURE 114.4A

FILE: f11404a.dwg
DATE: 04/05/99



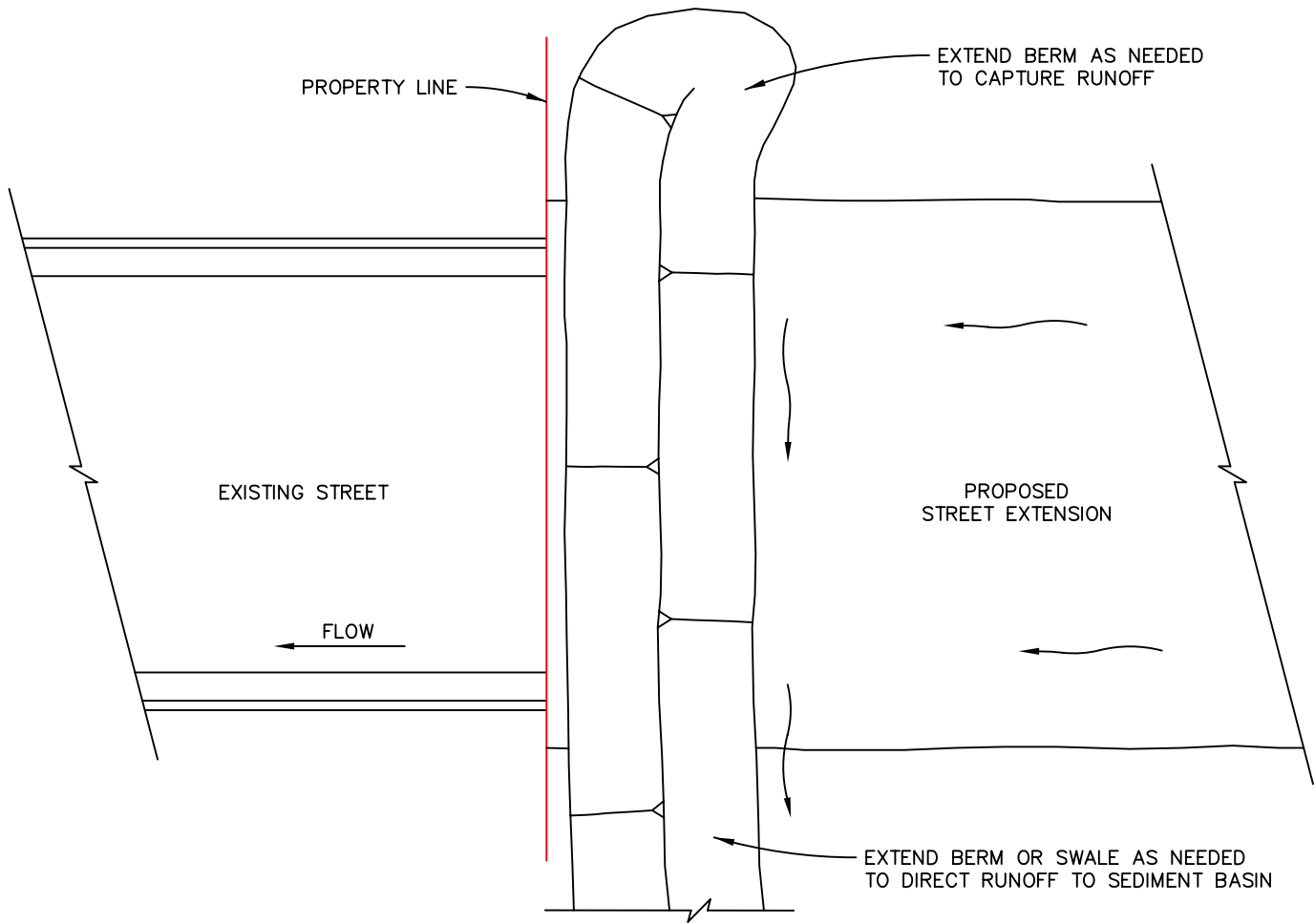
DROP INLET SEDIMENT FILTER

GREENE COUNTY MISSOURI - STORM WATER DESIGN STANDARDS

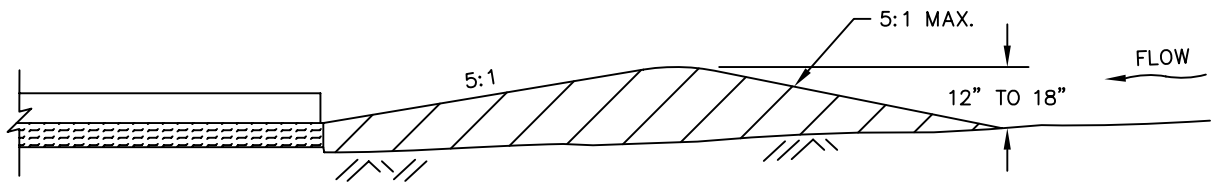
AREA INLET PROTECTION

FIGURE 114.4B

FILE: f11404b.dwg
DATE: 04/05/99



PLAN



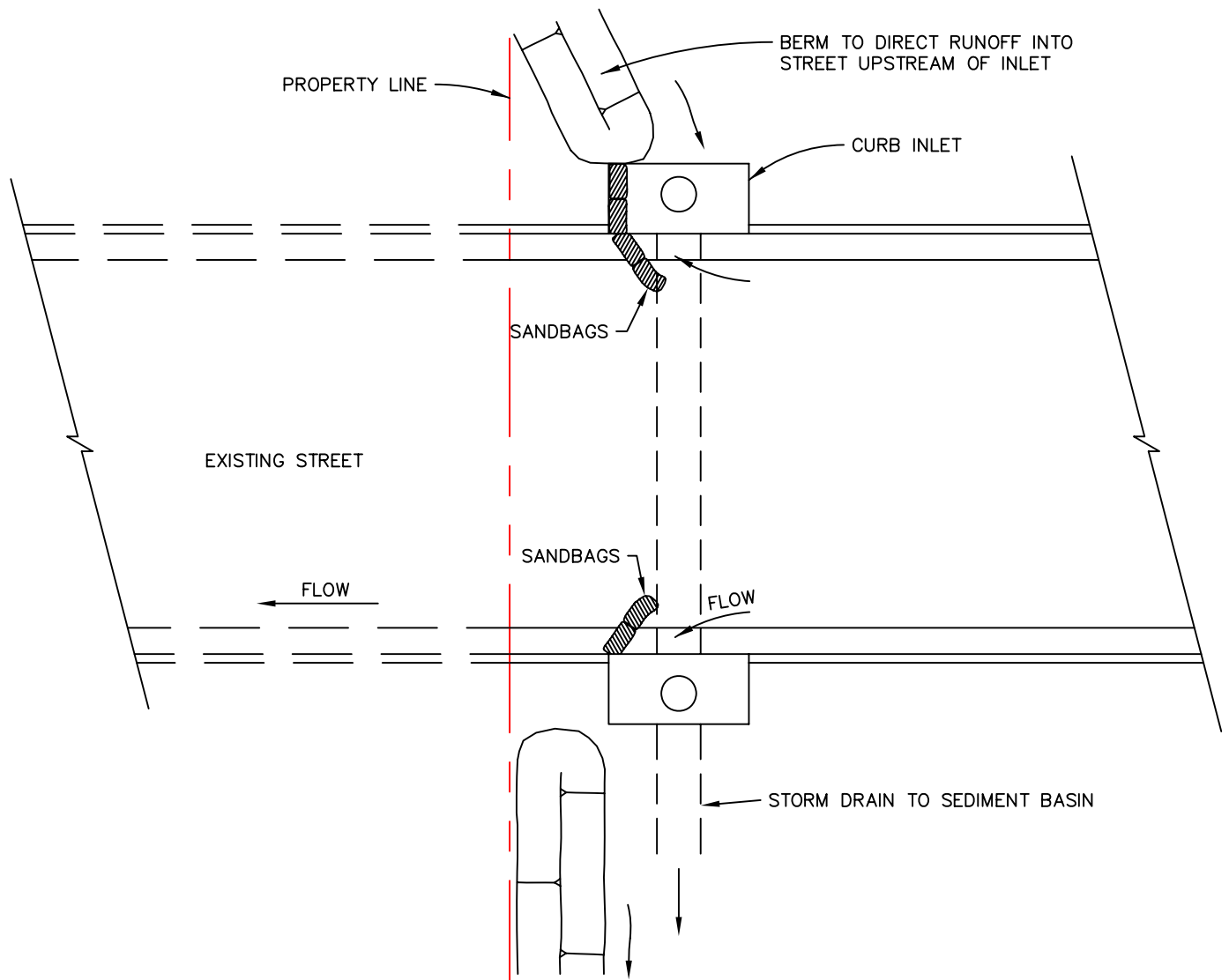
CROSS-SECTION

GREENE COUNTY MISSOURI – STORM WATER DESIGN STANDARDS

DIVERSION OF RUNOFF
 FOR CURBED STREET
 CASE 1 – AFTER INITIAL EXCAVATION OF SUBGRADE

FIGURE 114.5

FILE: f11405.dwg
 DATE: 04/05/99



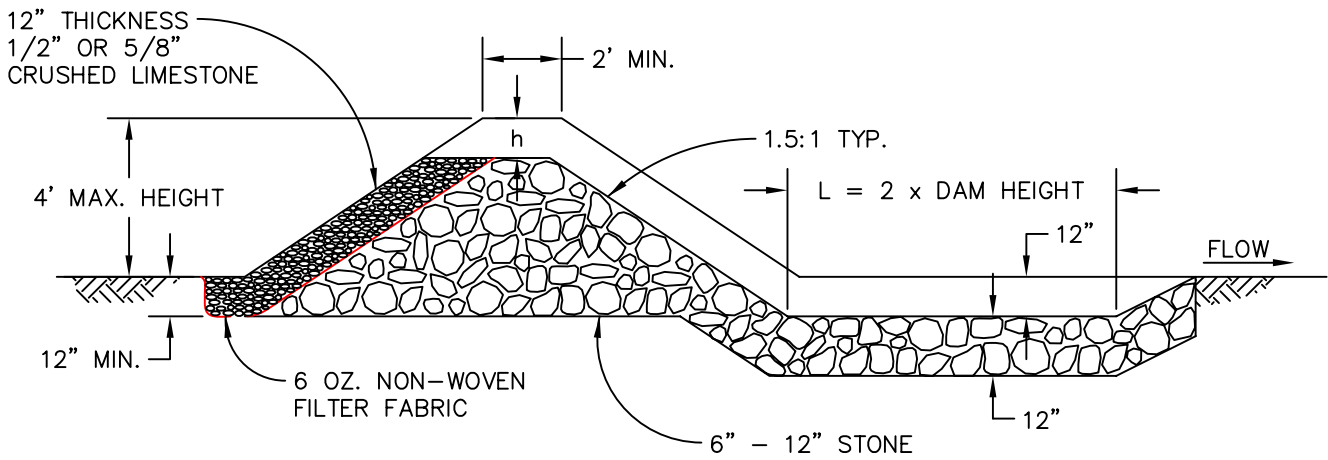
NOTE: FILL SANDBAGS WITH CHAT OR LIMESTONE SAND

GREENE COUNTY MISSOURI – STORM WATER DESIGN STANDARDS

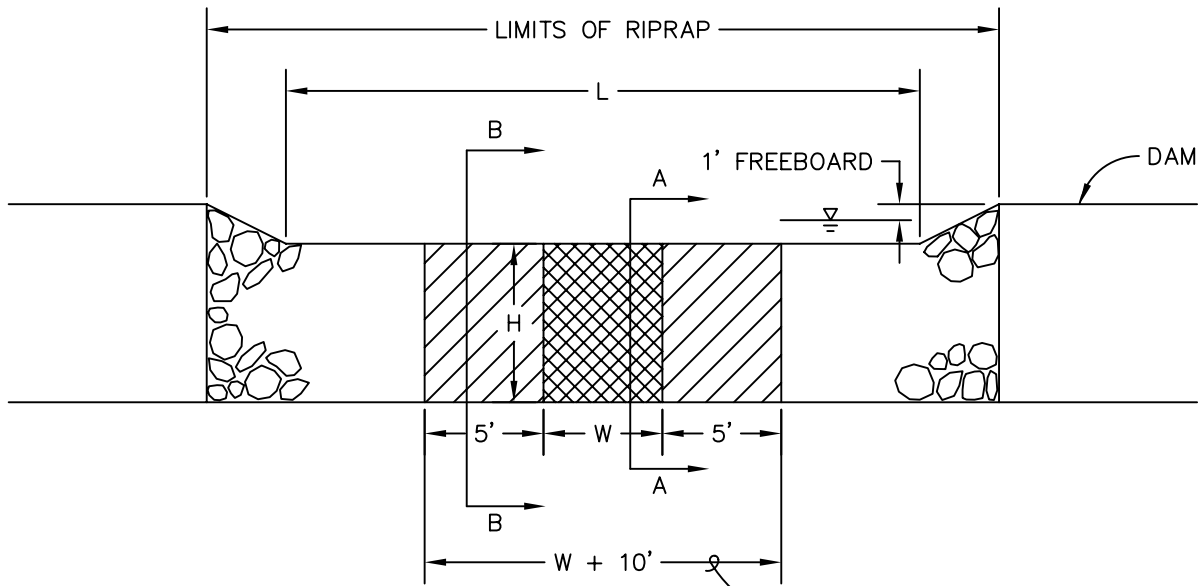
DIVERSION OF RUNOFF
FOR CURBED STREET
CASE 2 – AFTER PAVEMENT AND INLETS COMPLETED

FIGURE 114.6

FILE: f11406.dwg
DATE: 04/05/99



SECTION A - A (THRU GRAVEL FILTER)



L = LENGTH REQUIRED TO PASS Q_{10} WHILE MAINTAINING 1 FT. OF FREEBOARD

W = WIDTH OF ROCK FILTER AREA

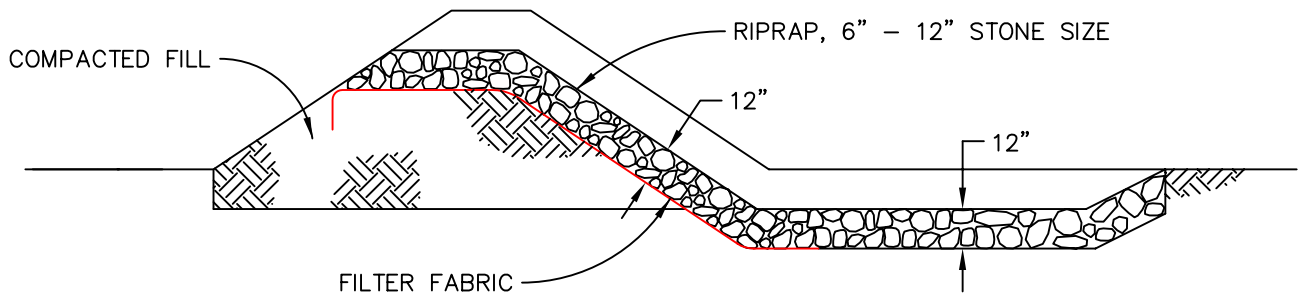
MIN. WIDTH OF FILTER FABRIC

GREENE COUNTY MISSOURI - STORM WATER DESIGN STANDARDS

GRAVEL FILTER DAM

FIGURE 114.7A

FILE: f11407a.dwg
DATE: 04/05/99



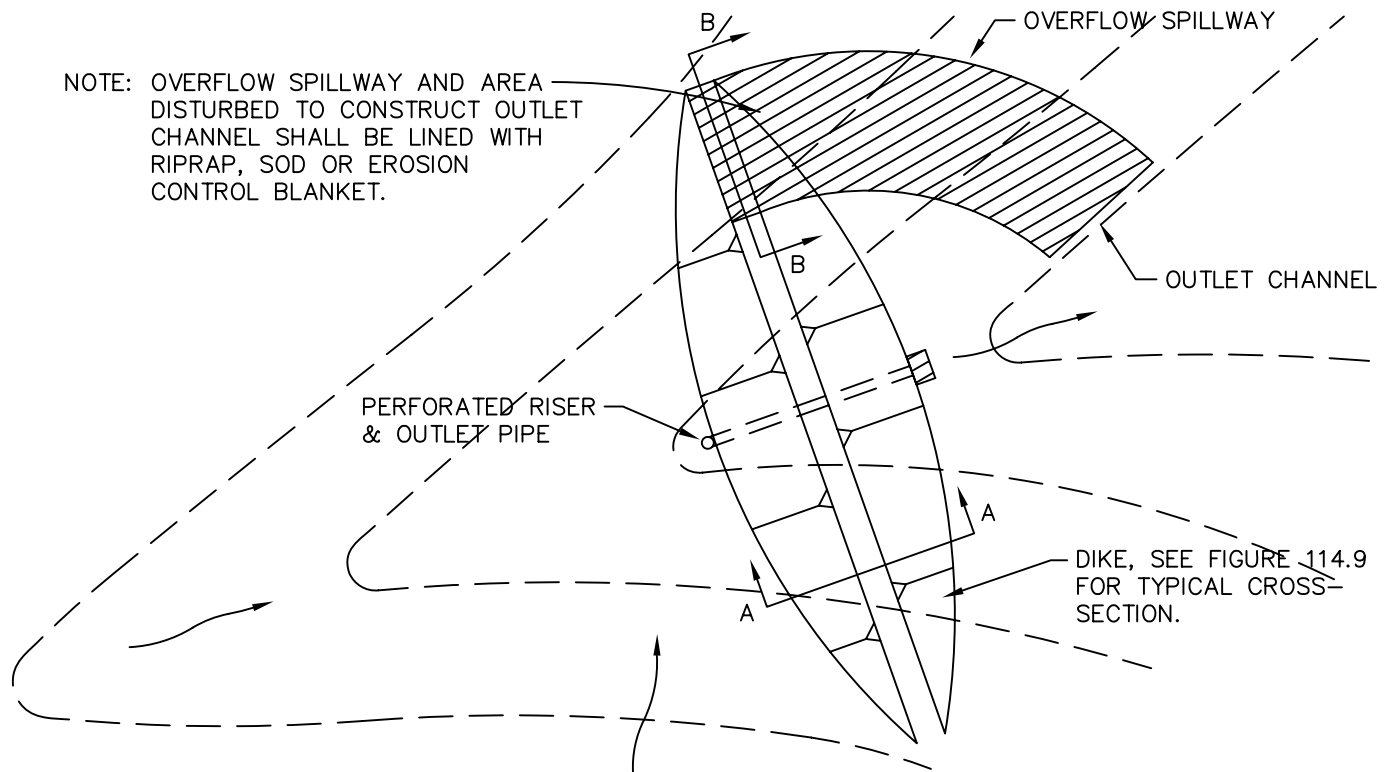
SECTION B - B
 (FIGURE 114.7A)

GREENE COUNTY MISSOURI - STORM WATER DESIGN STANDARDS

RIPRAP OVERFLOW SPILLWAY
 FOR GRAVEL FILTER DAM

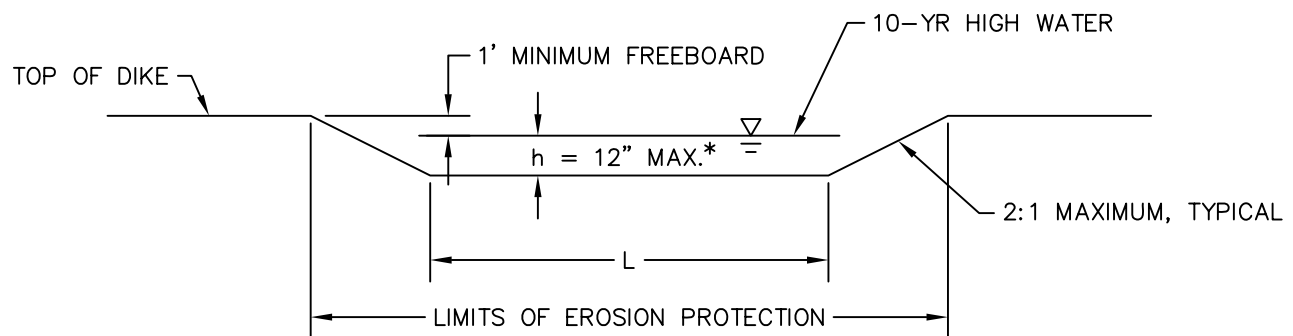
FIGURE 114.7B

FILE: f11407b.dwg
 DATE: 04/05/99



TYPICAL COMPONENTS OF TEMPORARY SEDIMENT BASIN PLAN

(PERFORATED RISER PIPE AND OVERFLOW SPILLWAY SHOWN. GRAVEL FILTER DAM AND RIPRAP OVERFLOW SPILLWAY AS SHOWN IN FIGURES 114.7A AND 114.7B MAY ALSO BE USED.)



* $h = 6'' \text{ MAX.}$ IF SOD LINING USED

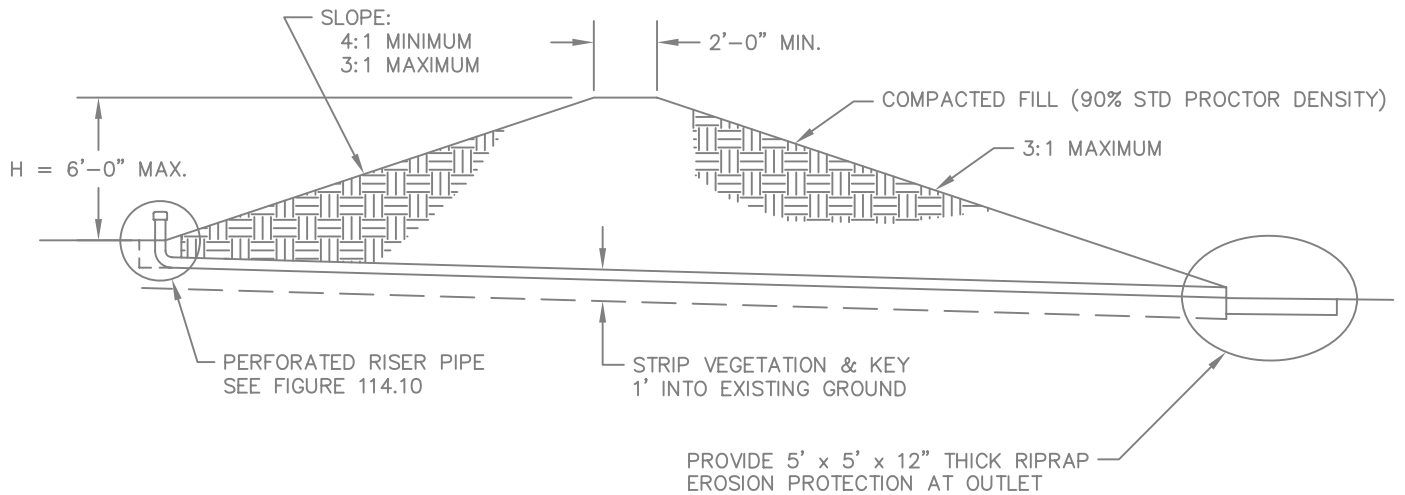
SECTION B - B TYPICAL OVERFLOW SPILLWAY CROSS-SECTION

GREENE COUNTY MISSOURI - STORM WATER DESIGN STANDARDS

TEMPORARY SEDIMENT BASIN

FIGURE 114.8

FILE: f11408.dwg
DATE: 04/05/99



SECTION A - A

(FIGURE 114.8)

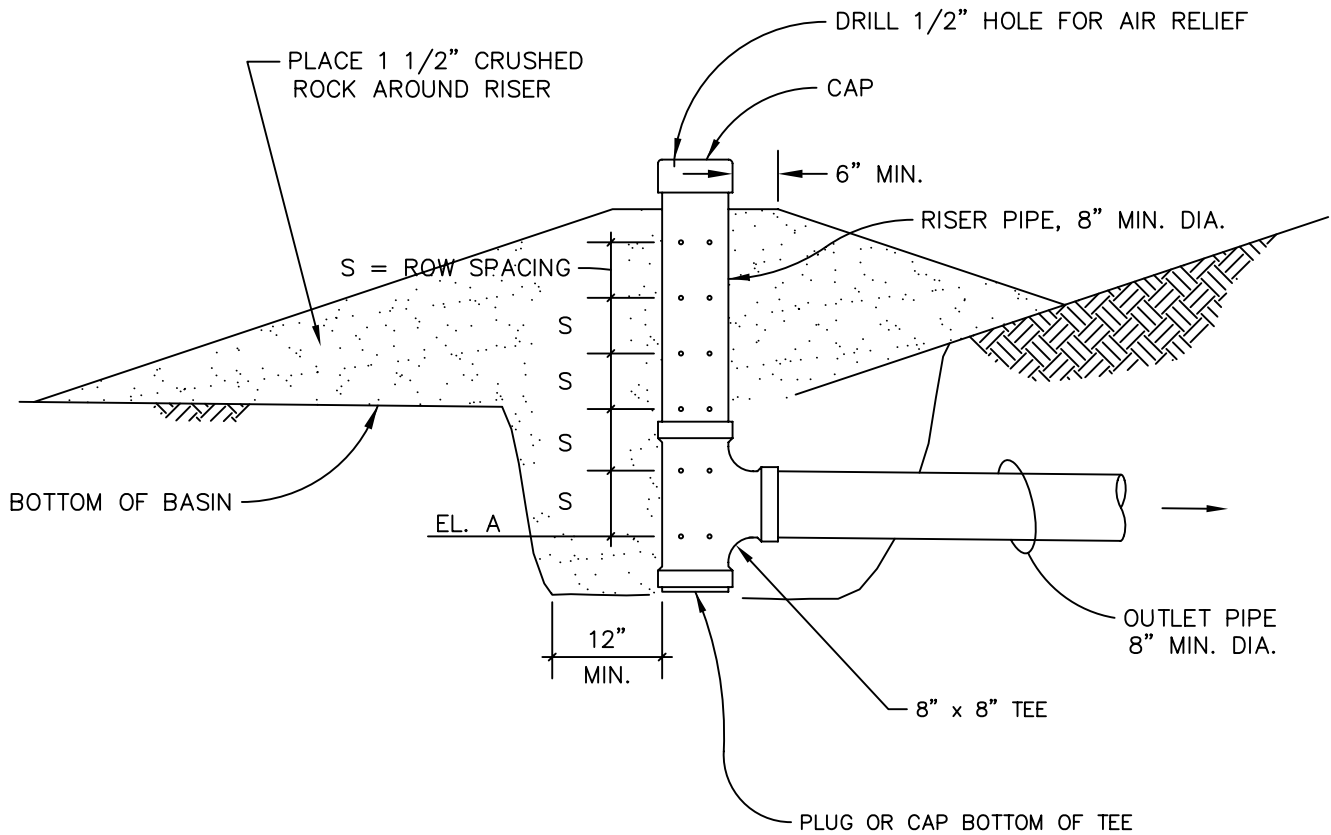
GREENE COUNTY MISSOURI - STORM WATER DESIGN STANDARDS

TEMPORARY SEDIMENT BASIN
BERM & OUTLET STRUCTURE
TYPICAL SECTION

FIGURE 114.9

FILE: f11409.dwg
DATE: 04/05/99

n = NUMBER OF HOLES PER ROW
 d = HOLE DIAMETER



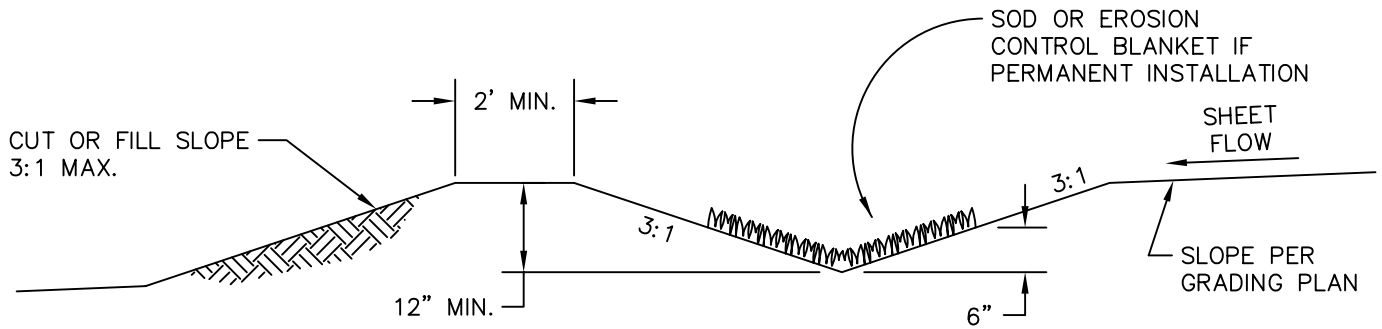
NOTE: BOTTOM ROW OF HOLES SHALL BE SET NO HIGHER THAN BOTTOM OF BASIN. ELEVATION OF BOTTOM ROW OF HOLES SHALL BE SET EQUAL TO INVERT ELEVATION OF OUTLET PIPE (EL. A). THIS ELEVATION MUST BE SPECIFIED ON THE DRAWING.

GREENE COUNTY MISSOURI – STORM WATER DESIGN STANDARDS

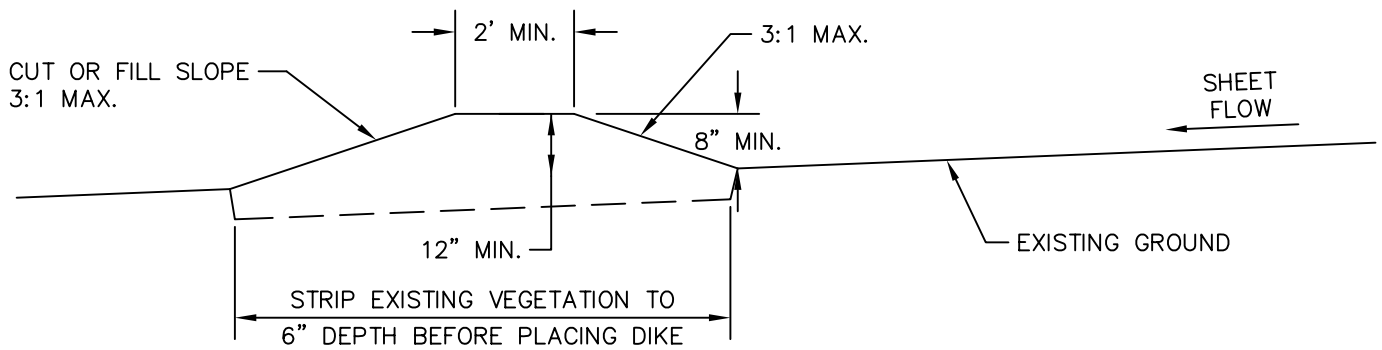
TEMPORARY SEDIMENT BASIN
 PERFORATED RISER PIPE
 TYPICAL SECTION

FIGURE 114.10

FILE: f11410.dwg
 DATE: 04/05/99



SWALE



DIKE

NOTES:

1. DIKE SHALL BE COMPACTED TO DENSITY EQUAL TO THAT SPECIFIED FOR ADJOINING AREA (90% STANDARD PROCTOR DENSITY, MINIMUM).
2. MINIMUM 1% GRADE MUST BE PROVIDED FOR SWALE OR ALONG UPSLOPE SIDE OF DIKE FOR PROPER DRAINAGE.

REFERENCE: Adapted from City of Austin & City of Tulsa Erosion and Sedimentation Control Manuals

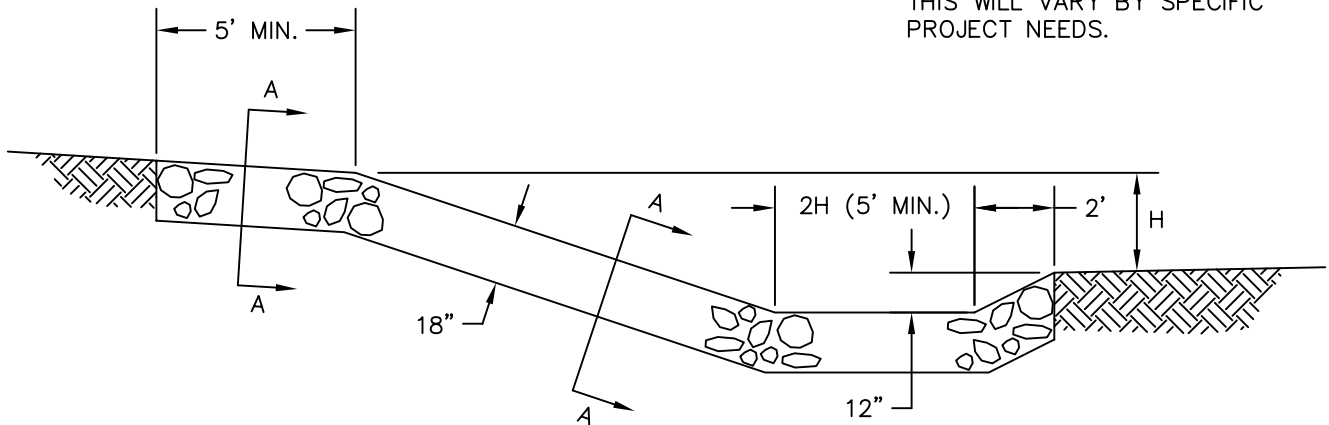
GREENE COUNTY MISSOURI – STORM WATER DESIGN STANDARDS

DIVERSION DIKES & SWALES

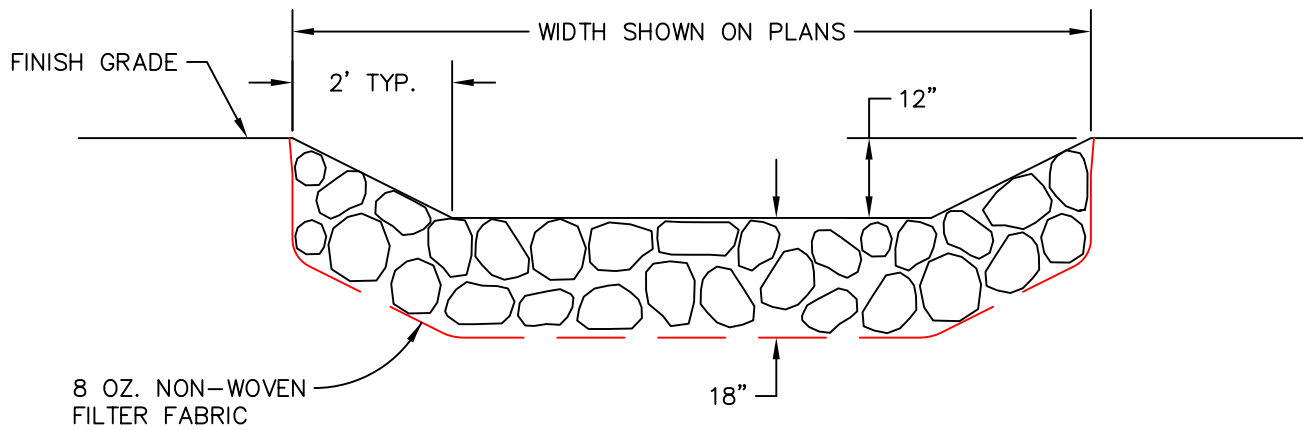
FIGURE 114.11

FILE: f11411.dwg
DATE: 04/05/99

PLANS TO SPECIFY WHETHER RIPRAP IS LOOSE OR GROUTED. THIS WILL VARY BY SPECIFIC PROJECT NEEDS.



TYPICAL SECTION



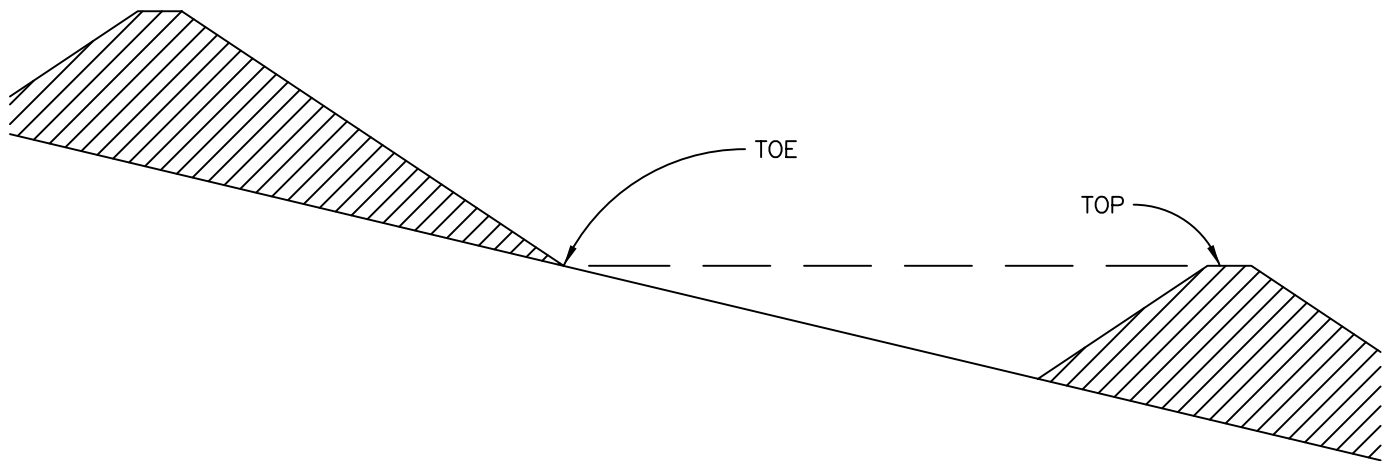
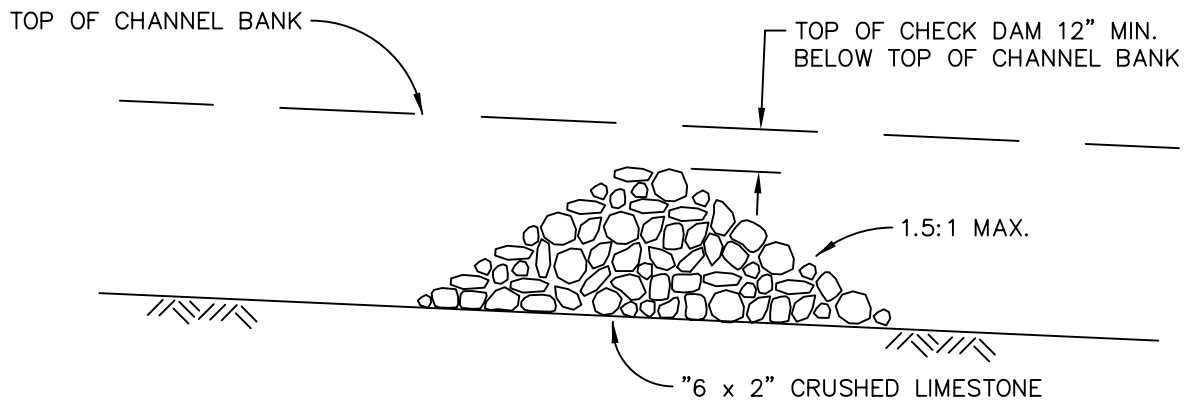
SECTION A - A

GREENE COUNTY MISSOURI - STORM WATER DESIGN STANDARDS

RIPRAP CHUTE CROSS-SECTION

FIGURE 114.12

FILE: f11412.dwg
DATE: 04/05/99



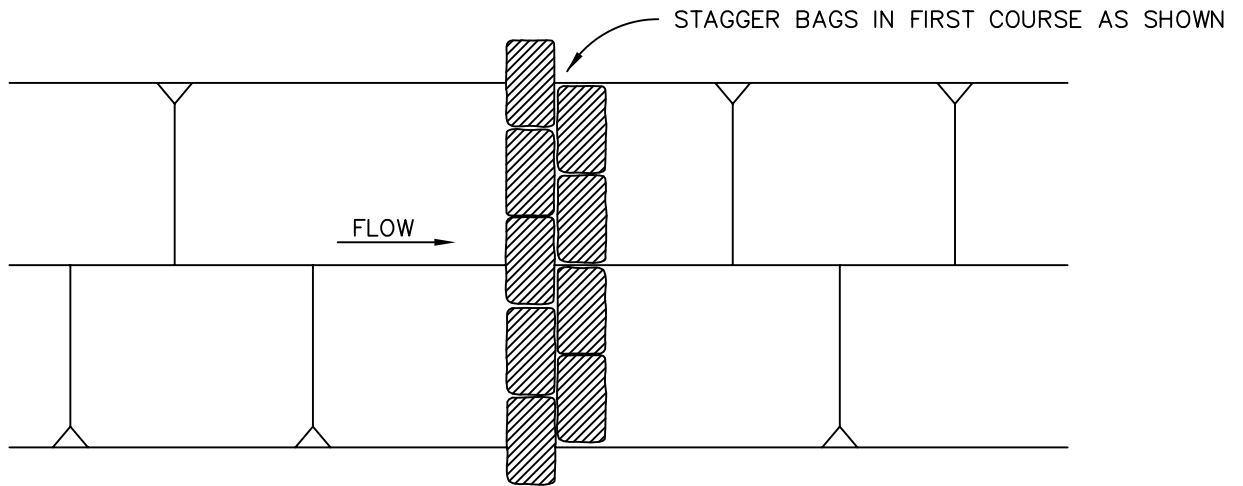
TYPICAL CHECK DAM SPACING

GREENE COUNTY MISSOURI – STORM WATER DESIGN STANDARDS

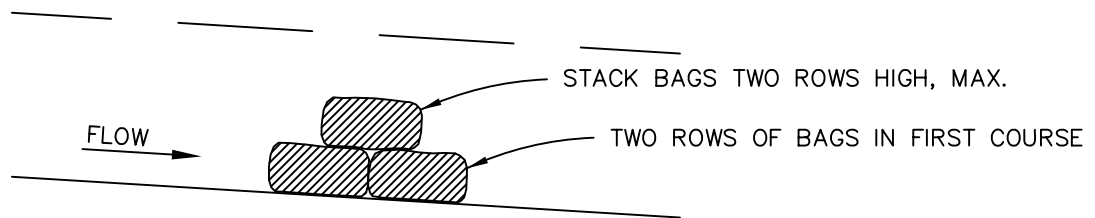
ROCK CHECK DAM

FIGURE 114.13

FILE: f11413.dwg
DATE: 04/05/99



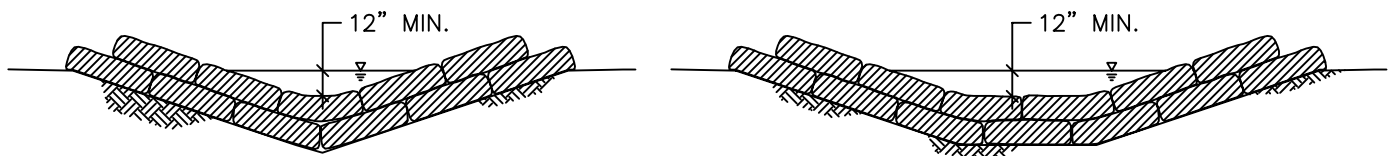
PLAN



PROFILE

NOTES:

FILL BAGS WITH 5/8" TO 1 1/2" CRUSHED LIMESTONE.
 BAGS MAY BE BURLAP OR WOVEN PLASTIC.
 SPACE CHECK DAMS AS SHOWN IN FIG. 114.13, OR AS
 SPECIFIED ON SEDIMENT & EROSION CONTROL PLAN.



TYPICAL CROSS-SECTIONS

GREENE COUNTY MISSOURI – STORM WATER DESIGN STANDARDS

SANDBAG CHECK DAM

FIGURE 114.14

FILE: f11414.dwg
 DATE: 04/05/99