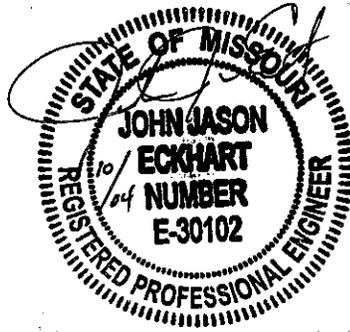


THE CITY OF CARTHAGE, MISSOURI

MODEL BEST MANAGEMENT PRACTICES (BMP'S) FOR LAND DISTURBANCE



Prepared by

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**MODEL BEST MANAGEMENT PRACTICES (BMPs)
CITY OF CARTHAGE**

BMP No.	Title	Detail No.	ENVIRONMENTAL CATEGORY						USE	
			Erosion Control	Pollution Control	Runoff Management	Sediment Capture	Tracking Control	Temporary	Permanent	
EC-1	Bonded Fiber Matrix	---	P						X	
EC-2	Dust Control	---	P						X	
EC-3	Erosion Control Blankets	---	P						X	X
EC-4	Mulching	EC-4	P						X	X
EC-5	Rock Outlet	EC-5	P		A				X	
EC-6	Seeding	---	P						X	X
EC-7	Sodding	EC-7	P							X
EC-8	Soil Binders	---	P						X	
EC-9	Streambank Protection	---	P							X
EC-10	Temporary Stream Crossing	EC-10	P						X	
PP-1	Non-Sediment Pollution Control	---		P					X	
RM-1	Check Dam	RM-1			P		A		X	
RM-2	Diversion-Ridge & Channel	RM-2			P				X	
RM-3	Diversion-Storm Sewer	---			P				X	
RM-4	Gradient Terrace	RM-4	A		P		A			X
RM-5	Grass Lined Channel	RM-5	A		P				X	X
RM-6	Gravel Bags	RM-6	A		P		A		X	
RM-7	Level Spreader	RM-7			P		A		X	
RM-8	Surface Roughening	RM-8	A		P		A		X	
RM-9	Temporary Slope Drain	RM-9	A		P				X	
SC-1	Filter Strip	SC-1	A		A		P			X
SC-2	Inlet Protection-Block & Gravel	SC-2					P		X	
SC-3	Inlet Protection-Fabric Drop	SC-3					P		X	
SC-4	Inlet Protection-Gravel & Wire Mesh	SC-4.1/SC-4.2					P		X	
SC-5	Inlet Protection-Sod Filter	SC-5	A		A		P			X
SC-6	Sediment Basin	SC-6			A		P		X	
SC-7	Sediment Trap	SC-7.1/SC7.2			A		P		X	
SC-8	Silt Fence	SC-8	A		A		P		X	
TC-1	Construction Entrance	TC-1	A				A	P	X	
TC-2	Construction Parking	---	A					P	X	
TC-3	Construction Road	TC-3	A				A	P	X	
TC-4	Washdown Station	TC-4						P	X	

Note: P - Primary BMP function; A - Additional uses

PHYSICAL DESCRIPTION:

WHERE BMP IS TO BE INSTALLED:

CONDITIONS FOR EFFECTIVE USE OF BMP:

WHEN BMP IS TO BE INSTALLED:

INSTALLATION/CONSTRUCTION PROCEDURES:

O&M PROCEDURES:

SITE CONDITIONS FOR REMOVAL:

TYPICAL DETAILS:

BONDED FIBER MATRIX

PHYSICAL DESCRIPTION:

A bonded fiber matrix (BFM) is a hydraulically applied continuous layer of elongated fiber strands held together by a water resistant bonding agent designed to protect exposed soil by eliminating direct impact of precipitation. BFMs adhere directly to the surface of the soil, eliminating gaps between the product and the soil; therefore no special treatment is required at the upstream end of the BFM. BFMs have a high water-holding capacity, but do not form a water-insensitive crust that would inhibit plant growth. BFMs biodegrade completely into material known to be beneficial to plant growth.

WHERE BMP IS TO BE INSTALLED:

Typically installed on slopes where erosion control blankets are impractical and other mulching methods are inadequate.

CONDITIONS FOR EFFECTIVE USE OF BMP:

Type of Flow: Sheet flow only

WHEN BMP IS TO BE INSTALLED:

Immediately after completion of a phase of grading

INSTALLATION/CONSTRUCTION PROCEDURES:

Follow manufacturer's recommendation to maximize usefulness

O&M PROCEDURES:

- Inspect at least every two weeks and after every storm until vegetation is fully established
- Repair eroded areas and reapply product and vegetation

SITE CONDITIONS FOR REMOVAL:

Typically left in place to degrade naturally

TYPICAL DETAILS:

Not Applicable

DUST CONTROL

PHYSICAL DESCRIPTION:

Control measures designed to reduce the transport of dust, thereby preventing pollutants from infiltrating into storm water. Examples for construction activities include vegetative cover, wind barriers, minimization of soil disturbance, spray on adhesives, tilling, chemical treatment and water sprays.

WHERE BMP IS TO BE INSTALLED:

Critical in areas of exposed soil

CONDITIONS FOR EFFECTIVE USE OF BMP:

A combination of the following actions should be used to help reduce the dust and air pollution at a construction site.

Minimize Concurrent Areas of Soil Disturbance – Phase work to the extent practical

Vegetative Cover – For areas not subjected to traffic, vegetation provides the most practical method of dust control and should be established as early as possible. Temporary vegetation should also be used. See Seeding and Sodding BMPs for additional information.

Sprinkling – The site can be sprinkled with water until the surface is moist. This practice is effective for dust control on large areas, haul routes or other traffic routes, but constant repetition is required for effective control.

Tilling – Roughen the surface and bring clods to the surface. This is an emergency measure that should be used before soil blowing starts. Begin tillage on windward side of the site. Chisel plows with shanks spaced about 12 inches to 18 inches apart and spring toothed harrows are examples of equipment that may produce the desired effect. See Surface Roughening BMP for additional information.

Wind Barriers – Solid board fences, snow fences, burlap fences, crate walls and similar materials can be used to control air currents and blowing soil. Barriers placed at right angles to prevailing wind currents at intervals of about 10 times their height are effective in controlling soil blowing.

Street Cleaning – Paved areas that have soil on them from construction sites should be cleaned continuously, at least daily, utilizing a street sweeper or bucket type endloader or scraper.

Mulching – This practice offers a fast and effective means of controlling dust when properly applied. Binders and tackifiers should be used on organic mulches. Mulching is not recommended for areas with heavy traffic. See Mulching BMP for additional information.

NOTE: If calcium chloride or spray-on adhesives are used for dust control, a permit may be required from the Missouri Department of Natural Resources.

WHEN BMP IS TO BE INSTALLED:

Routinely, especially in advance of and during periods of dry weather

INSTALLATION/CONSTRUCTION PROCEDURES:

See Conditions for Effective Use above

O&M PROCEDURES:

Inspect daily and renew as needed

SITE CONDITIONS FOR REMOVAL:

Maintain practices until all disturbed areas are vegetated or paved and blowing soil is no longer a concern.

TYPICAL DETAILS:

Not applicable

EROSION CONTROL BLANKETS

PHYSICAL DESCRIPTION:

An erosion control blanket is a preformed protective blanket of plastic fibers, straw or other plant residue designed to protect soil from the impact of precipitation and overland flow, and retain moisture to facilitate establishment of vegetation. There are many products on the market designed for a variety of applications.

WHERE BMP IS TO BE INSTALLED:

Typically installed on slopes or in channels prior to establishment of vegetation.

CONDITIONS FOR EFFECTIVE USE OF BMP:

Several factors, such as soil conditions, steepness and length of slope, depth of flow, runoff velocities, and time required to establish desired vegetation, influence the choice of product. Manufacturer's recommendations should be followed. Products are available for a variety of uses:

Netting - synthetic or natural fiber mesh installed over disturbed area to hold organic mulch and/or seed in place

Biodegradable Erosion Control Blanket - natural fiber blanket held together by netting to provide temporary erosion protection on slopes and channels.

Permanent Erosion Control Blanket - synthetic blanket material which provides permanent erosion control on slopes and channels with increased water flow velocities.

Turf Reinforcement Mat - 3-dimensional permanent synthetic mat that provides a matrix to greatly reinforce the root system of the desired vegetation for permanent erosion protection in high flow channels and on critical slopes.

WHEN BMP IS TO BE INSTALLED:

Dependent upon intended use – immediately after completion of a phase of grading or installation of vegetation

INSTALLATION/CONSTRUCTION PROCEDURES:

Follow manufacturer's recommendations and specifications, particularly noting requirements for check slots, fastening devices and need for firm contact with soil.

O&M PROCEDURES:

- Inspect at least every two weeks and after every storm until adequate vegetation is established
- Repair erosion and/or undermining at top of slope
- Repair undermining beneath blankets – pull back the blanket(s), fill and compact eroded area, revegetate and then secure blanket(s) firmly
- Reposition or replace blankets that have moved along the slope or channel and secure firmly
- Replace damaged blankets

SITE CONDITIONS FOR REMOVAL:

Temporary blankets will generally degrade naturally; permanent blankets remain in place

TYPICAL DETAILS:

Not Applicable

MULCHING

PHYSICAL DESCRIPTION:

A layer of organic material designed to protect exposed soil or freshly seeded areas from erosion by eliminating direct impact of precipitation and slowing overland flow rate. Mulch materials may include, but are not limited to, such things as grass, hay, straw, wood chips, wood fibers, and shredded bark.

WHERE BMP IS TO BE INSTALLED:

Typically installed on seeded areas for temporary use, and in landscaped areas for permanent use

CONDITIONS FOR EFFECTIVE USE OF BMP:

Types of Flow: Sheet flow only
Slopes: See attached chart for types of mulch acceptable as a function of slope length and steepness
Mulching Rates: See attached table

WHEN BMP IS TO BE INSTALLED:

Immediately after grading landscaped areas or seeding other areas

INSTALLATION/CONSTRUCTION PROCEDURES:

- Install upstream BMPs to protect area to be mulched
- Rough grade area and remove all debris larger than 1 inch if area is to be vegetated and mowed in the future, larger than 2 inches if area is to be permanently mulched
- If area is to be seeded, follow requirements of Seeding BMP
- Spread mulch and anchor by punching it into the ground, using netting, peg and twine, or tacking with liquid binder

O&M PROCEDURES:

- Inspect at least every two weeks and after every storm until adequate vegetation is established; annually for permanent mulch
- Protect from vehicular and foot traffic
- Repair damaged, degraded or eroded areas – reseed as needed and replace mulch

SITE CONDITIONS FOR REMOVAL:

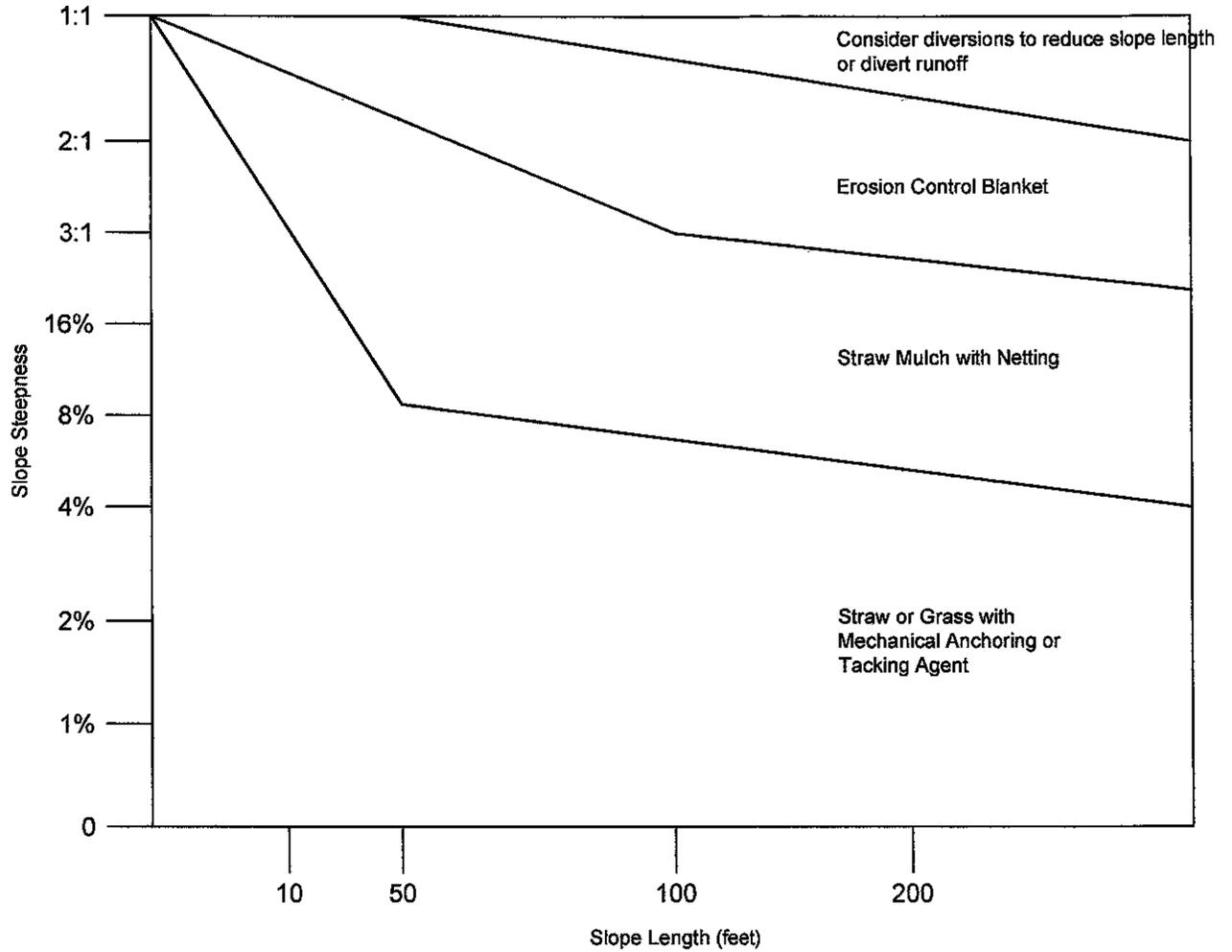
Temporary mulch should be removed when adequate vegetation is established

TYPICAL DETAILS:

Type of mulch required for various slopes and application rates attached

MULCHING (CONT.)

MULCH SELECTION AS A FUNCTION OF SLOPE



MATERIALS	RATE PER ACRE	REQUIREMENTS	NOTES
Straw	2-2½ tons	Dry, unchopped, unweathered; avoid weeds	Spread by hand or machine; must be tacked or tied down
Wood fiber or Wood cellulose	½-1 ton		Use with hydroseeder; may be used to tack straw. Do not use in hot, dry weather.
Wood chips	5-6 tons	Air dry, add nitrogen fertilizer at 12lb/ton	Apply with blower, chip handler, or by hand. Not for fine turf areas
Bark	35 yd ³	Air dry, shredded, or hammermilled; or chips.	Apply with mulch blower, chip handler, or by hand. Do not use asphalt tack.

CITY OF CARTHAGE	
TYPICAL BMP DETAIL	
MULCHING RATES	
REVISION NUMBER	DRAWING NUMBER
0	EC-4

ROCK OUTLET

PHYSICAL DESCRIPTION:

A rock apron installed over a geotextile fabric at a point of concentrated discharge, designed to slow the velocity of flow and protect the receiving area from erosion.

WHERE BMP IS TO BE INSTALLED:

Installed at BMP outlets, for example, at the end of pipe slope drains, the emergency overflow or outlet pipe of a sediment basin.

CONDITIONS FOR EFFECTIVE USE OF BMP:

Type of Flow: Concentrated flow
Flow at Outlet: Maximum velocity of 10 fps

WHEN BMP IS TO BE INSTALLED:

With the construction of the upstream BMP that created the concentrated discharge

INSTALLATION/CONSTRUCTION PROCEDURES:

- Grade subgrade of rock blanket to required section
- Place filter fabric, providing enough slack to assure that rock will not tear the fabric when it is placed
- Install rock with uniform profile and cross section

O&M PROCEDURES:

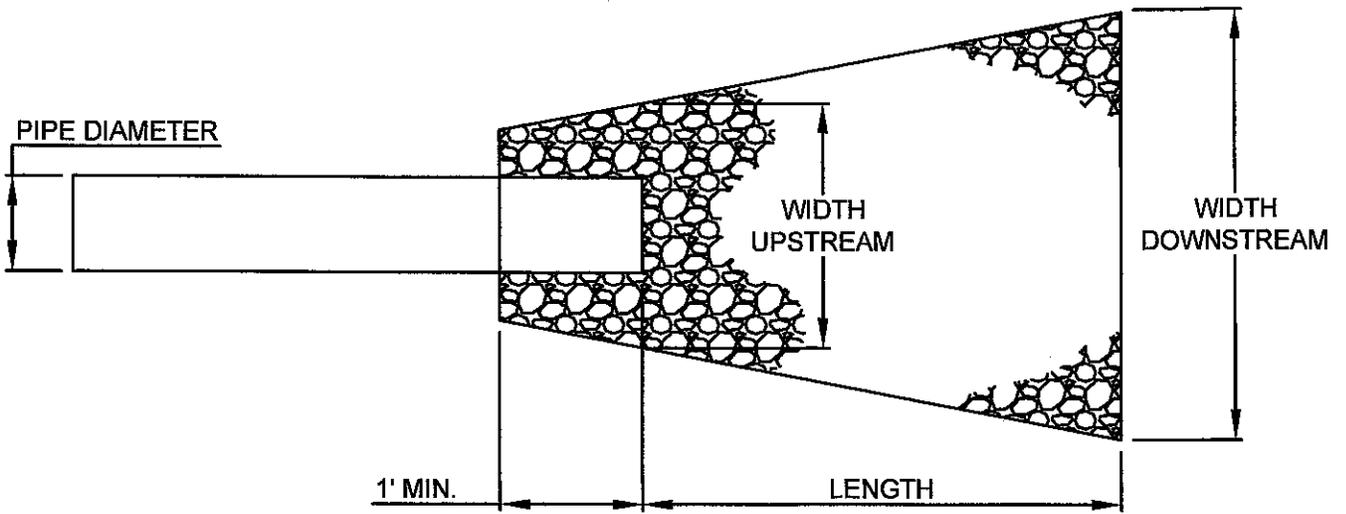
- Inspect at least every two weeks and after every storm during construction
- Remove sediment and trash accumulation
- Replace displaced rock - larger rock may be required
- Stabilize eroded areas - extend if necessary

SITE CONDITIONS FOR REMOVAL:

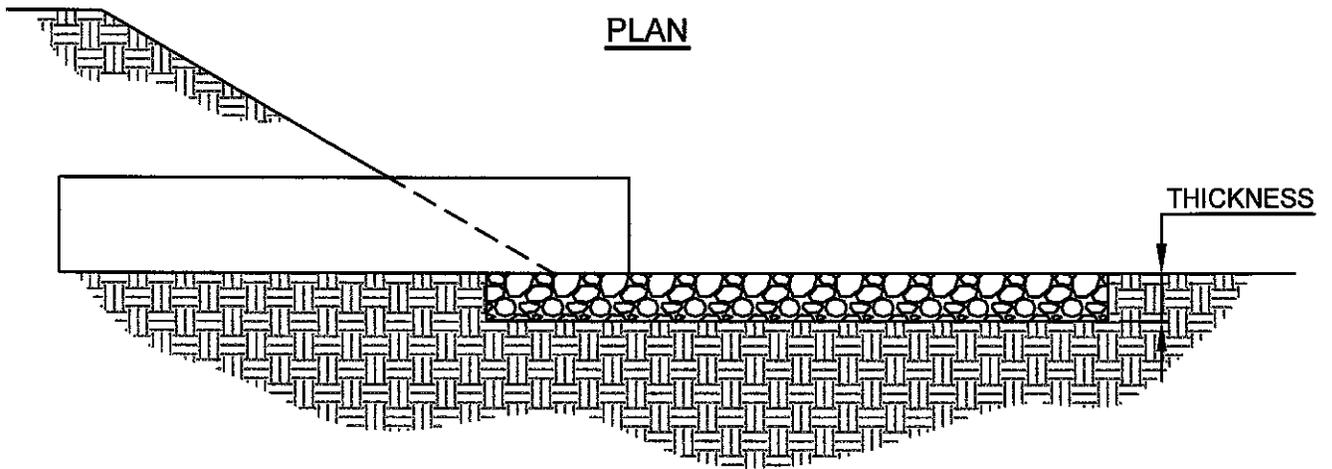
Removed concurrently with upstream BMP

TYPICAL DETAILS:

EC-5



PLAN



WOVEN FABRIC ALONG BOTTOM AND ALL SIDES (MIRAFI 600X OR EQUAL)

SECTION/ELEVATION

PIPE DIAMETER (INCHES)	WIDTH UPSTREAM (FEET)	WIDTH DOWNSTREAM (FEET)	LENGTH (FEET)	ROCK SIZE (INCHES)	THICKNESS (INCHES)
6	1.5	8	8	5-10	15
12	3	12	12	5-10	15
18	4.5	16	16	9-14	21
24	6	20	20	9-14	21
30	7.5	22	22	9-14	21

NOTE: WIDTH UPSTREAM IS MEASURED AT END OF PIPE

CITY OF CARTHAGE	
TYPICAL BMP DETAIL	
ROCK OUTLET	
REVISION NUMBER	DRAWING NUMBER
0	EC-5

SEEDING

PHYSICAL DESCRIPTION:

Establishment of vegetation by spreading grass seed designed to protect exposed soil from erosion by eliminating direct impact of precipitation and slowing overland flow rates. Once established, the vegetative cover will also filter pollutants from the runoff.

WHERE BMP IS TO BE INSTALLED:

Exposed soil after a phase of rough or finish grading has been completed, or areas where no activity will occur for 30 days

CONDITIONS FOR EFFECTIVE USE OF BMP:

Type of Flow:	Sheet flow
Contributing Slope Length:	30 foot maximum for 3:1 slopes 50 foot maximum for slope between 3:1 and 10:1 100 foot maximum for sloped under 10%
Minimum Rates:	See attached chart(s)
Acceptable Dates:	See attached chart

WHEN BMP IS TO BE INSTALLED:

Immediately after rough or finished grading is completed

INSTALLATION/CONSTRUCTION PROCEDURES:

- Install upstream BMPs to protect area to be seeded
- Rough grade area and remove all debris larger than 1 inch diameter and concentrated areas of smaller debris
- Install stabilization grids, if needed
- Mix soil amendments (lime, fertilizer, etc.) into top 3"-6" of soil as needed
- Plant seed ¼-½ inch deep
- Roll lightly to firm surface
- Cover seeded area with mulch unless seeding completed during optimum spring and summer dates
- Install additional stabilization (netting, bonded fiber matrix, etc.) as required
- Water immediately – enough to soak 4 inches into soil without causing runoff

O&M PROCEDURES:

- Inspect at least every two weeks and after every storm
- Protect area from vehicular and foot traffic
- Reseed areas that have not sprouted within 21 days of planting
- Repair damaged or eroded areas and reseed and stabilize as needed
- Do not mow until 4 inches of growth occurs
- During the first 4 months, mow no more than 1/3 the grass height
- Refertilize during 2nd growing season

SITE CONDITIONS FOR REMOVAL:

Does not require removal, but temporary seeding can be removed immediately prior to work returning to an area

TYPICAL DETAILS:

Minimum seeding rates and acceptable dates for work attached

SEEDING REQUIREMENTS

Dates For Seeding												
Permanent Seeding	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Tall Fescue			O	O	O			O	O			
Smooth Brome			O	O	O			O	O			
Fescue & Brome			O	O	O	O		O	O			
Fescue, Rye, & Bluegrass	A	A	O	O	O	P	P	O	O	P	P	A

Temporary Seeding	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Rye or Sudan	A	A	O	O	O	O	O	O	O	O	A	A
Oats		A	O	O	O	O	O	O	O			

O – Optimum seeding dates A – Acceptable seeding dates
 P – Permitted seeding dates with reseeding 2 months later – Initially use 50% of seed and 75% of fertilizer. Reseed with remaining seed and fertilizer.

Minimum Fertilizer and Seeding Rates		
Permanent Seeding*	lb./acre	lb./1000 sq. ft.
Tall Fescue	300	7
Smooth Brome	200	4.6
Mixture #1	250	5.7
Mixture #2	210	4.8

Mixture #1 – Tall Fescue @ 150 lbs./ac. and Brome @ 100 lbs./ac.
 Mixture #2 – Tall Fescue @ 100 lbs./ac., Perennial Rye Grass @ 100 lbs./ac.,
 and Kentucky Bluegrass @ 10 lbs./ac.

* Seeding rate for slopes in excess of 20% (5:1) shall be 10 lb./1000 sq. ft.

Temporary Seeding	lb./acre	lb./1000 sq. ft.
Rye or Sudan	150	3.5
Oats	120	2.8

Fertilizer	Permanent Seeding (lb./acre)	Temporary seeding (lb./acre)
Nitrogen	45	30
Phosphate	65	30
Potassium	65	30
Lime - ENM	600	600

ENM – effective neutralizing material per state evaluation of quarried rock

SODDING

PHYSICAL DESCRIPTION:

A ¾ - 1 inch thick mat of vigorous turf, free of disease, insects and weeds. Sod prevents raindrops from disrupting the soil structure and causing erosion. Sod slows water runoff and acts as a filter when sediment laden runoff crosses over the sodded area.

WHERE BMP IS TO BE INSTALLED:

Typically installed in areas requiring immediate erosion protection, such as swales or detention ponds and as filter strips, around inlets, and adjacent to curbs. Also installed in areas requiring immediate aesthetic appearance or function such as entrances to new subdivision and off site construction areas.

CONDITIONS FOR EFFECTIVE USE OF BMP:

Type of Flow: Sheet flow and low concentrated flows with velocities less than 5 fps

WHEN BMP IS TO BE INSTALLED:

Immediately after finish grading, installation of area inlets, and installation of underground services and foundations of new homes.

INSTALLATION/CONSTRUCTION PROCEDURES:

- Rough grade area and remove all debris larger than 1/2 inch in diameter and concentrated areas of smaller debris
- Soil preparation of area to be sodded shall be determined by tests to determine lime and fertilizer requirements. Soil amendments shall be mixed into top 3-6 inches of soil by disking or other means.
- Level and roll soil lightly to provide an even grade and firm the surface. Soil should not be excessively wet or dry
- Lay first row of sod perpendicular to the slope or direction of flow. Butt subsequent rows tight against previous rows with strips staggered in brick-like pattern. Fill minor gaps with good soil and roll entire surface to ensure contact.
- Stake, staple and/or net corners and centers of sod strips as required.
- Water immediately after installation enough to soak 4 inches into soil without causing runoff

O&M PROCEDURES:

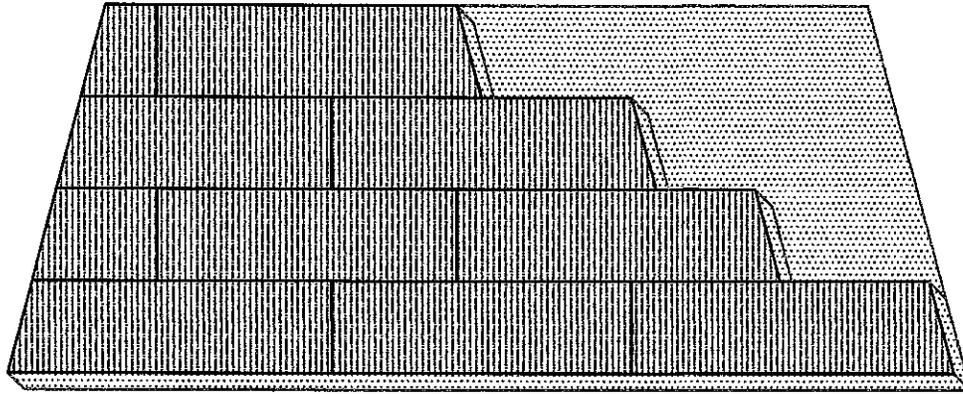
- Water sod daily for 3 weeks - enough to soak 4 inches into soil without causing runoff
- Reposition areas of sod that have moved along the slope
- Remove sediment accumulations - replace sod if necessary
- Repair any eroded areas, replace sod, and stabilize as needed
- Do not mow until 3 inches of new growth occurs. During the first 4 months, mow no more than 1/3 the grass height

SITE CONDITIONS FOR REMOVAL:

Not Applicable

TYPICAL DETAILS:

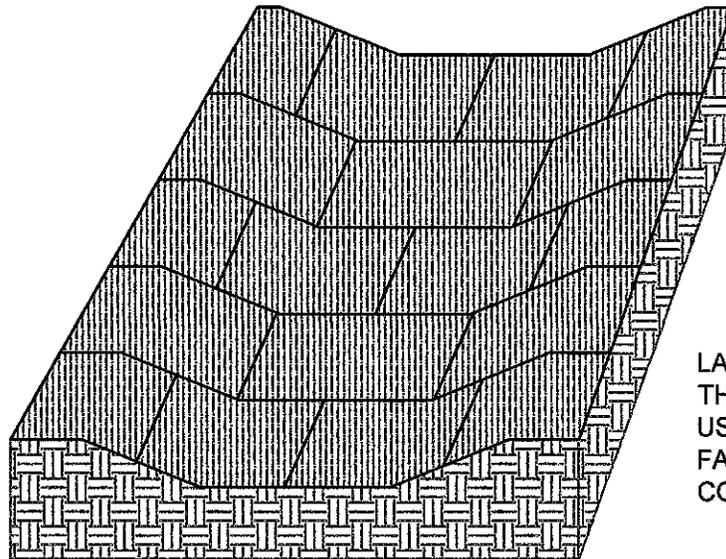
EC-7



LAY SOD IN A STAGGERED PATTERN WITH STRIPS BUTTED TIGHTLY AGAINST EACH OTHER.

ON SLOPES > 4% USE PEGS OR STAPLES TO FASTEN SOD FIRMLY AT THE CORNERS AND CENTERS.

INSTALLATION OF GRASS SOD



LAY SOD PERPENDICULAR TO THE DIRECTION OF FLOW. USE PEGS OR STAPLES TO FASTEN SOD FIRMLY AT THE CORNERS AND CENTERS.

INSTALLATION OF SOD IN WATERWAYS

JUTE MATTING CAN BE USED WHERE ADDITIONAL STABILITY IS REQUIRED

 CITY OF CARTHAGE	
TYPICAL BMP DETAIL	
SODDING	
REVISION NUMBER	DRAWING NUMBER
0	EC-7

SOIL BINDERS

PHYSICAL DESCRIPTION:

A material sprayed onto the surface of exposed soils designed to protect against erosion from wind or runoff. The useful life of most products is 3 to 6 months. Examples of materials used include vegetable-based adhesives, copolymers, petroleum oils and resin-emulsions.

WHERE BMP IS TO BE INSTALLED:

Typically used in disturbed areas and in combination with other BMPs such as perimeter controls, seeding or mulching

CONDITIONS FOR EFFECTIVE USE OF BMP:

Type of Flow: Sheet Flow

WHEN BMP IS TO BE INSTALLED:

Immediately after completion of a phase of grading

INSTALLATION/CONSTRUCTION PROCEDURES:

Follow manufacturer's recommendations to maximize usefulness and avoid formation of pools or impervious areas where storm water cannot infiltrate

O&M PROCEDURES:

- Inspect at least every two weeks for damage from vehicles, runoff, or freeze-thaw conditions
- Reapply product or utilize additional BMP

SITE CONDITIONS FOR REMOVAL:

Typically left in place to degrade naturally

TYPICAL DETAILS:

Not Applicable

STREAMBANK PROTECTION

PHYSICAL DESCRIPTION:

A vegetative, structural or combination treatment of streams designed to stabilize the stream and reduce erosion. It is important to note that a systemic analysis of the entire reach of stream must be conducted in order to avoid unintended negative impacts on a stream as a result of a corrective action at an isolated location. A wide array of products and methodologies can be used to stabilize streams: live stakes; cellular confinement matrices; articulated block pavers; rip rap; gabion baskets; turf reinforcement mats; fabric formed revetments; cedar tree revetments; straw wattles; grade control structures; stilling basins; etc.

WHERE BMP IS TO BE INSTALLED:

Open channels downstream from developed areas

CONDITIONS FOR EFFECTIVE USE OF BMP:

Acceptable methods vary widely due to the unique nature of each reach of channel. Design considerations include: current and future watershed conditions; discharge; velocity; sediment load; channel slope; control of bottom scour (incising); soil conditions; compatibility with other improvements; changes in channel alignment; and protection and maintenance of fish and wildlife habitats and existing tree canopy.

WHEN BMP IS TO BE INSTALLED:

Well in advance of disturbing any upstream areas in order to give plant material a relatively long period to become established and allow ample time for inspection and necessary repairs during construction of the remainder of the development

INSTALLATION/CONSTRUCTION PROCEDURES:

- Procedures are specific to materials used. General construction principles include;
- Stabilize the channel bottom first to prevent incising and knick points from undermining the bank protection
- Start and stop bank protection at stable points along the channel
- Minimize the size of all disturbed areas and stabilize as soon as each phase of construction is complete
- Use other BMPs to prevent runoff from disturbing the streambank protection area until it has been completed
- Store all construction materials well away from the stream
- At the end of each workday, move all construction equipment out of and away from the stream to prevent flooding
- Avoid steep slopes on the streambank
- Fence the construction area and post warning signs if trespassing or vandalism is likely

O&M PROCEDURES:

- Inspect at least every two weeks and after every storm during construction; and once each season thereafter
- Repair, relocate, or add BMPs protecting channel until the streambank protection is operational
- Remove sediment as needed for proper establishment of protection measures
- Repair gaps in vegetative cover by replacing plants or designing alternative methods/material
- Repair structural systems as needed

SITE CONDITIONS FOR REMOVAL:

Not Applicable

TYPICAL DETAILS:

Not Applicable

TEMPORARY STREAM CROSSING

PHYSICAL DESCRIPTION:

A stabilized stream crossing designed to protect the stream banks while facilitating access for construction vehicles and equipment. Use of temporary stream crossings is discouraged - crossings are a direct source of pollution and should be avoided if alternatives are feasible. If the work involves construction below the normal water of a defined channel, a permit will need to be obtained from the US Army Corps of Engineers prior to the City approving the SWPPP.

WHERE BMP IS TO BE INSTALLED:

At locations where work and disruption in creek can be minimized

CONDITIONS FOR EFFECTIVE USE OF BMP:

When no other feasible alternative exists, crossing streams may be permitted. Design considerations include: current and proposed watershed conditions; average and peak discharge (2-year, 24-hour storm); effect on water surface elevation off-site; velocity; sediment removal; and protection of fish and wildlife habits and existing trees. Criteria for certain types of crossings follow.

Low Water Crossing - Any constant flow less than 3" deep; light traffic; bank height less than 5 feet; perpendicular to flow or with slight upstream arc

Culvert - Sized for 2-year, 24-hour storm with 1 foot freeboard and no flooding of off-site areas; pipe parallel to flow; embankment perpendicular to channel or with slight upstream arc; rip rap on exposed faces sized for overtopping during a peak storm period

WHEN BMP IS TO BE INSTALLED:

During dry periods in advance of need to cross stream

INSTALLATION/CONSTRUCTION PROCEDURES:

Procedures are specific to type of crossing used. Procedures for low water crossings and culverts include:

- Ensure that all necessary materials are on site before beginning work
- Provide a stable means to bypass normal channel flow prior to disturbing channel
- Scarify and stabilize channel bottom to provide even foundation for crossing
- Install culvert, if needed - place clayey soil to required dimensions around pipe
- Grade and compact access ramps
- Place and compact soil embankment for culvert; rip rap for low water crossing, if needed
- Install fabric under crossing and to required distance from creek bank
- Install stone on access ramps and cellular confinement system for driving surface of crossing
- Place rip rap on faces of and downstream from culvert embankment

O&M PROCEDURES:

- Inspect at least every two weeks and after every storm
- Remove sediment and trash accumulation at inlet
- Repair settlement, cracking, or piping holes
- Stabilize eroded areas at outlet - extend rip rap if necessary

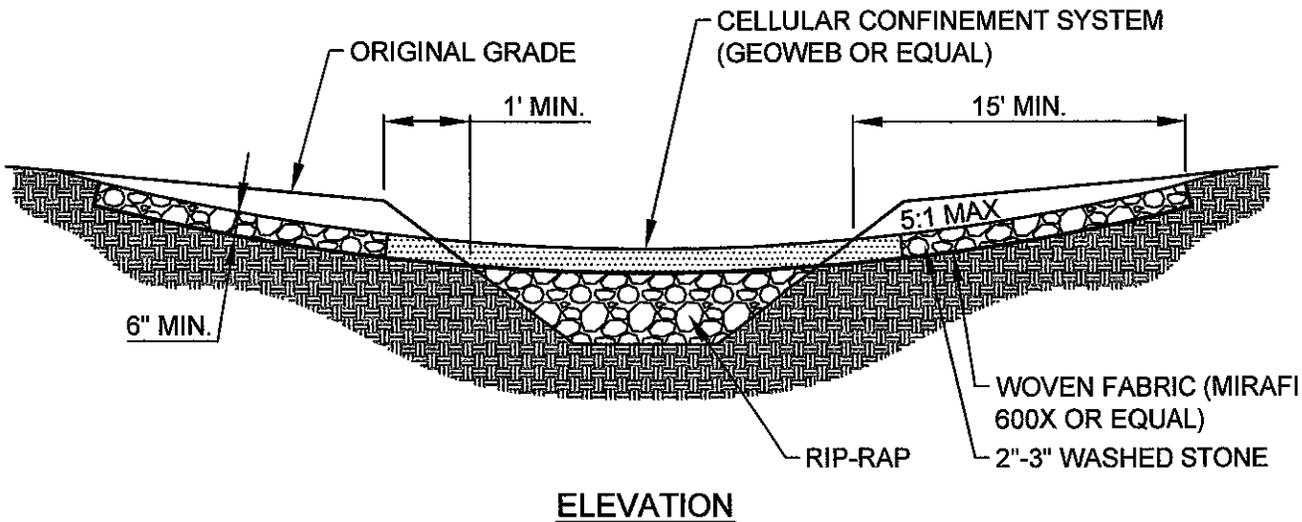
SITE CONDITIONS FOR REMOVAL:

Remove as soon as alternative access is available. All foreign materials should be removed from creek. The streambed and banks should be returned to the original contour and should be stabilized if necessary

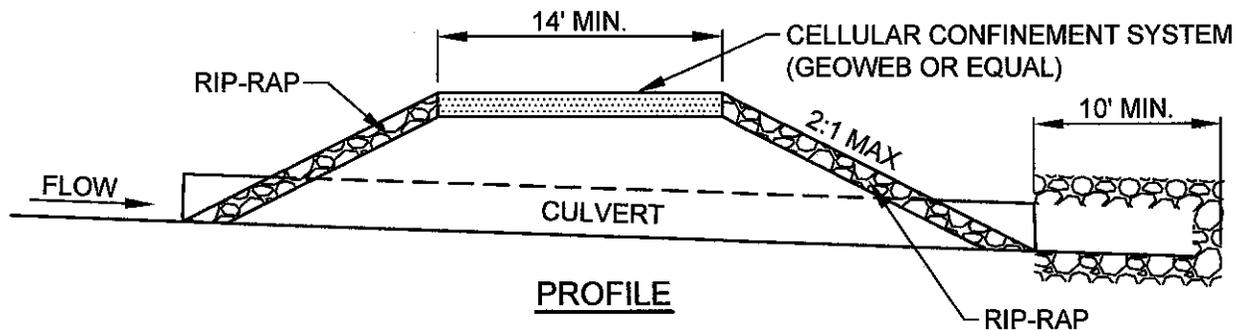
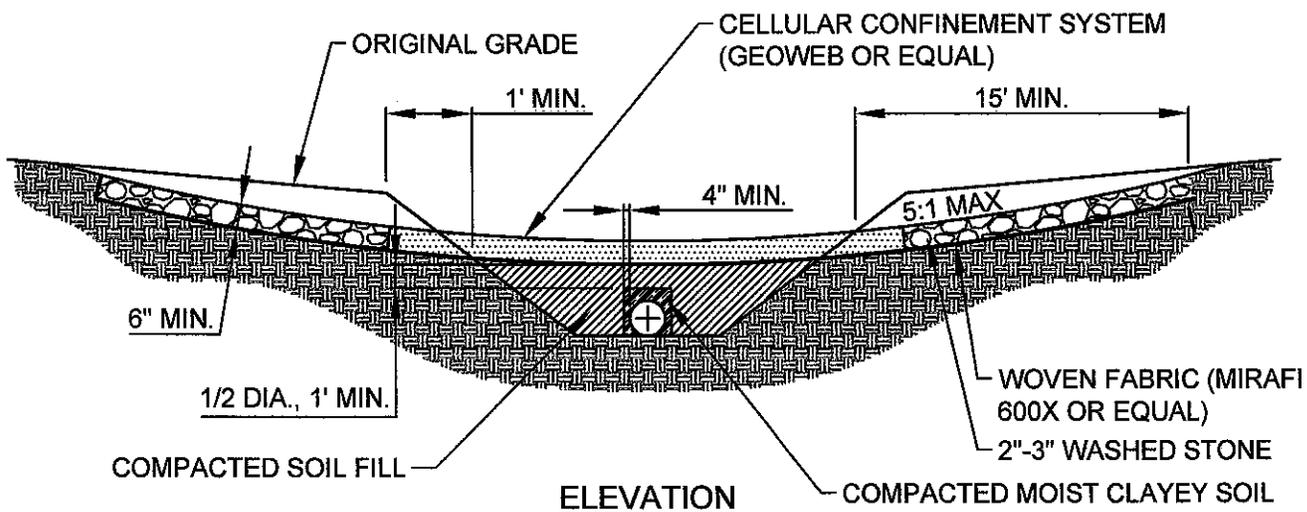
TYPICAL DETAILS:

EC-10

LOW WATER CROSSING



CULVERT



- NOTE:
1. MULTIPLE CONDUITS CAN BE USED.
 2. ELEVATION OF CONDUITS CAN VARY.

CITY OF CARTHAGE	
TYPICAL BMP DETAIL	
TEMPORARY STREAM CROSSING	
REVISION NUMBER	DRAWING NUMBER
0	EC-10

NON-SEDIMENT POLLUTION CONTROL

PHYSICAL DESCRIPTION:

Control measures designed to prohibit chemicals, hazardous materials, solid waste and construction debris from polluting storm water. Pollutants carried in solution or as surface films on runoff will be carried through most erosion control and sediment capture BMPs. Keeping substances like fuel, oil, asphalt, paint, solvents, fertilizer, soil additives, concrete wash water, solid waste and construction debris from polluting runoff can be accomplished to a large extent through good housekeeping on the site and following the manufacturer's recommendations for disposal.

WHERE BMP IS TO BE INSTALLED:

Collection, storage and fueling areas should be located onsite in an area that does not receive a substantial amount of runoff from upland areas and does not drain directly to lakes, creeks, streams, rivers, sewers, groundwater, wetlands, or road ditches.

CONDITIONS FOR EFFECTIVE USE OF BMP:

- Reduction in pollutants depends heavily on how construction personnel perform their duties. An effective management system requires training and signage to promote proper storage, handling and disposal of materials. Follow up observations of actions and inspection of storage areas by management personnel is also required.
- Plans should contain notes clearly stating requirements for addressing potential pollutants
- Fueling areas and storage areas for hazardous materials should be protected by berms or other means of catching leaks or spills.

WHEN BMP IS TO BE INSTALLED:

Immediately following installation of construction entrance and wash station

INSTALLATION/CONSTRUCTION PROCEDURES:

- Place waste receptacles near area of work
- Construct protective berm or other devices around fueling and hazardous materials storage areas
- Install appropriate signage
- Post guidelines for proper handling, storage and disposal of materials, and emergency spill cleanup onsite

O&M PROCEDURES:

- Inspect activities on regular basis
- Inspect storage areas and control devices at least every two weeks and after every storm
- Make necessary corrections and repairs

SITE CONDITIONS FOR REMOVAL:

Maintain practices until all construction on the site has been completed

TYPICAL DETAILS:

General pollution prevention notes attached

POLLUTION PREVENTION PROCEDURES

1. HANDLING AND DISPOSAL OF HAZARDOUS MATERIALS

DO: Prevent spills
Use products up
Follow label directions for disposal
Remove lids from empty bottles and cans when disposing in trash
Recycle wastes whenever possible

DON'T: Don't pour waste into sewers or waterways on the ground
Don't pour waste down the sink, floor drain or septic tanks
Don't bury chemicals or containers, or dispose of them with construction debris
Don't burn chemicals or containers
Don't mix chemicals together

2. Containers shall be provided for collection of all waste material including construction debris, trash, petroleum products and any hazardous materials to be used onsite.
3. No waste materials shall be buried onsite.
4. Mixing, pumping, transferring or otherwise handling construction chemicals such as fertilizer, lime, asphalt, concrete drying compounds, and all other potentially hazardous materials shall be performed in an area away from any watercourse, ditch or storm drain.
5. Equipment fueling and maintenance, oil changing, etc., shall be performed only in an area designated for that purpose. The designated area is equipped for recycling oil and catching spills.
6. Concrete wash water shall not be allowed to flow directly to storm sewers, streams, ditches, lakes, etc. without being treated. A sump or pit shall be constructed to contain concrete wash water.
7. If substances such as oil, diesel fuel, hydraulic fluid, antifreeze, etc. are spilled, leaked, or released onto soil, the soil shall be dug up and disposed of at a licensed sanitary landfill (not a construction/demolition debris landfill). Spills on pavement shall be absorbed with sawdust, kitty litter or product designed for that purpose and disposed of at a licensed sanitary landfill. Hazardous or industrial wastes such as most solvents, gasoline, oil-based paints, and cement curing compounds require special handling. These materials will be removed from the site and recycled or disposed of in accordance with MODNR requirements.
8. State law requires the party responsible for a petroleum product spill in excess of 50 gallons to report the spill to MDNR (537-634-2436) as soon as practical after discovery. Federal law requires the responsible party to report any release of oil if it reaches or threatens a sewer, lake, creek, stream, river, groundwater, wetland, or area like a road ditch, that drains into one of the above.

CHECK DAM

PHYSICAL DESCRIPTION:

A small dam built within a drainage swale or temporary diversion channel designed to pond water and cause sediment to settle out. Dams can be constructed of rock, sand bags or gravel bags.

WHERE BMP IS TO BE INSTALLED:

At intervals along drainage swales or channels. The top of the downstream check dam should be level with the base of the upstream check dam.

CONDITIONS FOR EFFECTIVE USE OF BMP:

Type of Flow:	Moderate concentrated flow
Contributing Area:	Maximum of 2 acres
Channel Slope:	Maximum of 2%

WHEN BMP IS TO BE INSTALLED:

Prior to disturbance of natural vegetation in contributing drainage area; immediately after construction of drainageway

INSTALLATION/CONSTRUCTION PROCEDURES:

- Grade drainageway and compact area of check dam
- Place rock, sand bags or gravel bags to required configuration perpendicular to flow

O&M PROCEDURES:

- Inspect at least every two weeks and after every storm
- Remove trash and leaf accumulation
- Remove sediment buildup once it reaches 1/2 depth of check dam or 12" depth, whichever is less
- Restore dam structure to original configuration to protect banks
- Replace rock on upstream face of dam if ponding does not drain in reasonable timeframe

SITE CONDITIONS FOR REMOVAL:

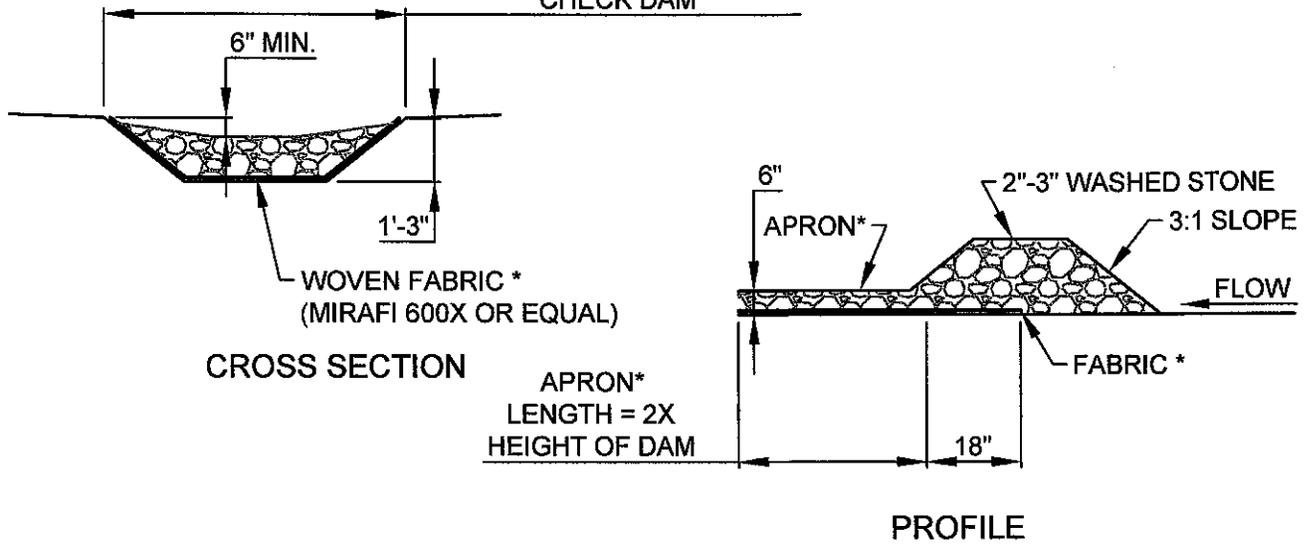
Remove after contributing drainage areas have been adequately stabilized and vegetation is adequately established in drainageway. Regrade and vegetate area of check dam.

TYPICAL DETAILS:

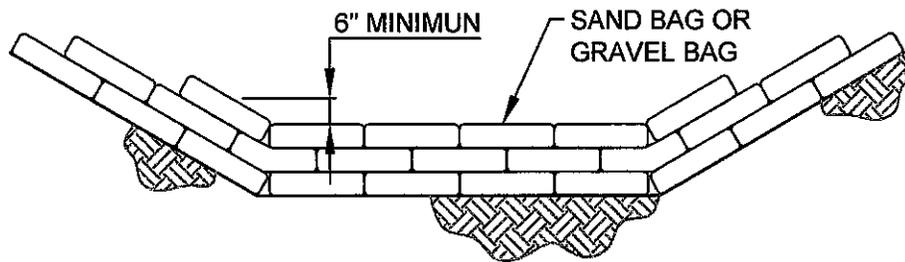
RM-1

LEVEL CENTER SECTION,
WITH 6"-12" RISE ON
BOTH SIDES TO CAUSE
FLOW OVER, NOT AROUND,
CHECK DAM

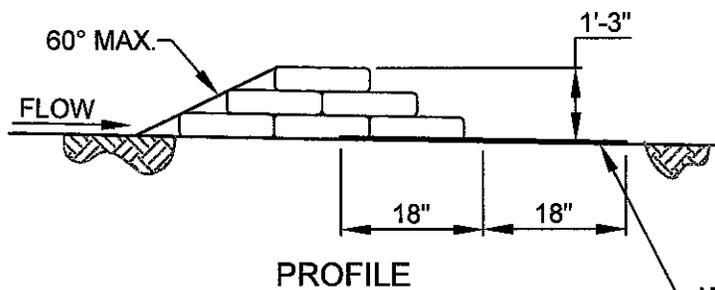
*FABRIC AND APRON
INSTALLED ON LAST CHECK
DAM IN NEWLY SEEDED
DRAINAGE WAYS.



ROCK CHECK DAM



CROSS SECTION



SAND BAG OR GRAVEL BAG
CHECK DAM

NOTES:

1. NUMBER OF BAGS AND
ARRANGEMENT MAY VARY
WITH ON-SITE CONDITIONS.

2. SEE GRAVEL BAG BMP FOR
ADDITIONAL INFORMATION.

WOVEN FABRIC *
(MIRAFI 600X OR EQUAL)

CITY OF CARTHAGE	
TYPICAL BMP DETAIL	
CHECK DAM	
REVISION NUMBER	DRAWING NUMBER
0	RM-1

DIVERSION-RIDGE & CHANNEL

PHYSICAL DESCRIPTION:

A compacted earth or gravel ridge, excavated channel or a combination of ridge and channel designed to direct runoff away from or around disturbed areas and cause sediment to settle out. Diversions built on a level contour are used in combination with temporary slope drains to provide adequate conveyance. Diversions built with positive drainage slopes release runoff into additional BMPs such as sediment traps or level spreaders. BMPs such as check dams can also be used in diversion channels to slow velocities.

WHERE BMP IS TO BE INSTALLED:

At top of disturbed slopes and other sensitive areas to protect them from upstream runoff; intermediate locations along long slopes to reduce slope length; and perimeter of construction area

CONDITIONS FOR EFFECTIVE USE OF BMP:

Type of Flow: Sheet flow and low-volume concentrated flows
Contributing Area: Contributing slope length - 300 feet maximum; 100 feet for slopes greater than 5%
Channel Lining: Diversions of slopes exceeding 5% should be lined with gravel or other material due to high velocity

WHEN BMP IS TO BE INSTALLED:

Prior to disturbance of natural vegetation on slopes and at intervals during construction of fill slopes

INSTALLATION/CONSTRUCTION PROCEDURES:

- Grade and compact channel and/or ridge
- Install vegetation or protective lining
- Stabilize outfall area as depicted on plan
- Install lathe or post at each end of diversion, and at 20 foot intervals. Mark maximum allowable sediment depth at 1/2 the depth of the channel.

O&M PROCEDURES:

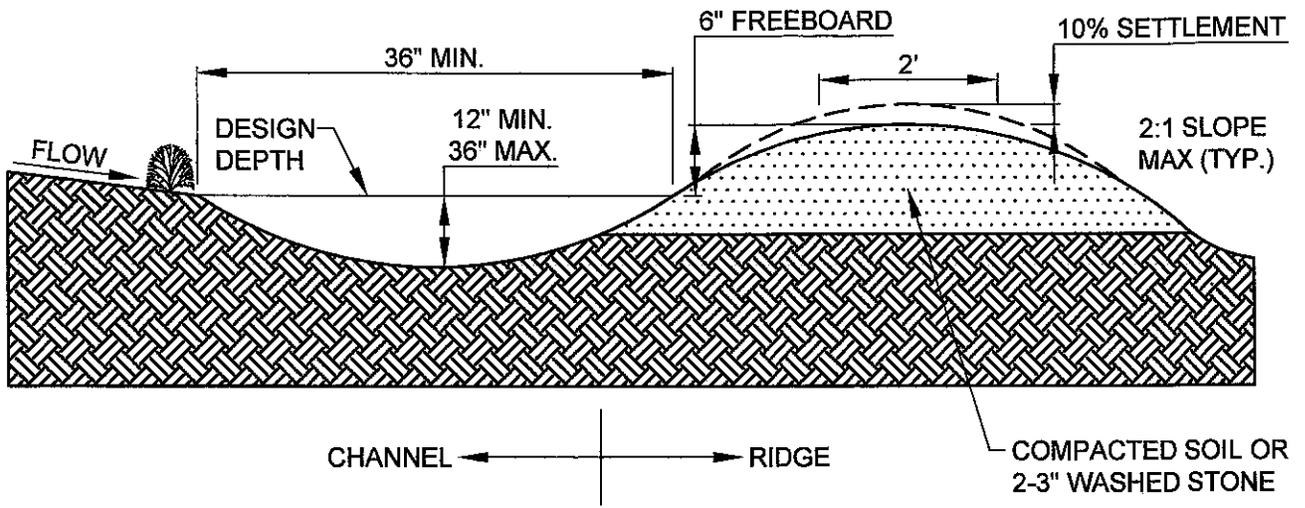
- Inspect at least every two weeks and after every storm
- Remove sediment once sediment reaches 1/2 design depth, as indicated on monitoring posts
- Remove any trash accumulation
- Repair, revegetate or stabilize any erosion damage

SITE CONDITIONS FOR REMOVAL:

After permanent vegetation of slope is established

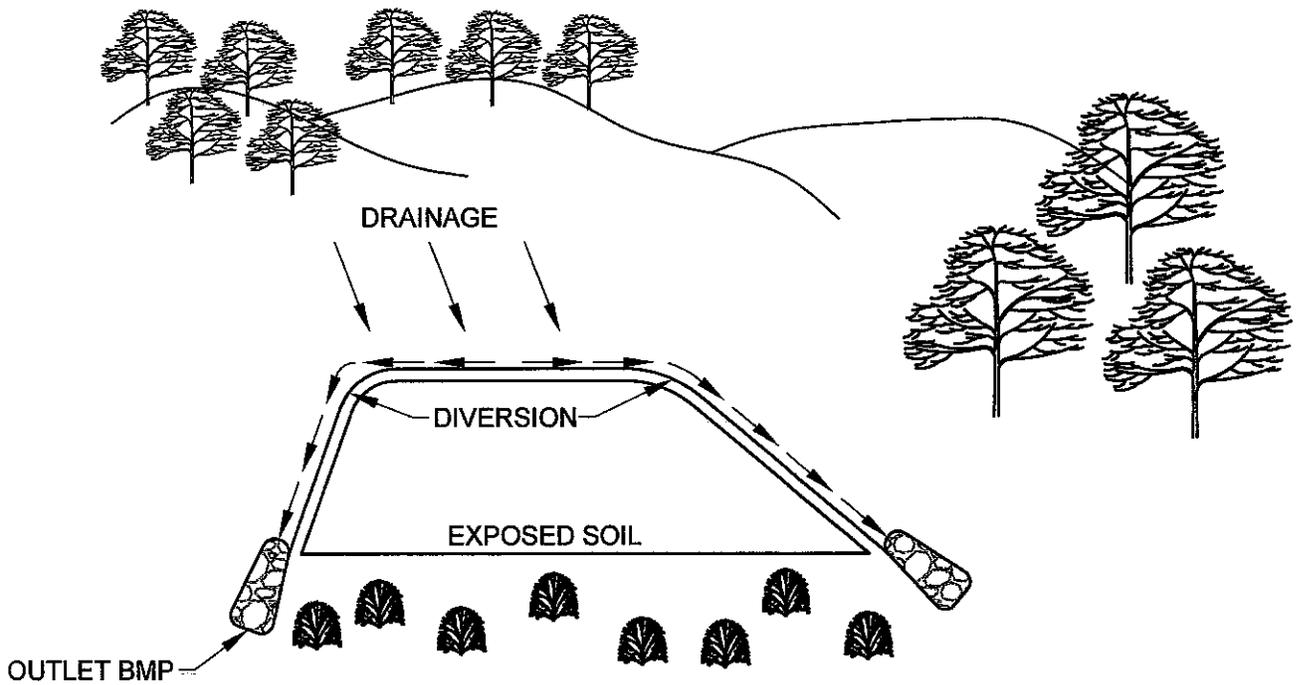
TYPICAL DETAILS:

RM-2

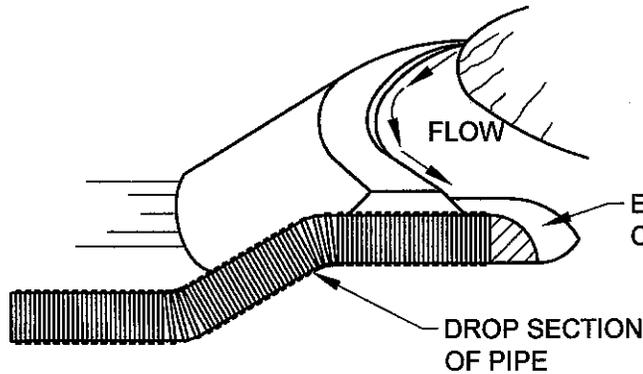


CROSS-SECTION

ALL SURFACES WITH MULCH, SEED OR GRAVEL



TYPICAL PERIMETER PROTECTION



NOTE:
SEE TEMPORARY SLOPE DRAIN BMP
FOR ADDITIONAL INFORMATION

**TYPICAL TOP OF
SLOPE INSTALLATION**

CITY OF CARTHAGE	
TYPICAL BMP DETAIL	
DIVERSIONS-RIDGE AND CHANNEL	
REVISION NUMBER	DRAWING NUMBER
0	RM-2

DIVERSION-STORM SEWER

PHYSICAL DESCRIPTION:

A stabilized diversion designed to redirect the flow of a storm sewer system while work that impacts the system is performed. Diversions can be in the form of pipes or channels, and can handle the flows of creeks or streams or at the outlets of storm sewer pipes. Diversion channels must be stabilized to prevent erosion. Diversions can release runoff directly into the storm sewer system downstream or to additional BMPs such as sediment traps, sediment basins or rock outlets. BMPs, such as check dams, can also be used in diversion channels to slow velocities.

WHERE BMP IS TO BE INSTALLED:

Around locations that impact the flow of runoff in storm sewer systems. Diversion route should be located to minimize impact on other construction activities.

CONDITIONS FOR EFFECTIVE USE OF BMP:

Type of Flow: Concentrated flow
Capacity of diversion device: Sized for 15-year, 20-minute storm, while minimizing velocity of flow

WHEN BMP IS TO BE INSTALLED:

Prior to disturbance of area impacting the function of the storm sewer system

INSTALLATION/CONSTRUCTION PROCEDURES:

- Excavate diversion area except for area of upstream connection
- Compact as required to place diversion properly
- Install pipe bedding or channel lining as required
- Install pipe and backfill to required dimensions
- Install additional BMPs as designed - both in the diversion and downstream
- Make final connection to upstream storm sewer

O&M PROCEDURES:

- Inspect at least every two weeks and after every storm
- Remove trash and leaves
- Remove sediment once sediment reaches 6 inches in depth
- Repair eroded areas and stabilize - a wider channel or additional stabilization may need to be designed

SITE CONDITIONS FOR REMOVAL:

Remove after work impacting existing storm sewer has been completed and stabilized

TYPICAL DETAILS:

Not Applicable

GRADIENT TERRACES

PHYSICAL DESCRIPTION:

Defined swales constructed at regular intervals along the face of a slope designed to reduce erosion by capturing surface runoff and directing it to an adequate, stable outlet. Due to the steep slopes needed to create the terrace, swales may only be created by construction of earth ridges.

WHERE BMP IS TO BE INSTALLED:

Typically installed on long steep slopes on which erosion is a concern. Gradient terraces should not be constructed in sandy or rocky soil.

CONDITIONS FOR EFFECTIVE USE OF BMP:

Type of Flow:	Sheet flow
Slope Characteristics:	Maximum of 3:1 slope
Contributing Slope Length:	Maximum of 30 feet for slopes steeper than 4:1; maximum of 50 feet for 4:1 and flatter
Outlet:	HGL of outlet BMP less than or equal HGL of terrace in 15-year, 20-minute storm

WHEN BMP IS TO BE INSTALLED:

Installed as fill is constructed. On existing slopes, terraces should be graded prior to removal of vegetation.

INSTALLATION/CONSTRUCTION PROCEDURES:

- Grade terraces as required
- Construct stable outfall as designed
- Vegetate gradient terrace

O&M PROCEDURES:

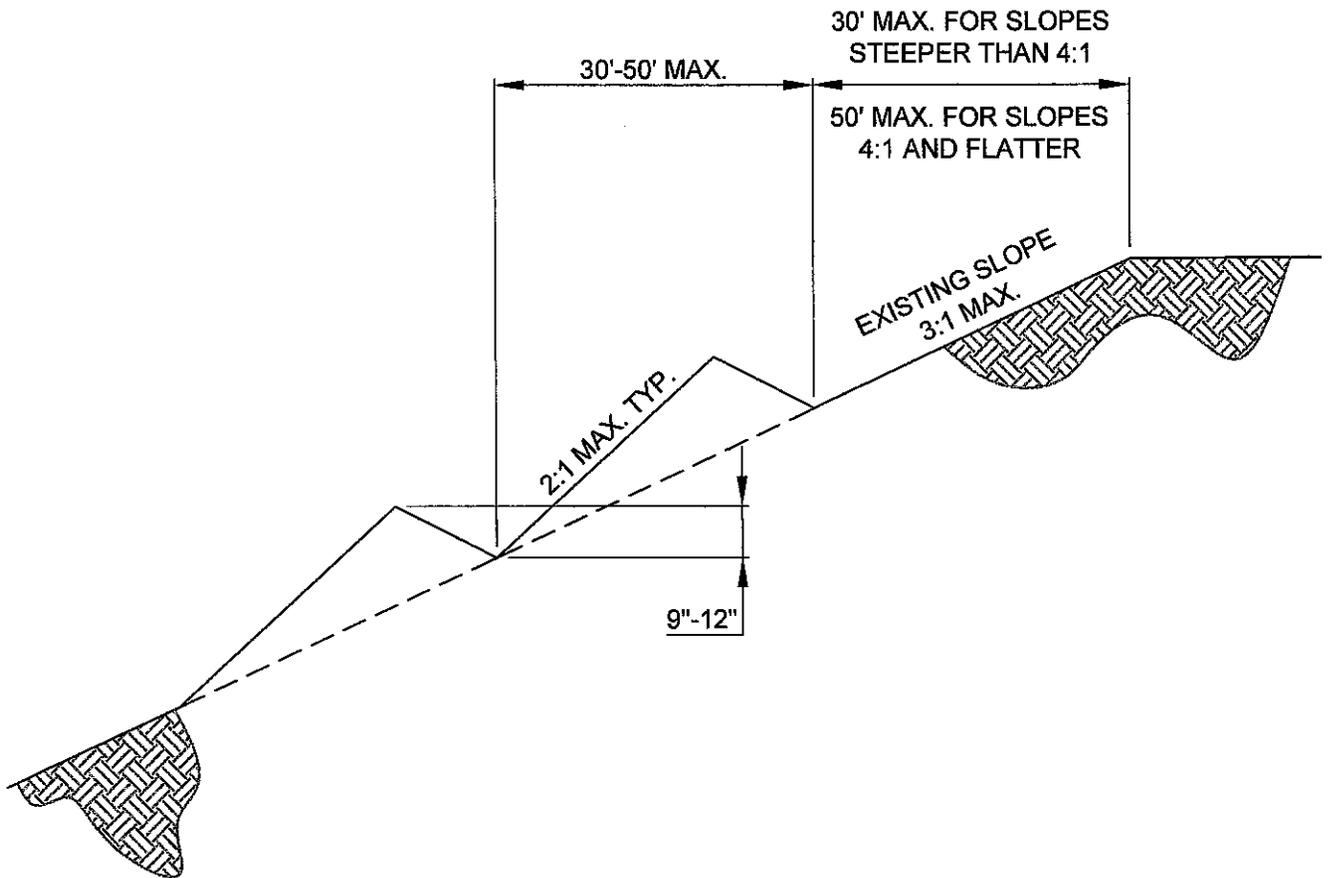
- Inspect at least every two weeks and after every storm during construction and annually thereafter
- Remove sediment accumulations once channel depth is reduced to 6 inches
- Repair settlement and eroded areas
- Remove sediment and stabilize eroded areas at outlet
- Revegetate as needed

SITE CONDITIONS FOR REMOVAL:

Not Applicable

TYPICAL DETAILS:

RM-4



NOTES:

1. MAXIMUM CONTINUOUS LENGTH OF 2:1 SLOPE SHALL BE 15'.
2. TERRACE SHALL SLOPE AT 1%-3% AND DRAIN TO AN ADEQUATE OUTLET.
3. TERRACES MAY ONLY BE FORMED BY CONSTRUCTION OF A BERM.

 CITY OF CARTHAGE	
TYPICAL BMP DETAIL	
GRADIENT TERRACES	
REVISION NUMBER	DRAWING NUMBER
0	RM-4

GRASS LINED CHANNEL

PHYSICAL DESCRIPTION:

Trapezoidal or parabolic storm water conveyance channel lined with vegetation, designed to direct runoff and reduce the flow velocity of concentrated runoff. Channels should outlet into sediment traps, detention/retention basins, or other stable outlets. In area with seasonally high water tables or seepage problems, subsurface drains are included under the channel. Grassed channels have a limited ability to control runoff from large storms and are often used in combination with other BMPs, such as subsurface drains and rip rap stabilization.

WHERE BMP IS TO BE INSTALLED:

Used in areas where erosion-resistant conveyances are needed, including areas with highly erodible soils and moderately steep channel slopes - less than 5%. Channels should only be installed where space is available for a relatively large cross section. Channels should not make sharp, unnatural changes in direction or grade of flow.

CONDITIONS FOR EFFECTIVE USE OF BMP:

Type of Flow: Concentrated flow
Flow Properties: Maximum velocity of 5 fps

WHEN BMP IS TO BE INSTALLED:

Immediately after clearing, prior to upstream grading activities

INSTALLATION/CONSTRUCTION PROCEDURES:

- Excavate and shape channel to required section
- Install subsurface drain, if needed
- Install erosion resistant lining, such as rip rap or sod, at concentrated inflow points
- Prepare and fertilize soil
- Install sod, seed with protection, such as erosion control blankets, turf reinforcement mats, or hydroseeding
- Sod should be perpendicular to flow, with a brick-like joint pattern. Stake, staple and/or net corners and centers of sod strips as required.
- Install lathe or post at each end of channel, and at 20 foot intervals. Mark maximum allowable sediment depth at 6 inches
- Water immediately after installation - enough to soak 4 inches into soil without causing runoff

O&M PROCEDURES:

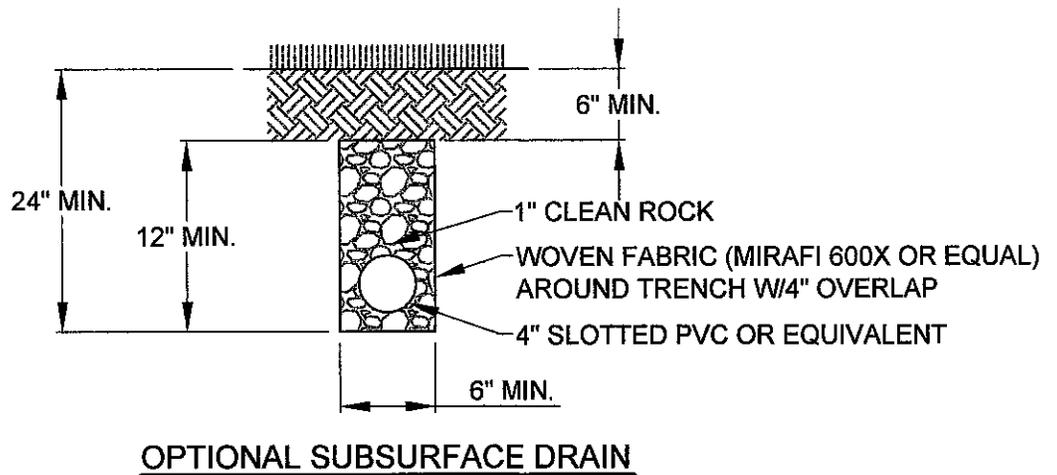
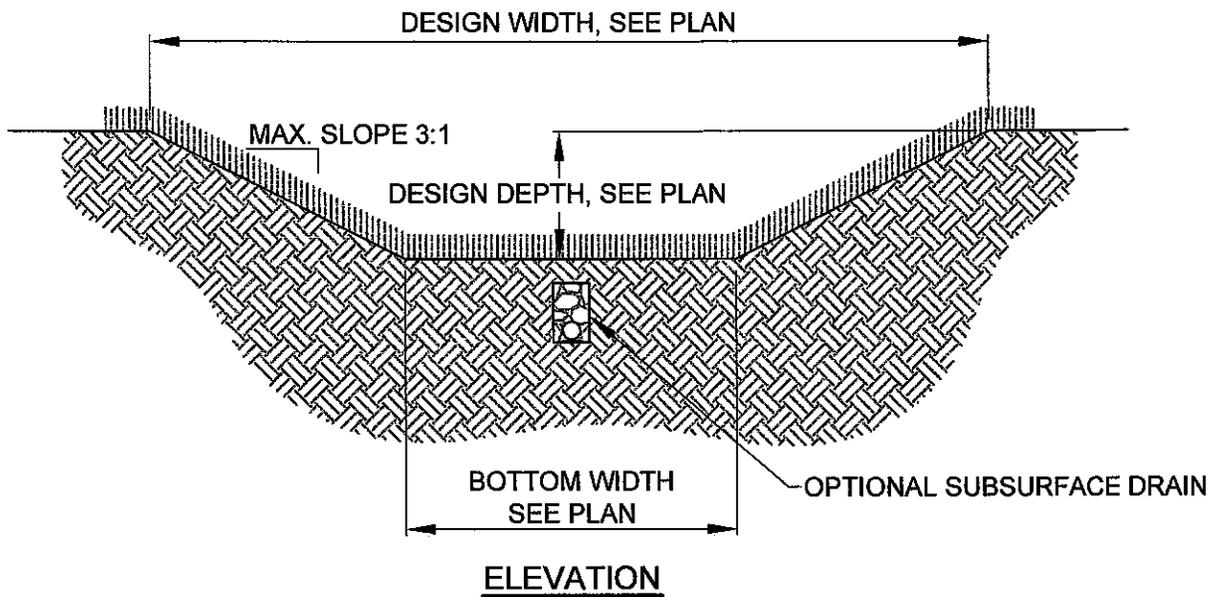
- Water sod daily for 3 weeks - enough to soak 4 inches into soil without causing runoff
- Inspect at least every two weeks and after every storm for the duration of construction or 6 months, whichever is longer
- Remove any blockage and or debris from channel, channel outlet or road crossings
- Reposition areas of sod that have moved
- Remove sediment accumulation once sediment reaches 6 inches in depth, as indicated on the monitoring posts - replace vegetation if necessary
- Repair any eroded areas, revegetate, and stabilize as needed
- Do not mow until 3 inches of new growth occurs. During the first 4 months do not mow more than 1/3 the grass height

SITE CONDITIONS FOR REMOVAL:

Temporary channels can be removed after permanent storm sewer is operational.

TYPICAL DETAILS:

RM-5



 CITY OF CARTHAGE	
TYPICAL BMP DETAIL GRASSED LINED CHANNEL	
REVISION NUMBER 0	DRAWING NUMBER RM-5

GRAVEL BAGS

PHYSICAL DESCRIPTION:

Open mesh nylon or burlap bags of gravel designed to pond water and cause sediment to settle out. Gravel bags can be used alone or as a part of other best management practices.

WHERE BMP IS TO BE INSTALLED:

Suitable for multiple uses including disrupting concentrated flows, redirecting concentrated flows, capturing sediment by ponding, and anchoring other devices. Can be used in place of silt fence, rock check dams, rock outlet protection, ridge diversions, inlet protection, and level spreader, or as part of the structure of sediment basins, sediment traps, storm drain diversions, and structural stabilization of streams.

CONDITIONS FOR EFFECTIVE USE OF BMP:

Type of Flow: Sheet flow and concentrated flow

WHEN BMP IS TO BE INSTALLED:

Dependent upon function it is designed to perform

INSTALLATION/CONSTRUCTION PROCEDURES:

- Fill bags approximately 2/3 full
- Grade and stabilize soil on which bags are to be placed
- Install center line of bags on bottom row
- Place remaining bags on each side of center - minimum width of bottom row is 3 bags
- Place upper rows of bags, staggering ends in brick-like pattern

O&M PROCEDURES:

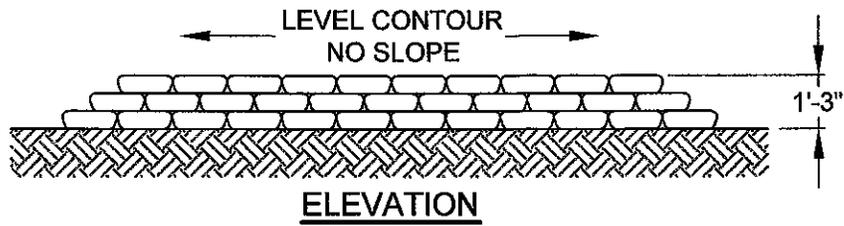
- Inspect at least every two weeks and after every storm
- Replace and stabilize any damaged bags or bags that have moved out of place
- When silt builds up in front of a row of gravel bags performing the function of silt fence, move the row of bags in front of the sediment buildup. The "new row" will capture additional sediment and keep concentrated flows from reaching the previous sediment deposit.
- Remove sediment at rows of bags used as weirs or lips. Bags may be repositioned to facilitate removal of sediment.

SITE CONDITIONS FOR REMOVAL:

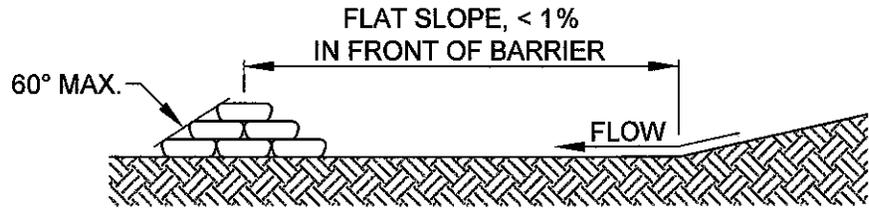
Completion of upstream work and vegetation of contributing runoff areas.

TYPICAL DETAILS:

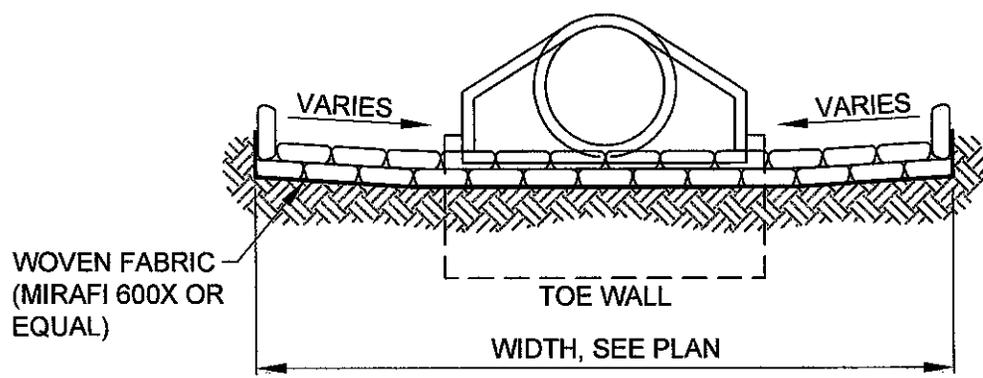
RM-6



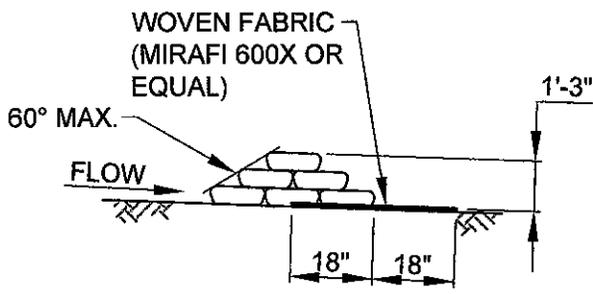
ELEVATION



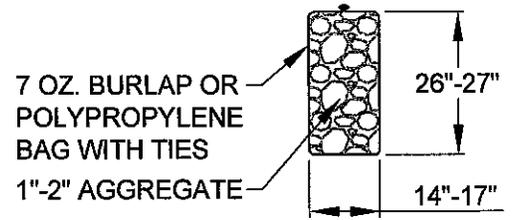
GRAVEL BAGS AS SILT FENCE



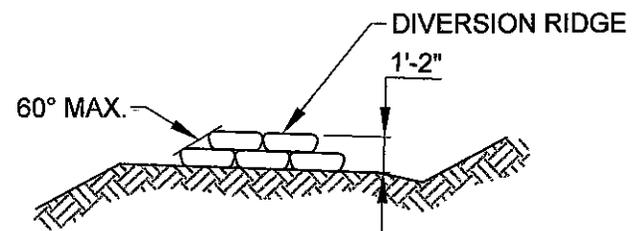
GRAVEL BAGS AS ROCK OUTLET PROTECTION



GRAVEL BAGS AS CHECK DAM



GRAVEL BAG
NOTE: FILL BAGS 2/3 FULL,
60 LBS. MAX. WEIGHT



GRAVEL BAGS AS DIVERSION RIDGE

CITY OF CARTHAGE	
TYPICAL BMP DETAIL	
GRAVEL BAGS	
REVISION NUMBER	DRAWING NUMBER
0	RM-6

LEVEL SPREADER

PHYSICAL DESCRIPTION:

A level graded area designed to slow and spread runoff and release it as sheet flow to a stabilized area. The level spreader outfall can be stabilized by vegetation, erosion control blankets or a combination wood timber and gravel. Undisturbed vegetated areas with a maximum slope of 10% at the outfall do not require stabilization.

WHERE BMP IS TO BE INSTALLED:

At downstream end of diversion devices and upstream end of filter strips

CONDITIONS FOR EFFECTIVE USE OF BMP:

Type of Flow: Sheet flow and concentrated flow
Contributing Area: Flow from 15-year, 20-minute storm under 5 cfs for vegetated lip, and up to 30 cfs for rigid lip

WHEN BMP IS TO BE INSTALLED:

Immediately after rough grading - concurrent with diversion devices prior to completion of filter strips downstream

INSTALLATION/CONSTRUCTION PROCEDURES:

- Excavate to length, width, depth and slopes specified on plan
- For rigid lip, excavate and stabilize a level area for timber and gravel. Fill remaining excavated area behind timber with gravel.
- Seed and net or hydroseed "channel" area of spreader
- For vegetated lip, staple erosion control blanket to protect lip
- Stabilize outfall area as depicted on plan
- Install lathe or post at each end and center of spreader. Mark maximum allowable sediment depth at 1/2 the depth of the spreader.

O&M PROCEDURES:

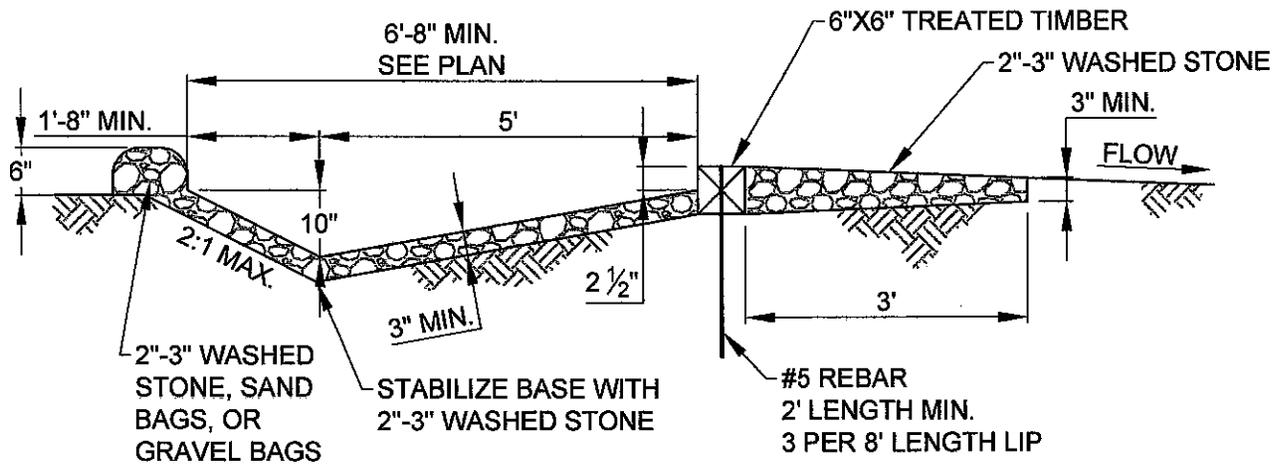
- Inspect at least every two weeks and after every storm
- Remove sediment accumulations once sediment reaches 1/2 design depth, as indicated on monitoring posts
- Repair and revegetate any erosion damage in spreader "channel" or downstream of lip

SITE CONDITIONS FOR REMOVAL:

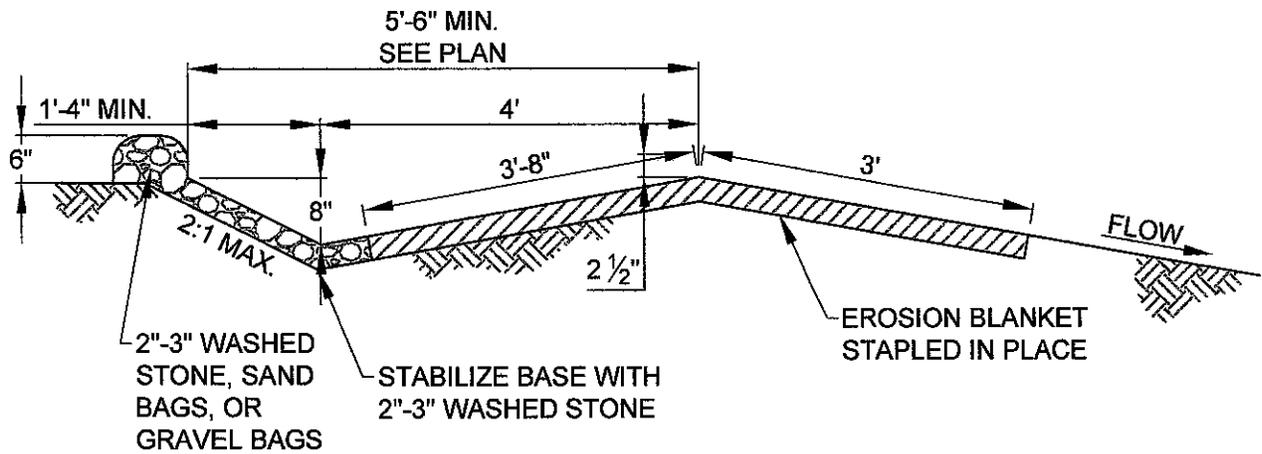
Remove after upstream areas are stabilized with vegetation, subsequent to diversion devices

TYPICAL DETAILS:

RM-7



RIGID LIP WITH TIMBER
 (DESIGN FLOWS 5 C.F.S. TO 20 C.F.S.)



VEGETATED LIP
 (DESIGN FLOWS LESS THAN 5 C.F.S.)

 CITY OF CARTHAGE	
TYPICAL BMP DETAIL	
LEVEL SPREADER	
REVISION NUMBER	DRAWING NUMBER
0	RM-7

SURFACE ROUGHENING

PHYSICAL DESCRIPTION:

Continuous horizontal grooves on the surface of slopes designed to reduce runoff velocity, increase infiltration, reduce erosion and trap sediment. Roughening can also be used when other methods of erosion/siltation control are not immediately available. In this case, surface roughening should be supplemented with other BMPs as soon as possible.

WHERE BMP IS TO BE INSTALLED:

At the top of, and at intermediate points along, disturbed slopes to disrupt low-volume, concentrated flows, and/or at the base of disturbed slopes to slow water runoff and capture sediment laden runoff

CONDITIONS FOR EFFECTIVE USE OF BMP:

Type of Flow: Sheet flow
Contributing Area: Unlimited on slopes < 10%
Slopes > 10% require additional BMPs (such as diversion channel)

WHEN BMP IS TO BE INSTALLED:

Immediately after rough grading; prior to seeding or mulching

INSTALLATION/CONSTRUCTION PROCEDURES:

- Using light weight machinery, such as tractors with a harrow, disk or box grader attachment, drag surface to create series of grooves and ridges perpendicular to water flow
- Light weight, track driven equipment, such as a skid-steer, can be used to create the grooves; however, travel direction up and down the slope is required

O&M PROCEDURES:

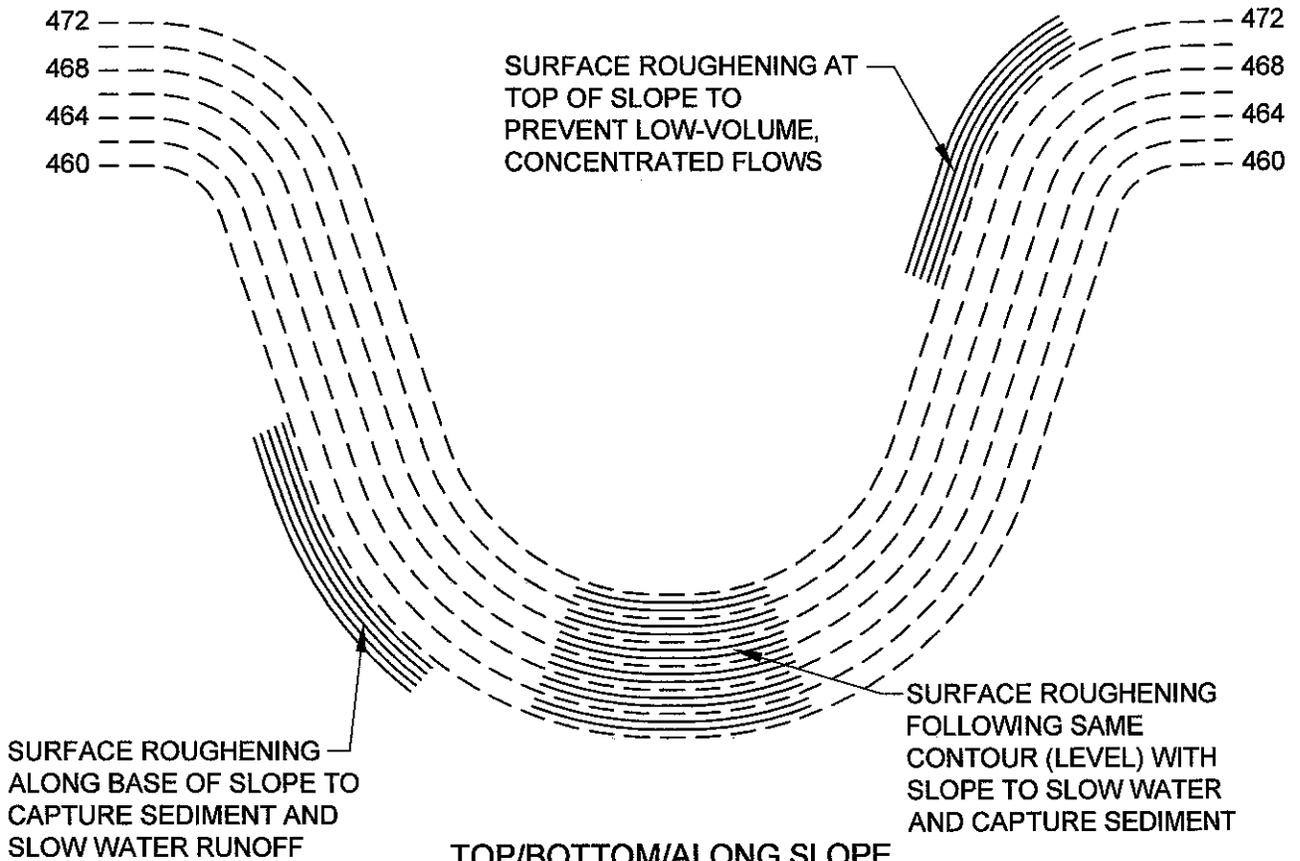
- Inspect at least every two weeks and immediately after storms
- Rework the slope and regroove after sediment buildup is deeper than 1/2 the groove depth
- Rework the slope and regroove if rills have cut across the roughened surface

SITE CONDITIONS FOR REMOVAL:

The slope should be reworked to the design grades immediately prior to final stabilization. In some cases, such as seeding the area, the roughened area could be left as is.

TYPICAL DETAILS:

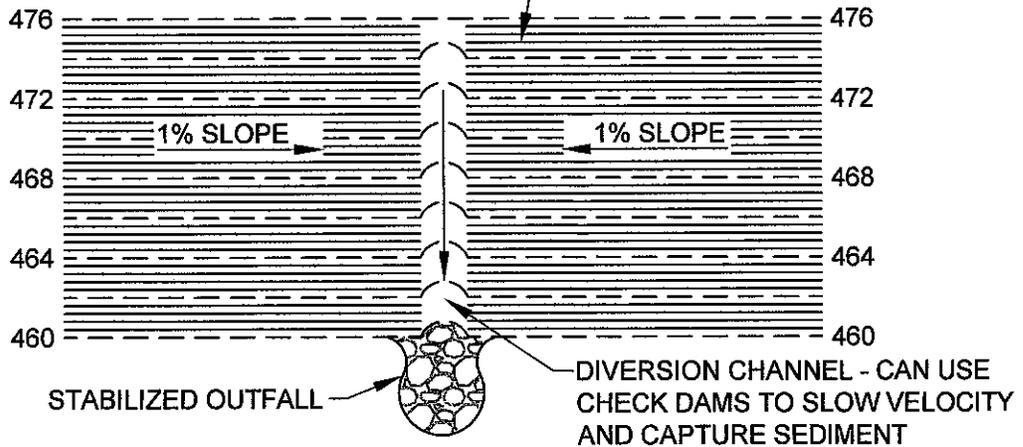
RM-8



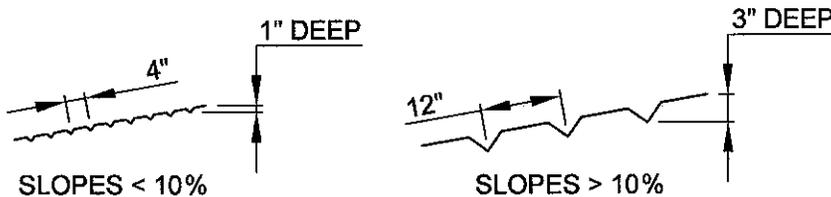
TOP/BOTTOM/ALONG SLOPE
SURFACE ROUGHENING TYPES

*TYPES CAN BE USED INDIVIDUALLY OR IN COMBINATIONS TO INCREASE EFFECTIVENESS

SURFACE ROUGHENING WITH SLIGH (1% MAX) DOWN SLOPE TO DIRECT RUNOFF INTO DIVERSION CHANNEL



DOWN SLOPE SURFACE ROUGHENING
WITH DIVERSION CHANNEL



PROFILES

CITY OF CARTHAGE	
TYPICAL BMP DETAIL	
SURFACE ROUGHENING	
REVISION NUMBER	DRAWING NUMBER
0	RM-8

TEMPORARY SLOPE DRAIN

PHYSICAL DESCRIPTION:

A flexible tubing or rigid conduit extending from the top to the bottom of a cut or fill slope designed to protect exposed slopes from upstream runoff. Slope drains typically extend beyond the toe of the slope to a stable area or outlet.

WHERE BMP IS TO BE INSTALLED:

Typically installed on long slopes where runoff cannot easily be directed to the ends of a section of cut or fill

CONDITIONS FOR EFFECTIVE USE OF BMP:

Type of Flow: Sheet flow and concentrated flow
Contributing Area: Maximum 5 acres per slope drain; pipe sized for 15-year, 20-minute storm

WHEN BMP IS TO BE INSTALLED:

Concurrently with diversion devices and at the end of each work day for slopes 10 feet or more in height

INSTALLATION/CONSTRUCTION PROCEDURES:

Temporary slope drains must be installed and maintained properly because failure will usually result in severe erosion of the slope. Other points of concern are failure from overtopping due to inadequate pipe inlet capacity or blockage, and lack of maintenance of the upstream diversion device capacity.

- Install slope drain down the slope, extending beyond the toe of the slope
- Install flared end or t-section at pipe inlet. Section should be well entrenched and stable so water can enter freely.
- Compact fill over an around pipe in area of diversion device
- Ensure that all pipe connections are secure and watertight
- Securely anchor the exposed section of the drain with stakes
- Install flared end section at pipe outlet - discharge into a sediment trap or other stabilized outlet

O&M PROCEDURES:

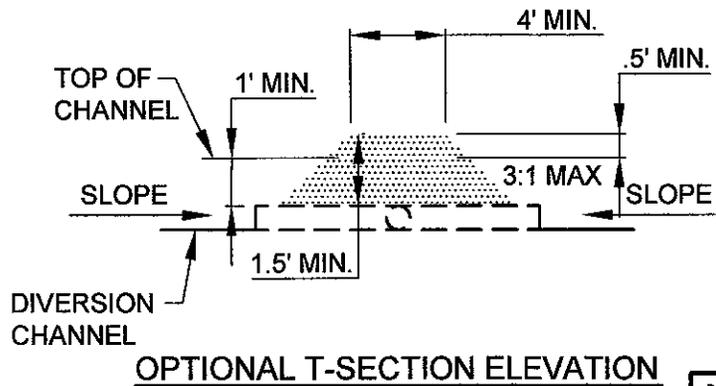
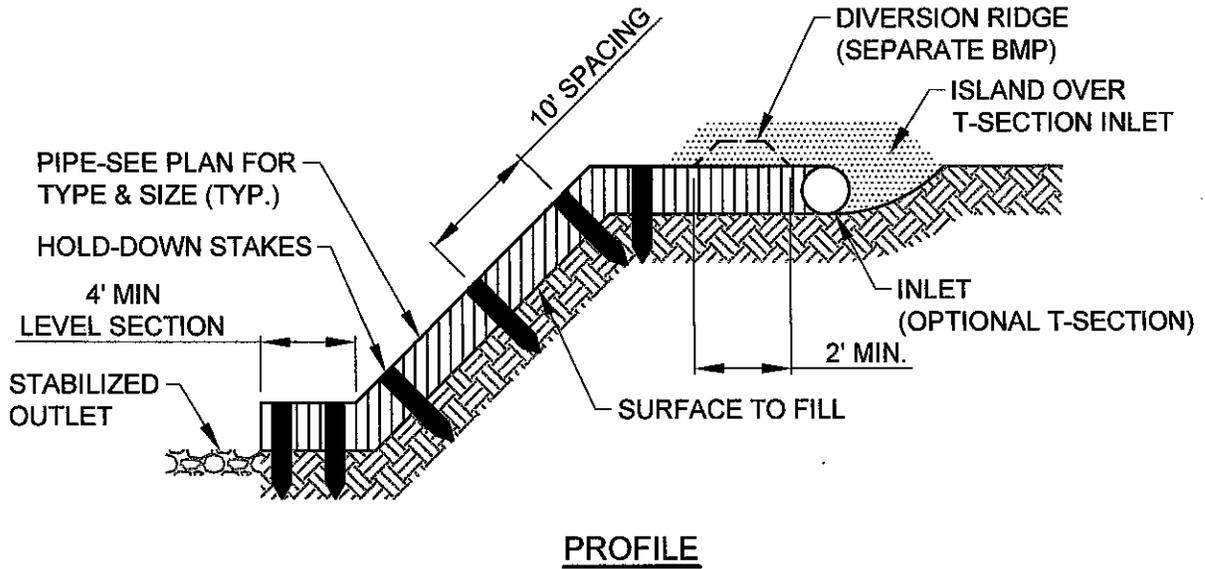
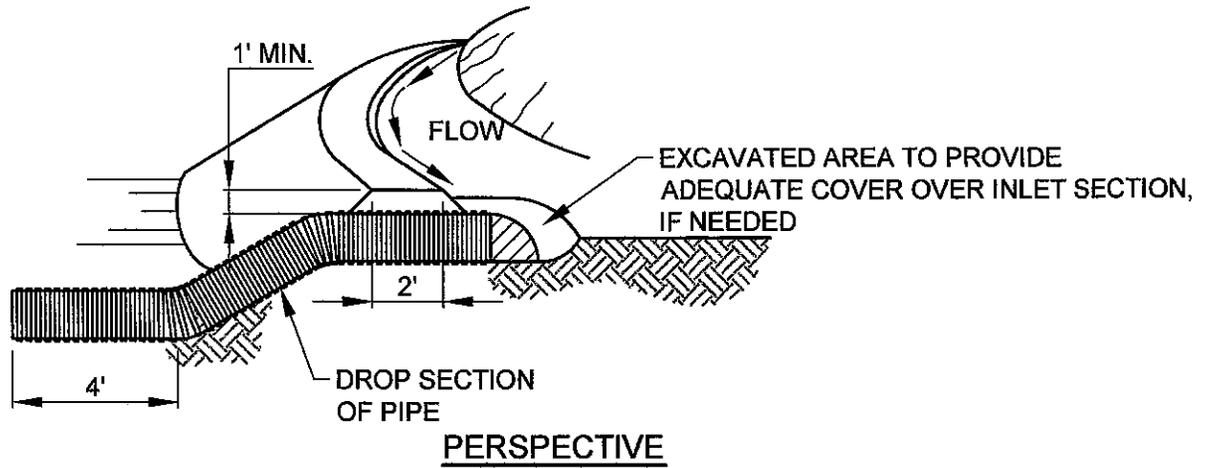
- Inspect at least every two weeks and after every storm
- Remove sediment and trash accumulation at inlet
- Repair settlement, cracking, or piping holes
- Repair leaks or inadequate anchoring along pipe
- Remove sediment and stabilize eroded areas at outlet - extend if necessary

SITE CONDITIONS FOR REMOVAL:

Remove concurrently with upstream diversion device; immediately prior to permanent vegetation of slope

TYPICAL DETAILS:

RM-9



CITY OF CARTHAGE	
TYPICAL BMP DETAIL	
DIVERSIONS-RIDGE AND CHANNEL	
REVISION NUMBER	DRAWING NUMBER
0	RM-9

FILTER STRIP

PHYSICAL DESCRIPTION:

A wide belt of vegetation running along a contour designed to provide infiltration, intercept sediment and other pollutants, and reduce stormwater flow and velocity. Vegetation may be in the form of natural wooded strip or proposed mix of erosion resistant plants that form a dense mat and effectively bind the soil.

WHERE BMP IS TO BE INSTALLED:

Adjacent to low or medium density residential areas on gently sloping ground (less than 15% slope)

CONDITIONS FOR EFFECTIVE USE OF BMP:

Type of Flow: Overland sheet flow only - cannot treat high velocity flows

Contributing Area: Maximum of 5 acres with less than 15% slope

WHEN BMP IS TO BE INSTALLED:

Immediately after rough grading to trap sediment during construction and/or immediately after final grading as a permanent measure to control surface runoff

INSTALLATION/CONSTRUCTION PROCEDURES:

- Fence off any undisturbed wooded strips to be preserved. No activity, including parking vehicles or equipment and storing clearing, grubbing or construction debris, shall be permitted in the wooded strip

If a grass filter strip is constructed, it must be completed and vegetated before construction in the impervious area is started.

- Clear and grub the filter strip area
- If the adjacent area does not have a level edge, install a level spreader to distribute runoff evenly. See Level Spreader BMP for information.
- Fertilize and vegetate strip with erosion resistant plants that form a dense mat and effectively bind the soil. Eg: crown vetch, sod, or seed and mulch

O&M PROCEDURES:

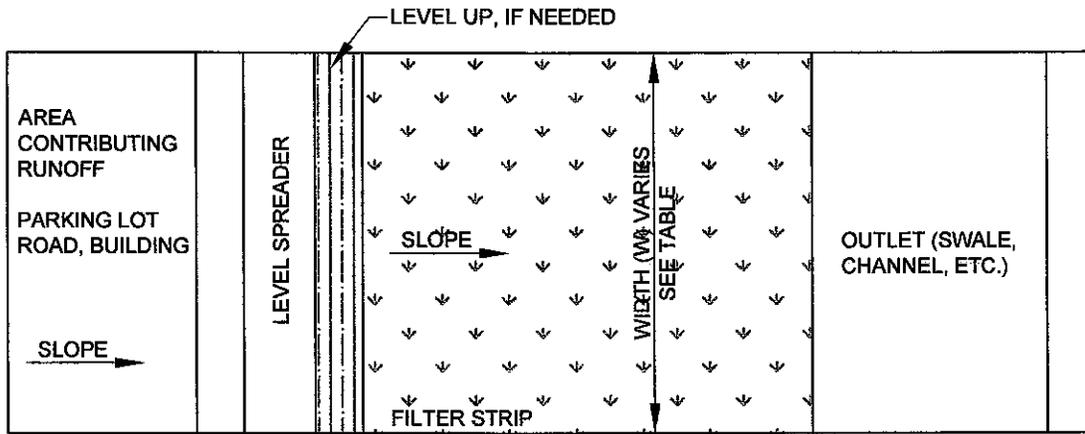
- Inspect at least every two weeks and after every storm during construction, and annually thereafter
- Fill and compact eroded areas and reseed, mulch and fertilize or establish other vegetation in the affected areas
- After improvements are complete, regrade and reseed the top edge of the filter strip to remove sediment trapped during construction and prolong the effective use of the filter strip.
- Protect new plantings from wildlife
- Mow grass strips to a height of 6 to 12 inches two to three times a year to suppress seeds and woody vegetation unless natural, woody vegetation is planned
- Repair foot paths and traffic ruts

SITE CONDITIONS FOR REMOVAL:

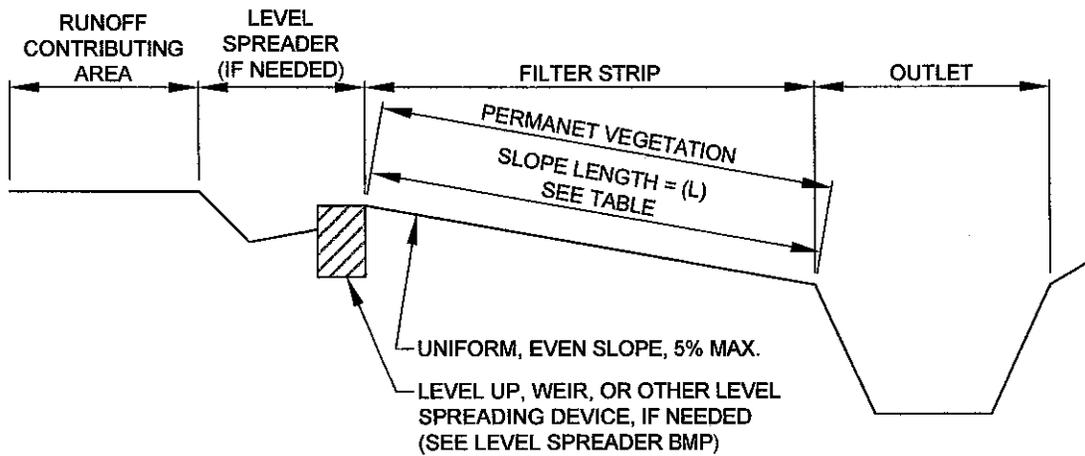
Not Applicable

TYPICAL DETAILS:

SC-1



PLAN VIEW



SECTION VIEW

SLOPE OF LAND %	WIDTH (W) OF FILTER STRIP FOR GRASSED AREAS (ft)	WIDTH (W) OF FILTER STRIP FOR WOODED AREAS (ft)	SLOPE LENGTH (L) OF FILTER STRIP
0	10	25	Lmin. = LENGTH OF CONTRIBUTING AREA, 50' MIN.
2	12	29	Lmin + 8 ft.
4	14	33	Lmin + 16 ft.
6	16	37	Lmin + 24 ft.
8	18	41	Lmin + 32 ft.
10	20	45	Lmin + 40 ft.
15	25	55	Lmin + 60 ft.

CITY OF CARTHAGE	
TYPICAL BMP DETAIL	
FILTER STRIP	
REVISION NUMBER	0
DRAWING NUMBER	SC-1

INLET PROTECTION-BLOCK & GRAVEL

PHYSICAL DESCRIPTION:

A temporary sediment control barrier consisting of a short concrete block wall supporting gravel filter media around a gated inlet designed to prevent sediment from entering the storm sewer. Shallow temporary ponding during and after rainfall should be expected.

WHERE BMP IS TO BE INSTALLED:

At inlets where heavy flows are expected and an overflow capacity is necessary to prevent excessive ponding around the structure

CONDITIONS FOR EFFECTIVE USE OF BMP:

Type of Flow: Sheet flow and concentrated flow
Contributing Area: Maximum of 1 acre

WHEN BMP IS TO BE INSTALLED:

Immediately after placement of inlet

INSTALLATION/CONSTRUCTION PROCEDURES:

- Backfill, compact and uniformly grade area around inlet
- Install first row of concrete blocks adjacent to the inlet sill, placing one block on its side on each side of inlet. The blocks are placed against the sill for lateral support and to avoid washouts when overflows occur.
- If needed for lateral support, install 2 x 4 lumber through vertical block openings
- Fill vertical block openings with gravel for stability
- place second row of block offsetting one-half block from the first row, in a brick-like pattern
- Fill vertical block openings with gravel
- Anchor wire screen over horizontal block openings to support gravel
- Place gravel around the blocks

O&M PROCEDURES:

- Inspect at least every two weeks and after every storm
- Remove sediment accumulation to keep it at least 8 inches from the top of the blocks
- Remove trash accumulation at inlet
- Repair elements to original configuration as needed

SITE CONDITIONS FOR REMOVAL:

Remove after contributing drainage areas have been adequately stabilized. Restore area to grade and vegetate

TYPICAL DETAILS:

SC-2

2"x4" CONSTRUCTION GRADE LUMBER IF NEEDED FOR LATERAL SUPPORT (TYP)

CONCRETE BLOCKS

2" CLEAN GRAVEL

INLET SILL

WIRE SCREEN - HARDWARE CLOTH OR OTHER MESH WITH 1/2" OPENINGS

PLAN VIEW

2"x4" CONSTRUCTION GRADE LUMBER IF NEEDED FOR LATERAL SUPPORT (TYP)

WIDE SCREEN

OVERFLOW

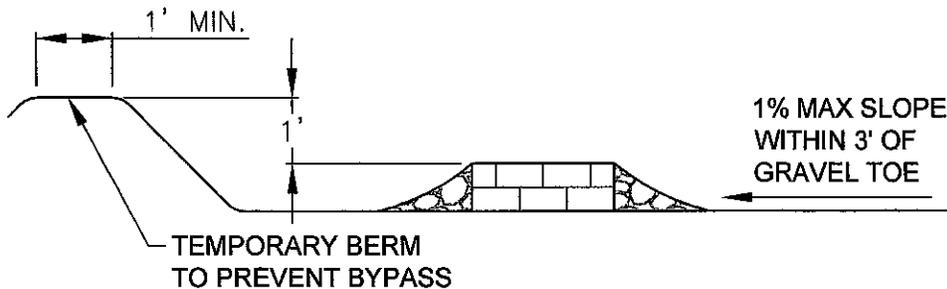
2"

SLOPE 2:1 OR FLATTER

FLOW

BOTTOM OF BLOCKS SHALL BE SET 2" LOWER THAN THE INLET SILL

SECTION A-A



DOWNSTREAM BERM

CITY OF CARTHAGE	
TYPICAL BMP DETAIL	
INLET PROTECTION- BLOCK AND GRAVEL	
REVISION NUMBER	DRAWING NUMBER
0	SC-2

INLET PROTECTION-FABRIC DROP

PHYSICAL DESCRIPTION:

A woven fabric barrier braced around an area inlet designed to prevent sediment from entering the storm sewer. Shallow temporary ponding during and after rainfall should be expected.

WHERE BMP IS TO BE INSTALLED:

At inlets designed to drain a small gently sloping area with maximum grade of 5%. Overflow capacity is limited on standard area inlets.

CONDITIONS FOR EFFECTIVE USE OF BMP:

Type of Flow: Shallow sheet flow
Contributing Area: Maximum of 2 cfs flowing to inlet

WHEN BMP IS TO BE INSTALLED:

Immediately after placement of inlet

INSTALLATION/CONSTRUCTION PROCEDURES:

- Backfill, compact and uniformly grade area around inlet
- Construct downstream berm, if required. Rock bags or sand bags may be used to construct berm
- Drive posts or wood frame close to inlet sill so overflow will fall directly on the structure and not on unprotected soil
- Dig trench around inlet for fabric to be buried
- Cut required length of fabric from one roll to eliminate joints. Fasten fabric tightly around posts/frame to enhance stability
- Backfill and compact trench

O&M PROCEDURES:

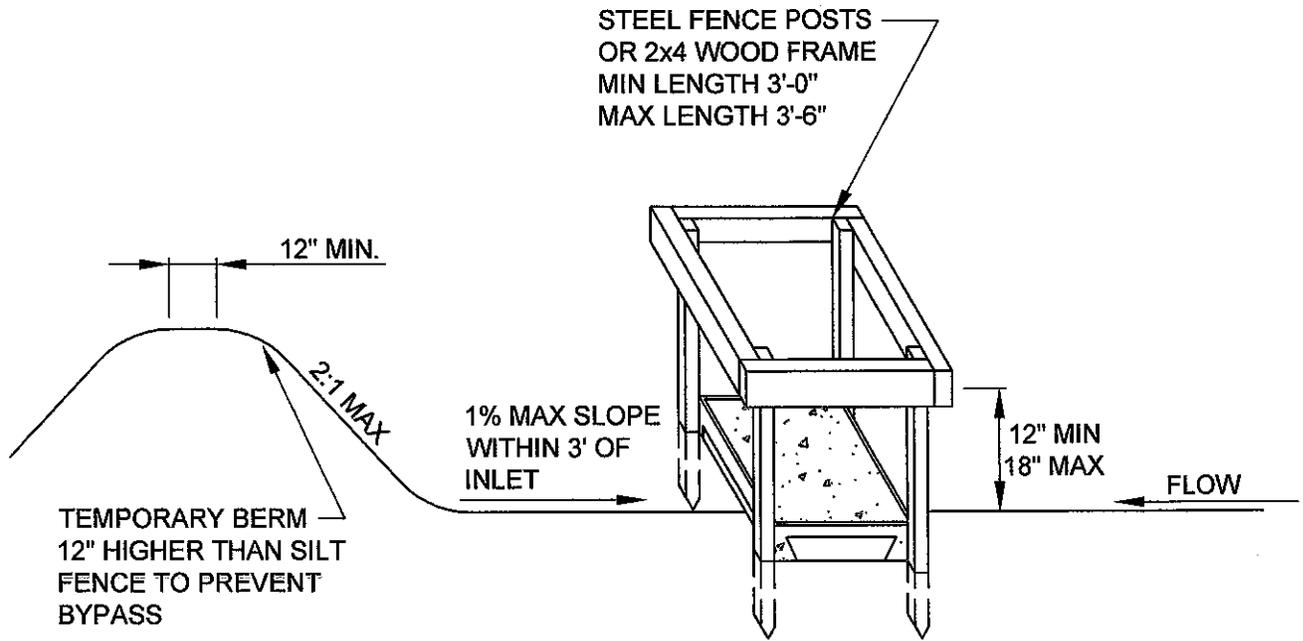
- Inspect at least every two weeks and after every storm
- Remove trash accumulation and sediment once it reached depth of 6 inches at inlet
- Replace loose, torn or clogged fabric
- Repair any erosion or settlement of temporary berm downstream of inlet

SITE CONDITIONS FOR REMOVAL:

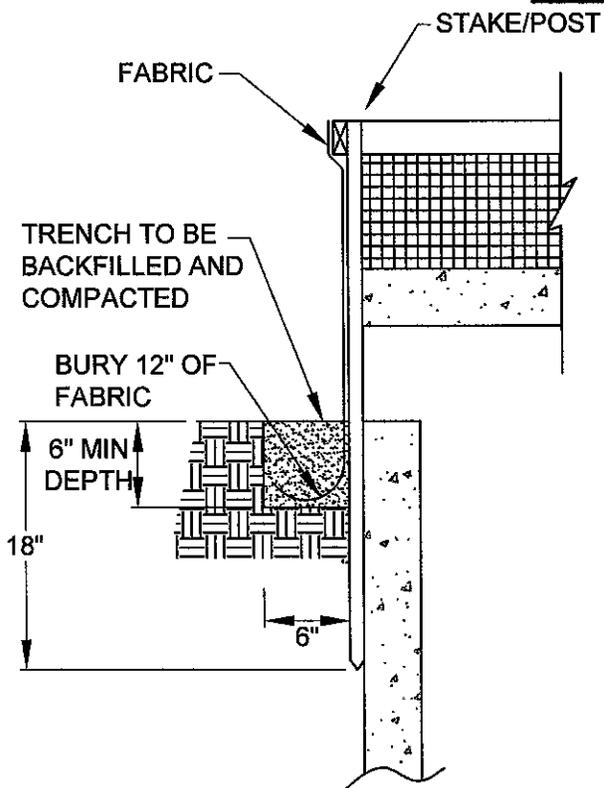
Remove after contributing drainage areas have been adequately stabilized. Restore area to grade and vegetate.

TYPICAL DETAILS:

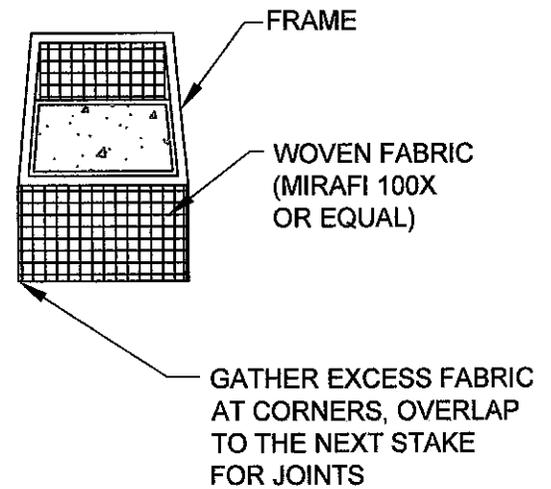
SC-3



PERSPECTIVE



SECTION



FABRIC

 CITY OF CARTHAGE	
TYPICAL BMP DETAIL	
INLET PROTECTION FABRIC DROP	
REVISION NUMBER	DRAWING NUMBER
0	SC-3

INLET PROTECTION-GRAVEL & WIRE MESH / PREMANUFACTURED SEDIMENT TRAP

PHYSICAL DESCRIPTION:

An open graded gravel, wire mesh and woven fabric filter barrier installed along the throat of a curb inlet designed to prevent sediment from entering the storm sewer. The barrier is supported by a wooden frame to provide stability and overflow capacity.

WHERE BMP IS TO BE INSTALLED:

Typically installed on pavement with slopes less than 2% and where flows are high

CONDITIONS FOR EFFECTIVE USE OF BMP:

Types of Flow: Sheet flow and concentrated flow
Contributing Area: Maximum of 2 acres due to reduction in inlet capacity

WHEN BMP IS TO BE INSTALLED:

One day after pavement is placed

INSTALLATION/CONSTRUCTION PROCEDURES:

- Construct wood frame to required dimensions and anchor in place
- Fasten wire mesh and fabric to frame, taking care to form flush with curb and pavement on both sides of inlet
- Place gravel to prevent water from entering the inlet under or around the fabric
- Place premanufactured sediment trap in front of inlet

O&M PROCEDURES:

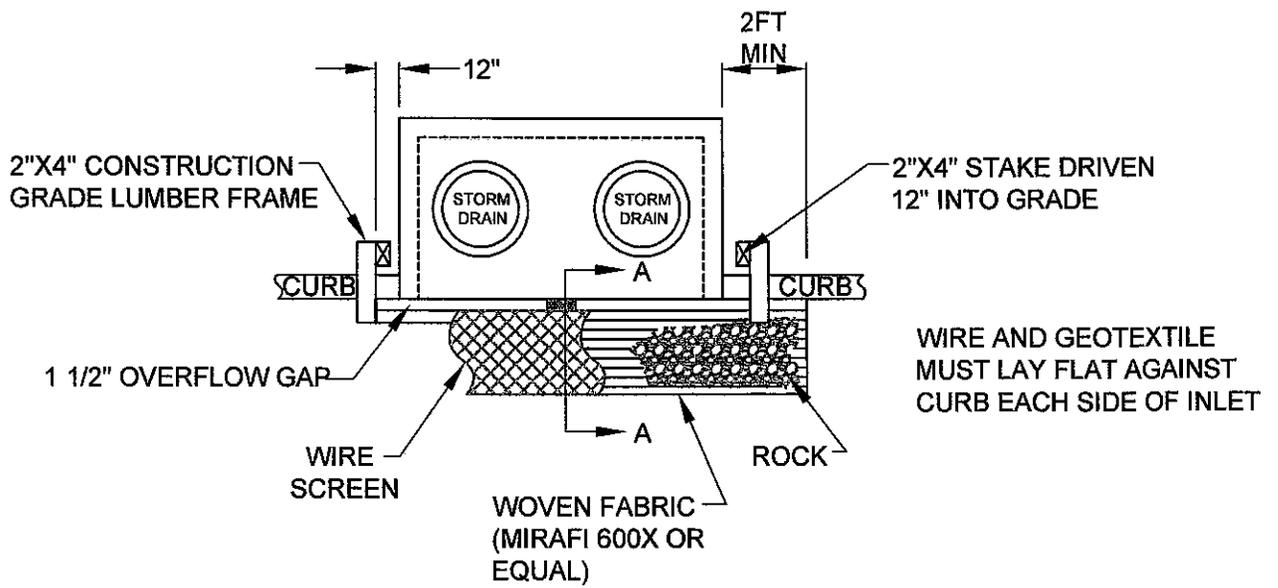
- Inspect at least every two weeks and after every storm
- Remove sediment accumulation once it is within 3 inches of the top of the inlet stone
- Remove trash accumulation at inlet
- Reposition/replace elements to original configuration as needed
- Repair inadequate anchoring of frame or fastening of mesh

SITE CONDITIONS FOR REMOVAL:

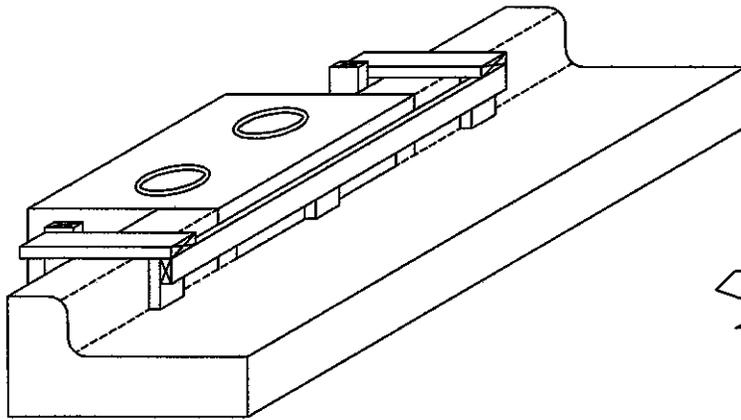
Remove after contributing drainage areas have been adequately stabilized

TYPICAL DETAILS:

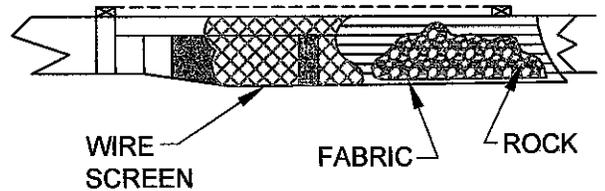
- SC-4.1 Inlet Protection: for use with gravel and wire mesh
SC-4.2 Inlet Protection: for use with premanufactured sediment trap



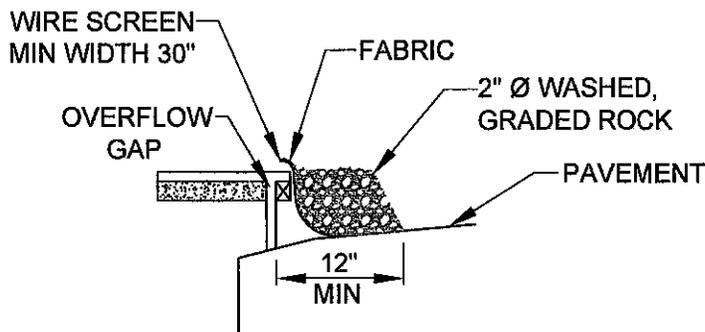
PLAN VIEW



WOODEN FRAME ON VERTICAL CURB

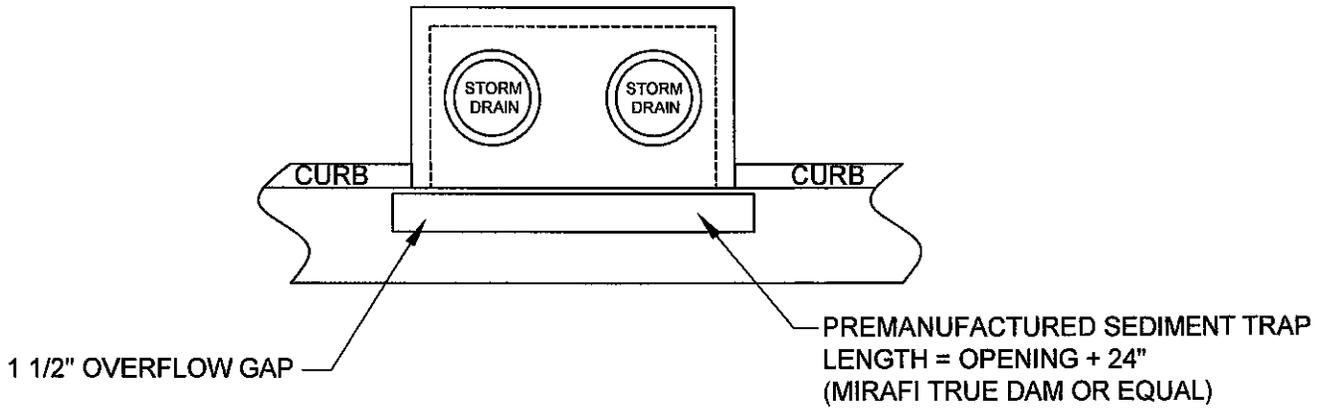


ELEVATION



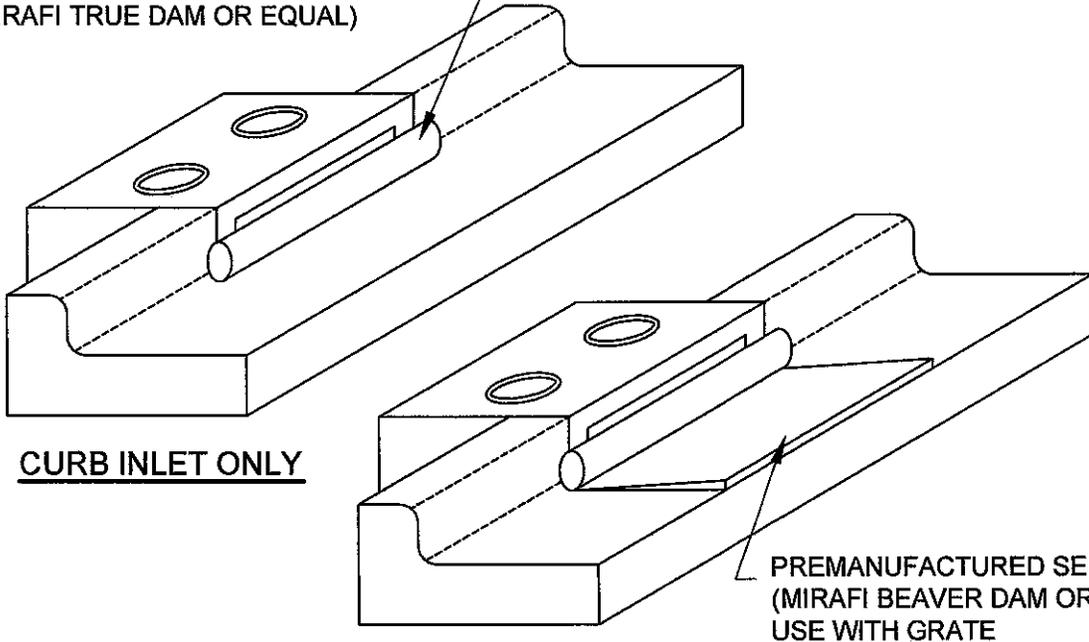
SECTION A-A

CITY OF CARTHAGE	
TYPICAL BMP DETAIL	
INLET PROTECTION- GRAVEL AND WIRE MESH	
REVISION NUMBER	DRAWING NUMBER
	SC 4.1



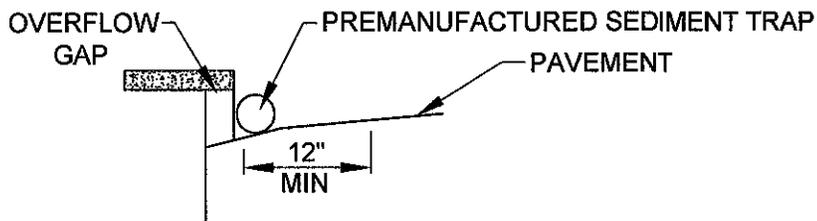
PLAN VIEW

PREMANUFACTURED SEDIMENT TRAP
LENGTH = OPENING + 24"
(MIRAFI TRUE DAM OR EQUAL)



CURB & GUTTER INLET

PREMANUFACTURED SEDIMENT TRAP ON
VERTICAL CURB



SECTION A-A

 CITY OF CARTHAGE	
TYPICAL BMP DETAIL	
INLET PROTECTION- SEDIMENT TRAP	
REVISION NUMBER	DRAWING NUMBER
	SC-4.2

INLET PROTECTION-SOD FILTER

PHYSICAL DESCRIPTION:

A sod barrier installed around an area inlet after the surrounding area has been stabilized. It is designed to slow runoff velocities and remove sediments and other pollutants from the runoff. This final inlet protection measure is an aesthetically pleasing way to treat storm water.

WHERE BMP IS TO BE INSTALLED:

Around the perimeter of an area inlet

CONDITIONS FOR EFFECTIVE USE OF BMP:

Type of Flow: Sheet flow and concentrated flow with velocities less than 5 fps

WHEN BMP IS TO BE INSTALLED:

Near end of construction, after the contributing watershed is stabilized with vegetation

INSTALLATION/CONSTRUCTION PROCEDURES:

- Prepare and fertilize soil
- Lay first row of sod adjacent to inlet perpendicular to the direction of flow. Butt subsequent rows tight against previous rows with strips staggered in brick-like pattern for a distance of at least 4 feet in each direction. Fill minor gaps with good soil and roll entire surface to ensure surface contact.
- Stake, staple and/or net corners and centers of sod strips as required
- Water immediately after installation - enough to soak 4 inches into soil without causing runoff

O&M PROCEDURES:

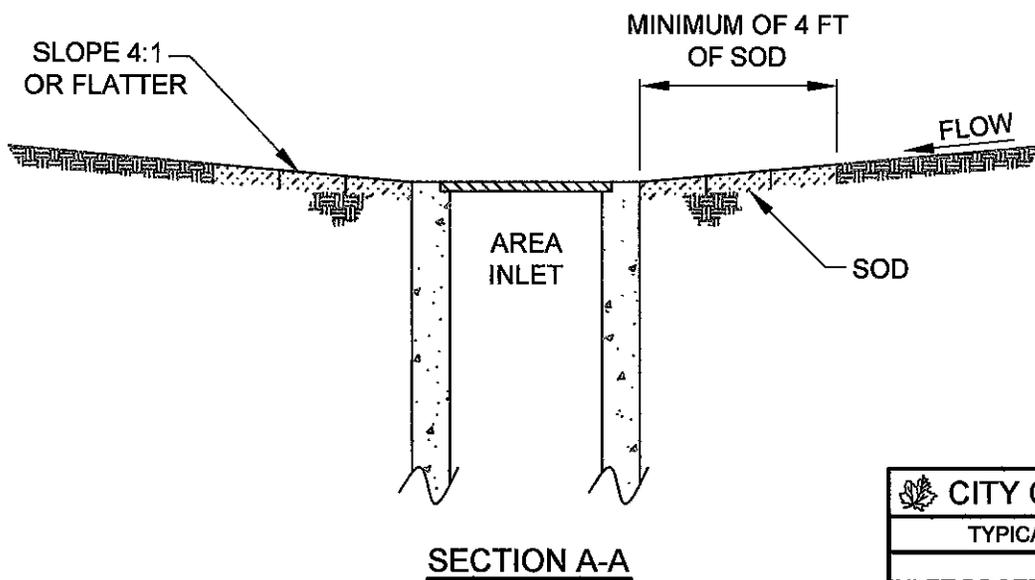
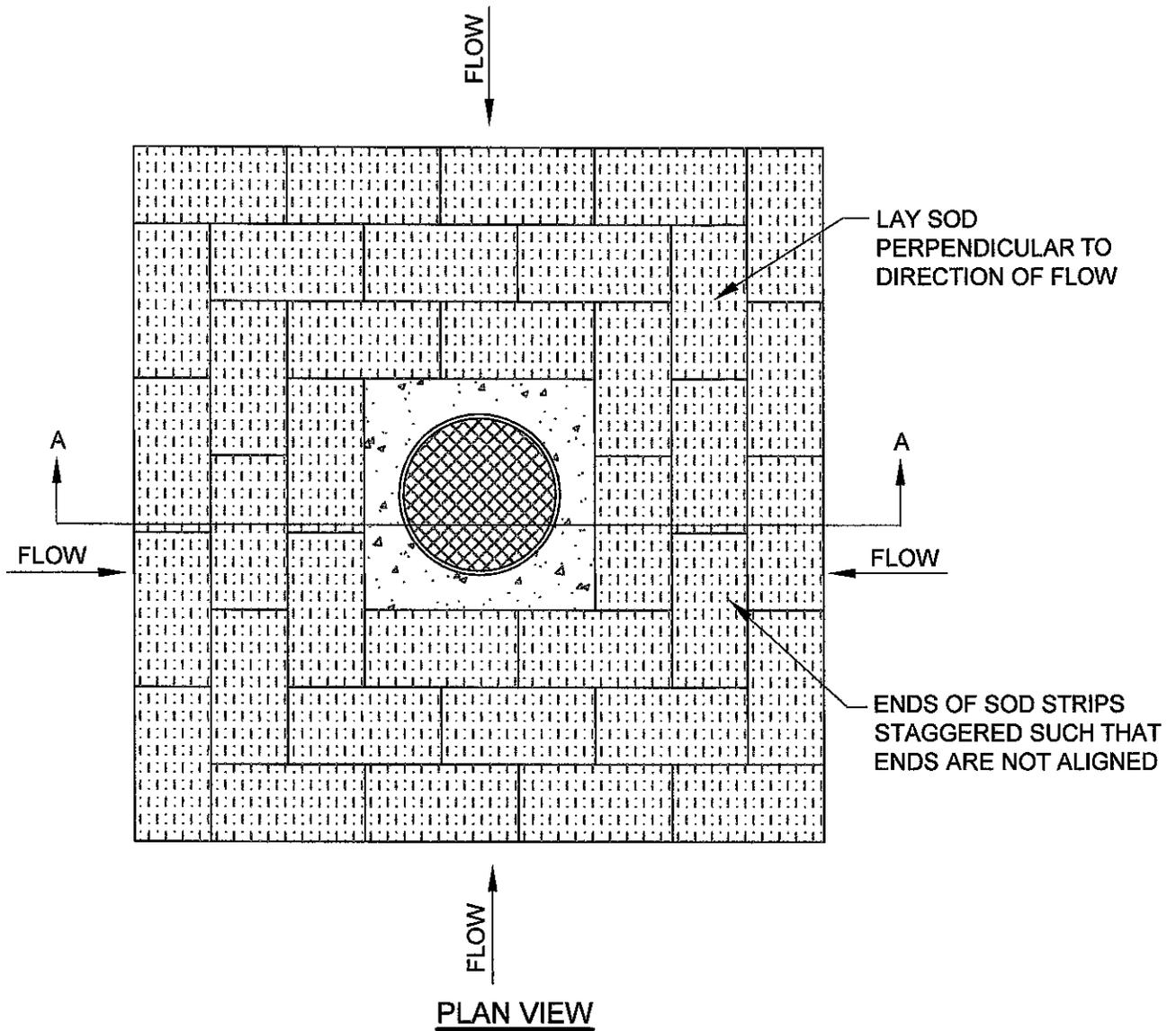
- Water sod daily for 3 weeks - enough to soak 4 inches into soil without causing runoff
- Inspect sod at least every two weeks and after every storm
- Reposition areas of sod that have moved
- Remove sediment accumulation on sod once it extends within 18 inches of inlet - replace sod if necessary
- Repair any eroded areas, replace sod, and stabilize as needed
- Do not mow until 3 inches of new growth occurs. During the first 4 months, do not mow more than 1/3 the grass height

SITE CONDITIONS FOR REMOVAL:

Not Applicable

TYPICAL DETAILS:

SC-5



 CITY OF CARTHAGE	
TYPICAL BMP DETAIL	
INLET PROTECTION-SOD FILTER	
REVISION NUMBER	DRAWING NUMBER
	SC-5

SEDIMENT BASIN

PHYSICAL DESCRIPTION:

A temporary settling pond designed to slowly release runoff, detaining it long enough to allow most of the sediment to settle out. Sediment basins cannot trap all sediment that enters. Basins should be used in conjunction with additional BMPs, such as temporary seeding, to reduce the total amount of sediment washing into them. Sediment basins may also be designed to be converted to permanent storm water detention basins after site construction has been completed.

WHERE BMP IS TO BE INSTALLED:

Should be located as close to the sediment source as possible. A sediment basin should not be used in areas of continuously running water (live streams) nor in areas where failure of the embankment will result in loss of life, damage to homes or structures, or prevent the use of roadways or utilities.

CONDITIONS FOR EFFECTIVE USE OF BMP:

Type of Flow:	Sheet flow and concentrated flow
Contributing Area:	Maximum 10 acres, as secondary or tertiary BMP
Basin Volume:	Volume of 15-year, 20-minute storm plus silt load of 1800 cf per acre below to p or riser
Surface Area to Volume Ratio:	Minimum of 25:1
Length to Width Ratio:	Minimum of 5:1; can be reduced with use of flocculants
Runoff Entry:	Maximize distance from outlet to provide maximum retention time; minimum of 20 feet If needed, install porous baffles to partition the basin into 2-3 cells and increase travel distance
Outlet Pipe:	Sized for 15-year, 20-minute storm when being converted to permanent detention facility

WHEN BMP IS TO BE INSTALLED:

Prior to disturbance of natural vegetation

INSTALLATION/CONSTRUCTION PROCEDURES:

- Excavated to length, width, depth and slopes specified on plan
- Place and compact fill to construct dam to elevation at least 1 foot above crown of outlet pipe
- Install outlet pipe and compact clayey soil around pipe using hand tampers
- Install the perforated riser pipe, wrap with fabric, and surround with uniformly graded gravel
- Install BMP at downstream end of outlet pipe
- Complete installation of dam to an elevation 10% above design height to allow for settling
- Grade and stabilize spillway
- Install lath or post near outlet of basin. Mark maximum allowable sediment depth as designed

O&M PROCEDURES:

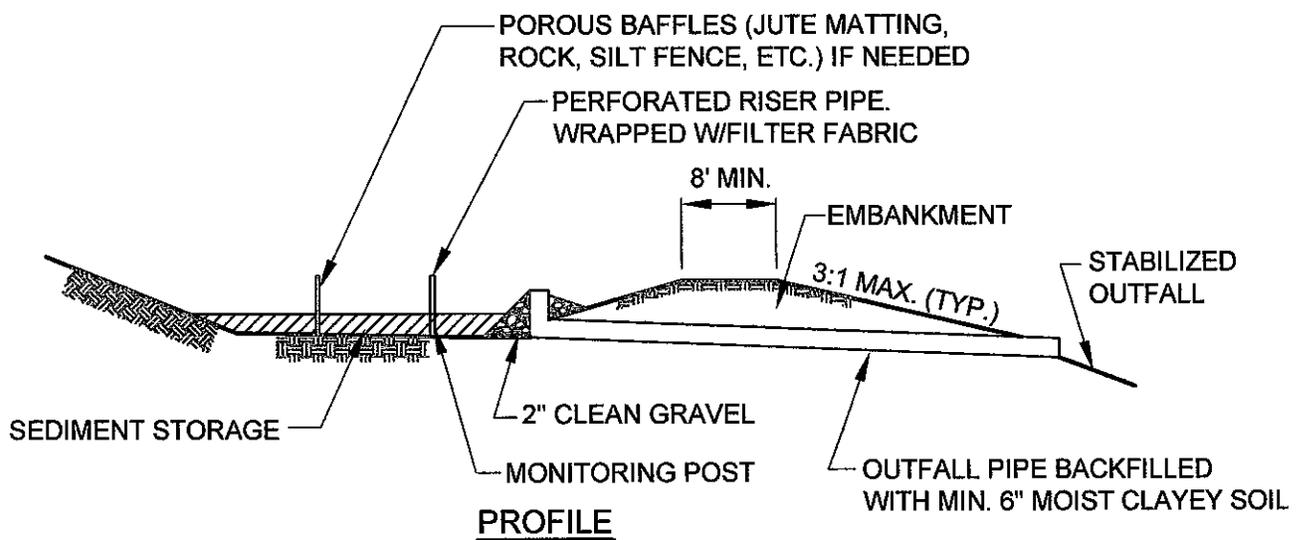
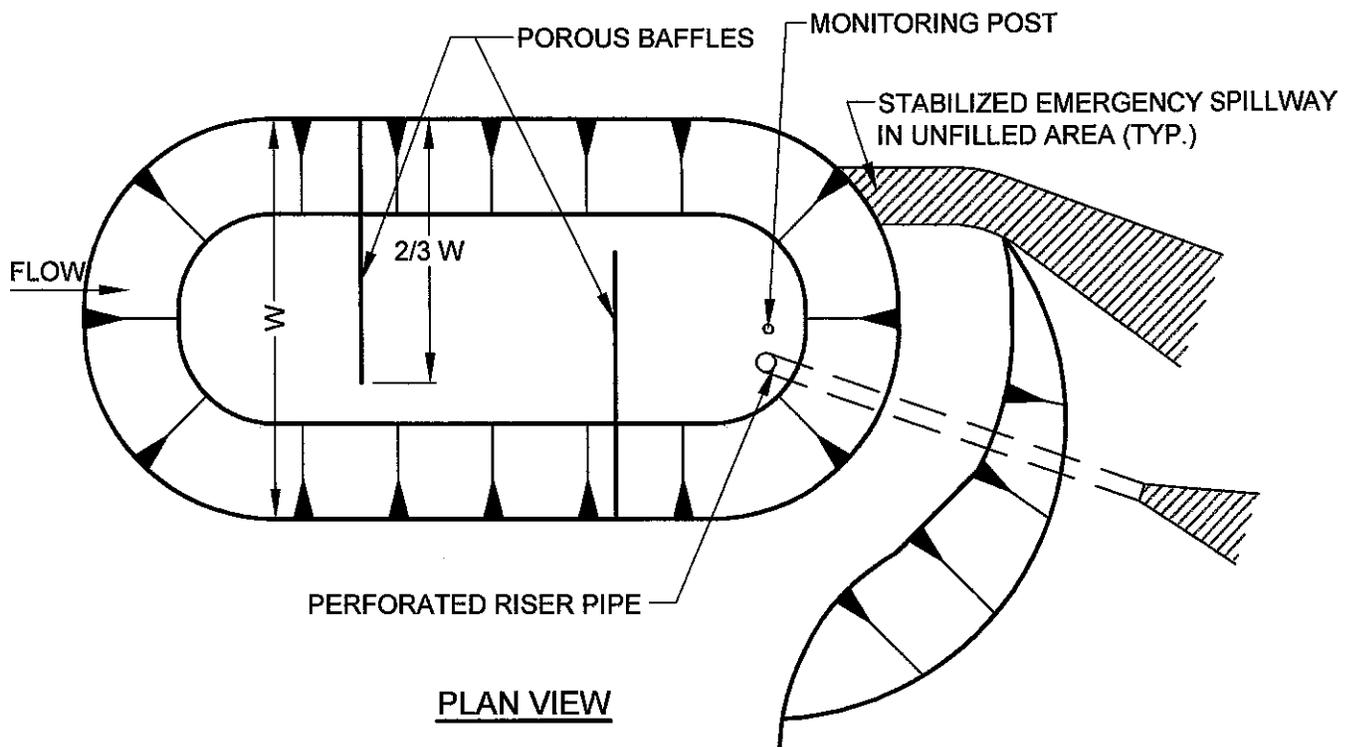
- Inspect at least every two weeks and after every storm
- Remove trash accumulation at outlet
- Remove sediment accumulations once sediment reaches design depth, as indicated on monitoring posts
- Repair and revegetate any erosion damage on spillway
- Repair settlement, cracking, piping holes, seepage at embankment
- Replace gravel around riser if basin does not drain properly

SITE CONDITIONS FOR REMOVAL:

Remove after upstream areas are stabilized with vegetation. Regrade as appropriate and vegetate immediately.

TYPICAL DETAILS:

SC-6



GENERAL NOTES:

1. TOP RISER PIPE SHOULD BE A MIN. OF 1' BELOW THE TOP OF THE EMBANKMENT AND 6" BELOW THE FLOW LINE OF ANY EMERGENCY SPILLWAY.
2. IF NO EMERGENCY SPILLWAY IS PROPOSED THERE SHALL BE A MINIMUM OF 1.5' OF FREEBOARD.
3. BAFFLE HEIGHT SHOULD BE GREATER THAN TOP OF RISER PIPE AND LESS THAN TOP OF EMBANKMENT.
4. SILT MONITORING POST(S) SHALL BE INSTALLED NEAR OUTLET OF BASIN AND BE MARKED WITH MAXIMUM PERMISSIBLE LEVEL OF SEDIMENT.

 CITY OF CARTHAGE	
TYPICAL BMP DETAIL	
SEDIMENT BASIN	
REVISION NUMBER	DRAWING NUMBER
	SC-6

SEDIMENT TRAP

PHYSICAL DESCRIPTION:

A temporary small area of impoundment designed to trap water and allow sediment to settle out. A trap usually consists of an excavated area and rip rap spillway outlet stabilized. Due to short retention periods, sediment traps do not typically remove fine particles such as silts and clays.

WHERE BMP IS TO BE INSTALLED:

Commonly used at the outlets of BMPs such as storm water diversion devices, channels, temporary slope drains, construction entrances, and vehicle wash areas

CONDITIONS FOR EFFECTIVE USE OF BMP:

Type of Flow:	Sheet flow and concentrated flow
Contributing Area:	Maximum 5 acres
Basin Volume:	Silt load of 1800 cf per acre
Length to Width Ratio:	5:1 minimum; can be reduced with use of flocculants

WHEN BMP IS TO BE INSTALLED:

Prior to disturbance of natural vegetation

INSTALLATION/CONSTRUCTION PROCEDURES:

- Excavate to length, width, depth and slopes specified on plan
- Place and compact fill to construct embankment and spillway
- Install rip rap spillway
- Install lathe or post at each end of basin and at 20 foot intervals. Mark maximum allowable sediment depth as designed.

O&M PROCEDURES:

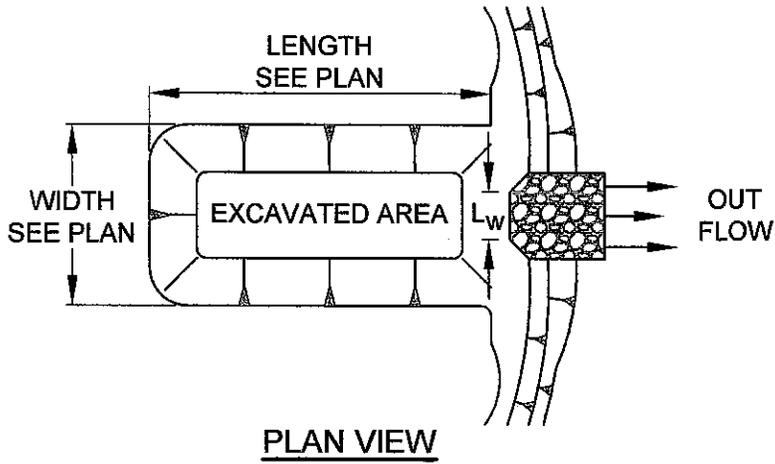
- Inspect at least every two weeks and after every storm
- Remove trash accumulation
- Remove sediment accumulations once sediment reaches design depth, as indicated on monitoring posts
- Repair and revegetate any erosion damage
- Repair settlement, cracking, piping holes, or seepage at embankment

SITE CONDITIONS FOR REMOVAL:

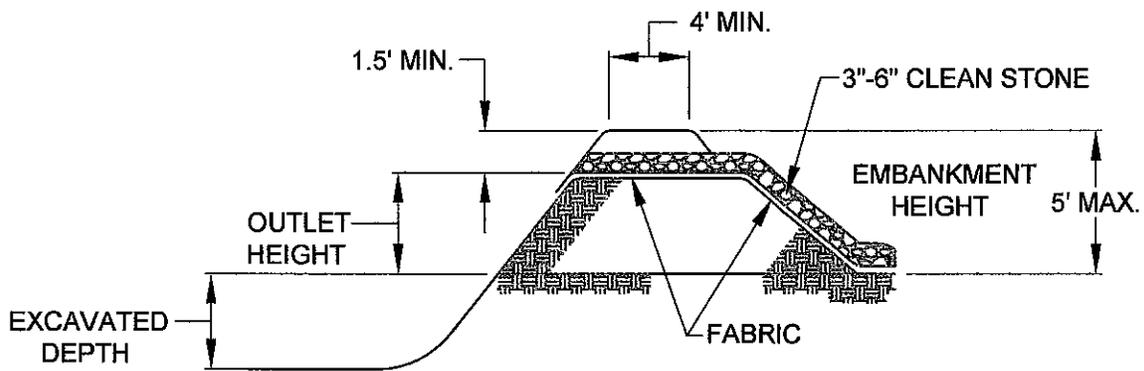
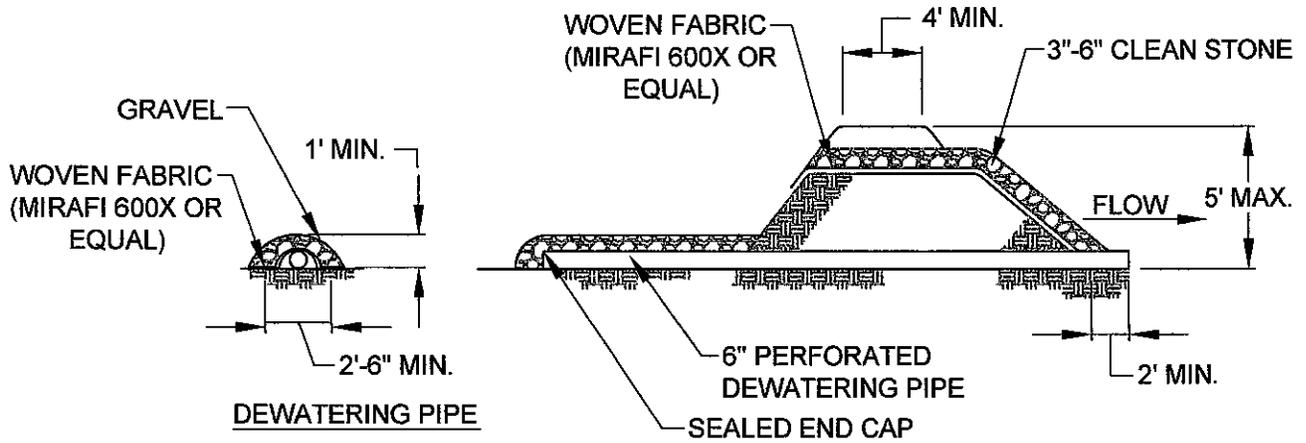
Remove after upstream areas are stabilized with vegetation. Regrade as appropriate and vegetate immediately

TYPICAL DETAILS:

SC-7 Sediment Trap - Single Cell: for use in line with swales and/or channels



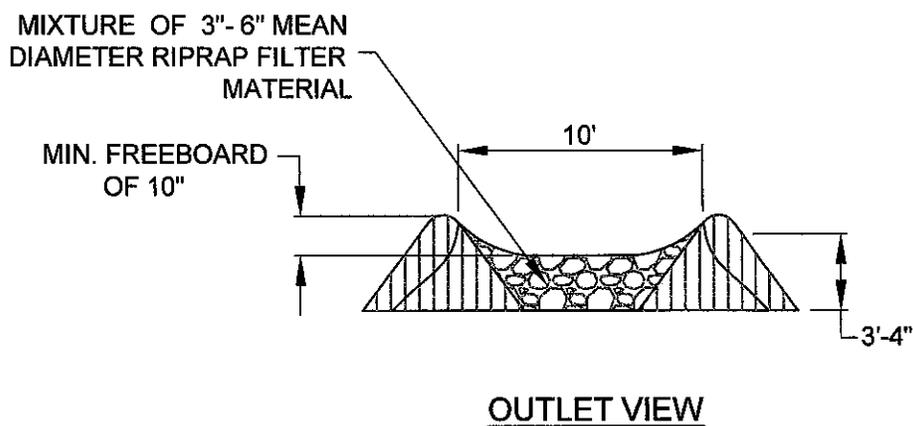
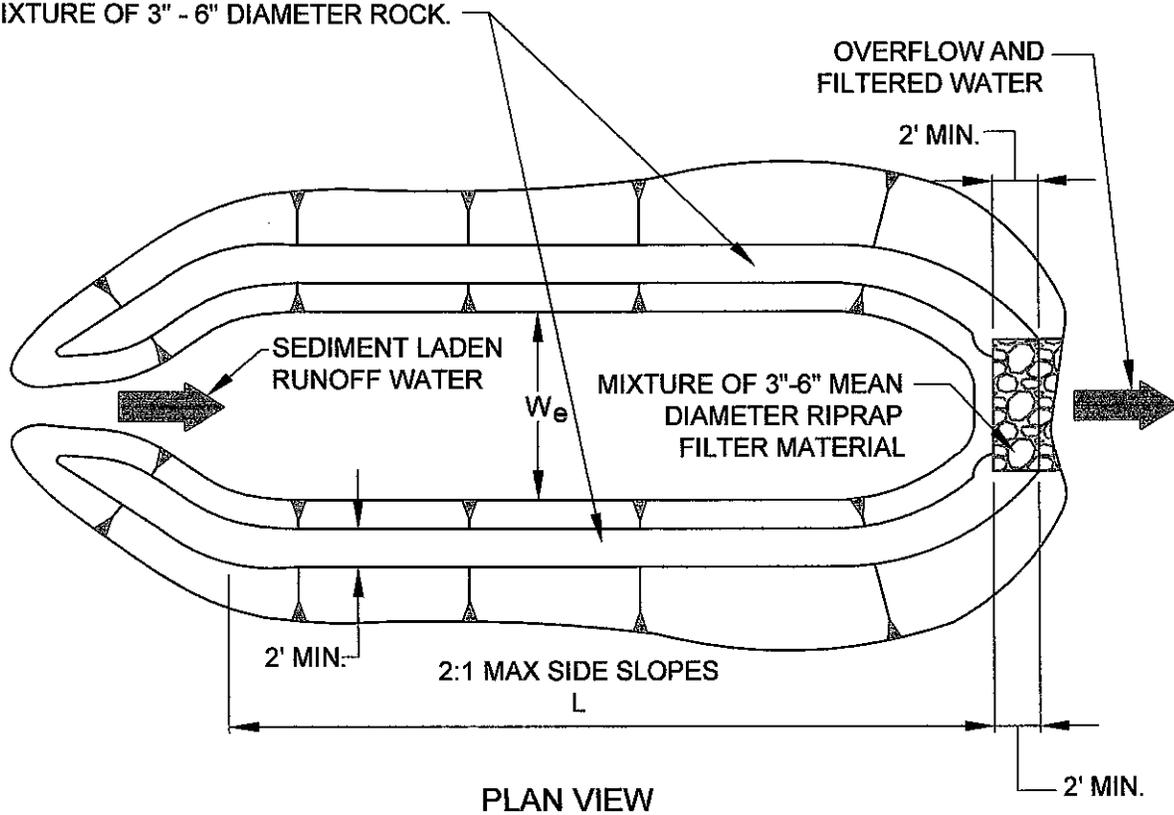
TRIBUTARY AREA (ACRES)	LENGTH OF SPILLWAY WEIR L _w (ft)
0-1.0	4
1.01-2.0	6
2.01-3.0	8
3.01-4.0	10
4.01-5.0	12



FOR USE IN OPEN AREAS

CITY OF CARTHAGE	
TYPICAL BMP DETAIL	
SEDIMENT TRAP	
REVISION NUMBER	DRAWING NUMBER
	SC-7.1

CONTAINMENT BERM CONSTRUCTED FROM BOTTOM MATERIAL EXCAVATED TO CREATE AN AVERAGE POND DEPTH OF AT LEAST 2' - 6" WHEN MEASURED FROM THE RIPRAP DEPRESSION LOW POINT. ALTERNATIVE MATERIAL CAN CONSIST OF RIPRAP HAVING A MIXTURE OF 3" - 6" DIAMETER ROCK.



TRIBUTARY AREA (ACRES)	L (ft)	We (ft)
< 0.5	59	13
0.51-1.0	82	16
1.01-1.5	102	20
1.51-2.0	118	23
2.01-2.5	131	26
2.51-3.0	144	30
3.01-3.5	154	30
3.51-4.0	167	33
4.01-4.5	177	36
4.51-5.0	187	36

FOR USE IN LINE WITH SWALES AND CHANNELS

CITY OF CARTHAGE	
TYPICAL BMP DETAIL	
SEDIMENT TRAP-SINGLE CHAMBER	
REVISION NUMBER	DRAWING NUMBER
	SC-7.2

SILT FENCE

PHYSICAL DESCRIPTION:

A fence constructed of woven filter fabric and wire mesh stretched between posts and entrenched in the ground designed to pond storm water runoff and cause sediment to settle out

WHERE BMP IS TO BE INSTALLED:

Installed along slopes, at base of slopes, and around perimeter of site as final barrier to sediment being carried offsite. Spacing of fence along slopes is relative to slope.

CONDITIONS FOR EFFECTIVE USE OF BMP:

Type of Flow:	Sheet flow only
Contributing Slope Length:	30 foot maximum for 3:1 slopes 50 foot maximum for slopes between 3:1 and 10:1 100 foot maximum for slopes under 10%

WHEN BMP IS TO BE INSTALLED:

Prior to disturbance of natural vegetation and at intervals during construction of fill slopes

INSTALLATION/CONSTRUCTION PROCEDURES:

- Drive posts for fence line
- Dig trench to required dimensions in front of posts for fabric burial
- Attach wire mesh to posts
- Attach fabric to posts, allowing required length below ground level to run fabric along bottom of trench
- Backfill and compact soil in trench to protect and anchor fabric

Alternate Construction - Install fence by slicing it into the ground with specialized equipment
Install posts at reduced spacing indicated on detail

O&M PROCEDURES:

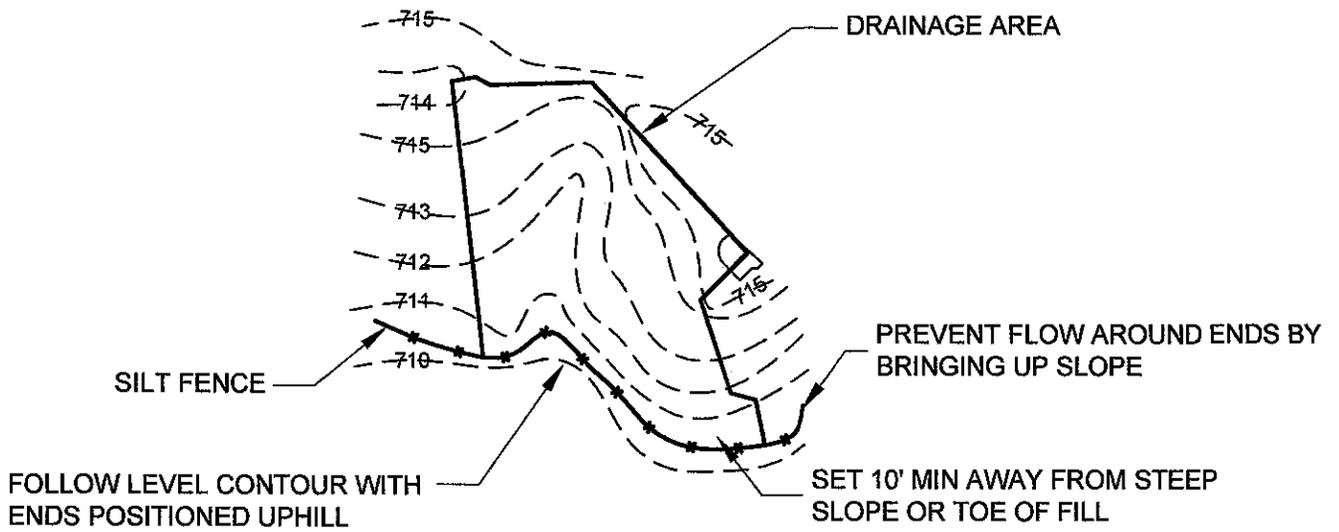
- Inspect at least every two weeks and after every storm
- Remove sediment buildup deeper than 1/2 the fence height or 12 inches, whichever is less
- Replace torn or clogged fabric; repair loose fabric
- Repair unstable or broken posts
- Stabilize any areas susceptible to undermining
- Extend fence or add additional row(s) of fence if necessary to provide adequate protection

SITE CONDITIONS FOR REMOVAL:

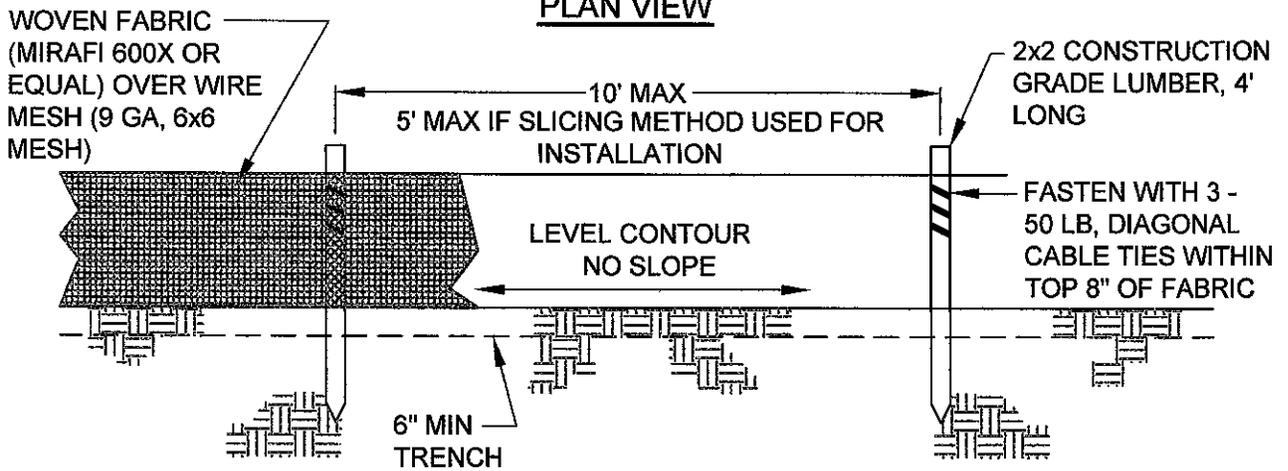
After permanent vegetation of slope is established, remove fence, regrade trench area and vegetate

TYPICAL DETAILS:

SC-8

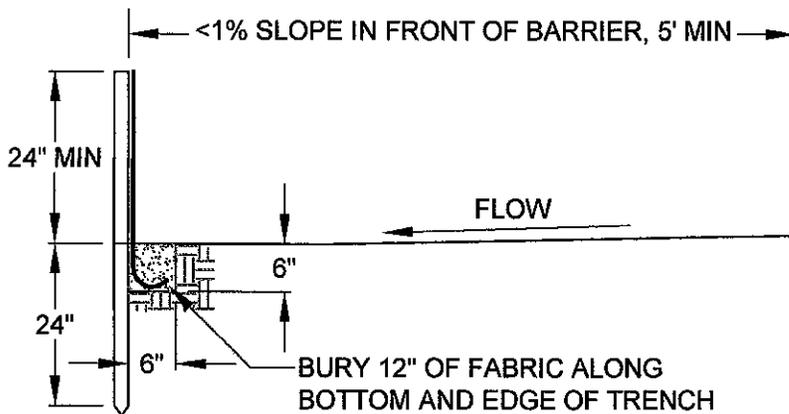


PLAN VIEW



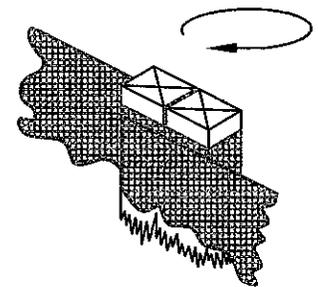
ELEVATION

WRAPS GEOTEXTILE AROUND STAKES BEFORE DRIVING



SECTION

NOTE: IF FABRIC IS INSTALLED BY EQUIPMENT DESIGNED TO SLICE INTO THE GROUND, THE TRENCH IS NOT NEEDED



JOINING SECTIONS OF SILT FENCE

CITY OF CARTHAGE	
TYPICAL BMP DETAIL	
SILT FENCE	
REVISION NUMBER	DRAWING NUMBER SC-8

CONSTRUCTION ENTRANCE

PHYSICAL DESCRIPTION:

A stabilized entrance to a construction site designed to minimize the amount of sediment tracked from the site on vehicles and equipment. Stabilization generally consists of aggregate over fabric. Mud and sediment fall off of tires as they travel along the stabilized entrance; however, additional measures in the form of a washdown area should also be included on site. The stabilized entrance also distributes the axle load of vehicles over a larger area thereby mitigating the rutting impact vehicles normally have on unpaved areas.

WHERE BMP IS TO BE INSTALLED:

At locations where it is safe for construction vehicles and equipment to access existing streets - preferably at location of future streets or drives.

CONDITIONS FOR EFFECTIVE USE OF BMP:

Drainage: Ditches or pipes, if needed, sized for 15-year, 20-minute storm; HGL 6 inches below surface of entrance

WHEN BMP IS TO BE INSTALLED:

First order of work, along with washdown area, prior to vehicles or equipment accessing unpaved areas

INSTALLATION/CONSTRUCTION PROCEDURES:

- Grade and compact area of construction entrance
- Install culvert under entrance if needed to maintain positive drainage
- Place fabric and cover with aggregate, forming diversion across entrance if needed to direct runoff away from roadway
- See Washdown Station BMP for additional steps

O&M PROCEDURES:

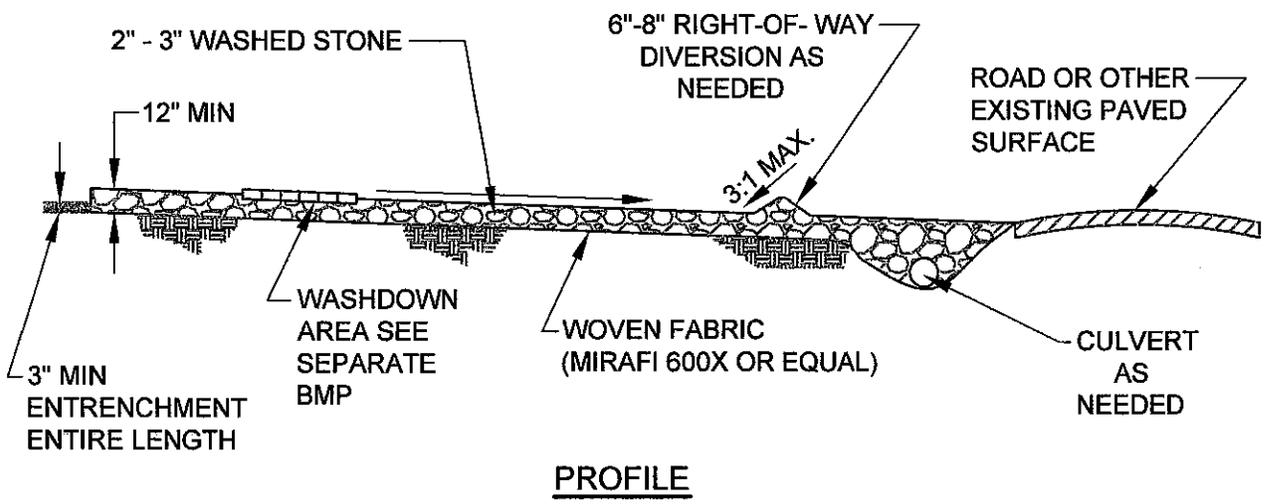
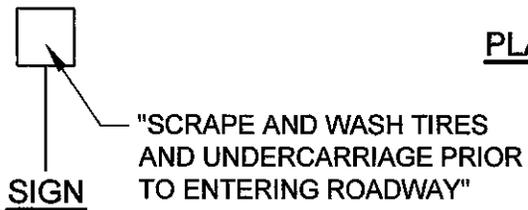
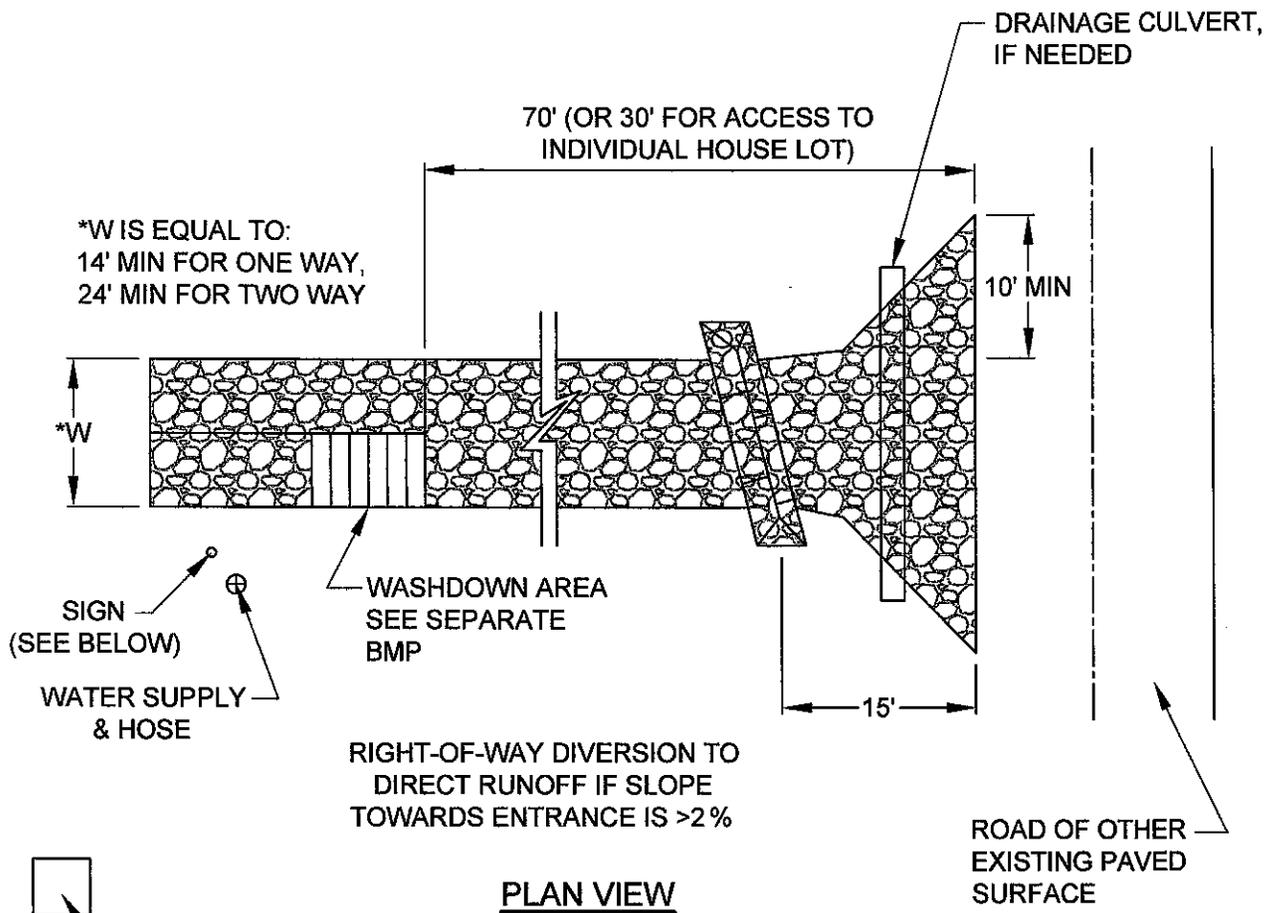
- Immediately remove any mud or debris tracked onto paved surfaces
- Remove sediment and clods of dirt from construction entrance continuously
- Replace rock if necessary to maintain clean surface
- Repair settled areas

SITE CONDITIONS FOR REMOVAL:

Remove when vehicles and equipment will no longer access unpaved areas

TYPICAL DETAILS:

TC-1



 CITY OF CARTHAGE	
TYPICAL BMP DETAIL	
CONSTRUCTION ENTRANCE	
REVISION NUMBER	DRAWING NUMBER
	TC-1

CONSTRUCTION PARKING

PHYSICAL DESCRIPTION:

A stabilized pad designed to provide off street parking for construction related vehicles, eliminate parking on non-surfaced areas, and minimize the amount of sediment tracked from the site. Stabilization generally consists of aggregate over woven fabric. The stabilized pad also distributes the axle load of vehicles over a larger area thereby mitigating the rutting impact vehicles normally have on unpaved areas.

WHERE BMP IS TO BE INSTALLED:

At locations close to related work zones that have access along continuous paved or stabilized surfaces. Parking may be distributed in clusters and/or relocated with different phases of construction.

CONDITIONS FOR EFFECTIVE USE OF BMP:

Drainage: Ditches or pipes, if needed, sized for 15-year, 20-minute storm; HGL below parking surface
Aggregate Size: 2 inch to 3 inch washed stone
Pad Design: Minimum of 12 inches thick and sized to handle anticipated number of employee and visitor vehicles. Plans shall provide provisions for relocation and resizing of parking area(s) as construction phasing requires. See table below for minimum requirements.

Construction Phase	Min. # of Parking Spaces*
Rough Grading	3
Sewer and Street Construction	10
Residential Home Construction	10**
Commercial Bldg. Construction	20

*Parking Space shall be a minimum of 19 feet long and 9 feet wide

**If multiple home builders involved, additional spaces required

Filter Fabric: Woven fabric - Mirafi 600X or equal

WHEN BMP IS TO BE INSTALLED:

Immediately after or concurrently with installation of construction entrance and washdown station

INSTALLATION/CONSTRUCTION PROCEDURES:

- Grade and compact area of pad and ditches, if needed
- Install culverts if needed to maintain positive drainage
- Place fabric and aggregate, and compact
- Install signage indicating the designated parking area

O&M PROCEDURES:

- Inform drivers of inappropriately parked vehicles that they need to be moved
- If necessary to ensure compliance on an ongoing basis, contact employers of violators
- Install "NO Parking" signage in areas where vehicles are being parked inappropriately
- Remove sediment and clods of dirt continuously
- Repair settled areas
- Replace rock if necessary to maintain clean surface

SITE CONDITIONS FOR REMOVAL:

Remove/relocate when vehicles can legally park on paved areas without impeding non-construction related traffic

TYPICAL DETAILS:

Not Applicable

CONSTRUCTION ROAD

PHYSICAL DESCRIPTION:

A stabilized pathway providing vehicular access to a remote construction area designed to reduce rutting, tracking of mud in wet weather, and creation of dust in dry weather. The "roadway" can be constructed of aggregate over fabric, asphaltic concrete or Portland cement concrete based on the longevity of the project, required performance, and site conditions. Roadways should follow the natural terrain to the extent possible.

WHERE BMP IS TO BE INSTALLED:

On long travel paths on unpaved areas, adjacent to bodies of water, and in areas where poor soil is encountered

CONDITIONS FOR EFFECTIVE USE OF BMP:

Drainage: Road ditches or pipes, if needed, sized for 15-year, 20-minute storm; HGL 6 inches below surface of road

WHEN BMP IS TO BE INSTALLED:

First order of work, prior to vehicles or equipment accessing remote areas

INSTALLATION/CONSTRUCTION PROCEDURES:

- Grade and compact area of construction road and, if needed, adjacent road ditches
- Install culvert under road if needed to maintain positive drainage
- Place and compact roadway materials
- Vegetate road ditches

O&M PROCEDURES:

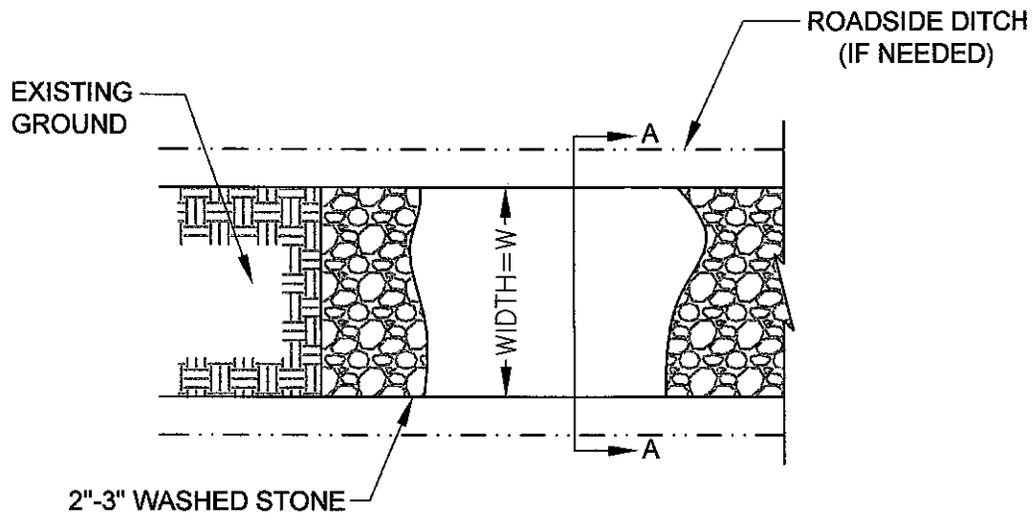
- Remove sediment and clods of dirt from road daily
- Repair settled areas
- Replace rock if necessary to maintain clean surface
- Remove sediment from road ditch once it is within 6 inches of top of road surface

SITE CONDITIONS FOR REMOVAL:

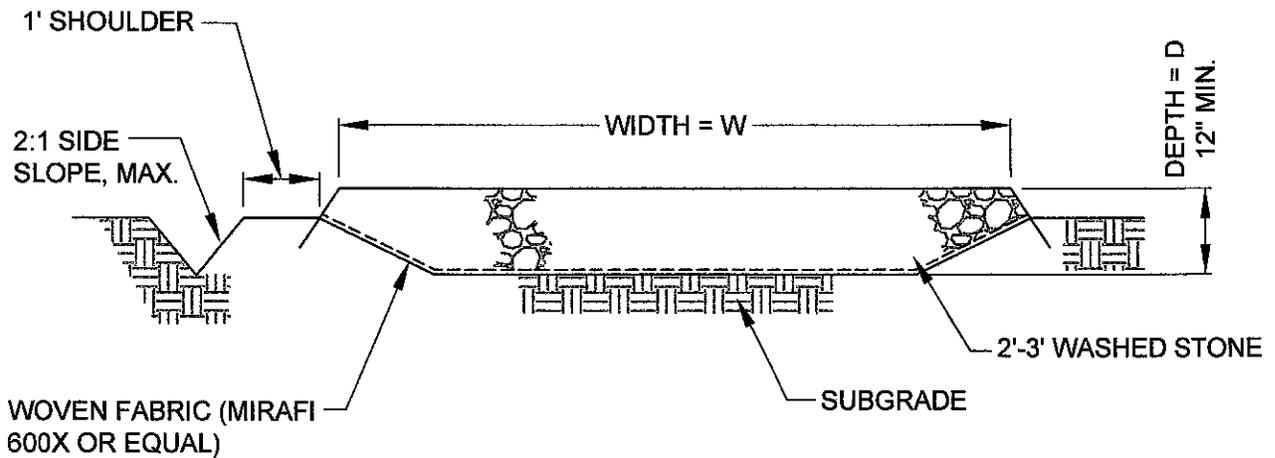
Remove when vehicles and equipment will no longer access remote areas; regrade area and vegetate

TYPICAL DETAILS:

TC-3



PLAN VIEW



SECTION A-A

NOTES:

1. SEE PLANS FOR CONSTRUCTION ROAD LOCATION, D AND W DIMENSIONS.
2. MINIMUM WIDTH IS 14 FEET FOR ONE-WAY TRAFFIC AND 24 FEET FOR TWO-WAY TRAFFIC. TWO-WAY TRAFFIC WIDTHS SHALL BE INCREASED A MINIMUM OF 4 FEET FOR TRAILER TRAFFIC. DEPENDING ON THE TYPE OF VEHICLE OR EQUIPMENT, SPEED, LOADS, CLIMATIC AND OTHER CONDITIONS UNDER WHICH VEHICLES AND EQUIPMENT OPERATE AN INCREASE IN THE MINIMUM WIDTHS MAY BE REQUIRED.
3. ROADWAY SHALL FOLLOW THE CONTOUR OF THE NATURAL TERRAIN TO THE EXTENT POSSIBLE.
4. GRADE ROAD AND DITCHES TO PROVIDE POSITIVE DRAINAGE AND PREVENT RUNOFF FROM LEAVING THE CONSTRUCTION SITE.
5. ASPHALTIC CONCRETE OR PORTLAND CEMENT CONCRETE MAY BE REQUIRED FOR LONG TERM PROJECTS OR UNSTABLE SOILS.

 CITY OF CARTHAGE	
TYPICAL BMP DETAIL	
CONSTRUCTION ROAD	
REVISION NUMBER	DRAWING NUMBER
0	TC-3

WASHDOWN STATION

PHYSICAL DESCRIPTION:

An area located at construction entrances designed to wash sediment from the tires and undercarriage of exiting vehicles and prevent sediment from being tracked onto existing roadways

WHERE BMP IS TO BE INSTALLED:

Across or immediately adjacent to exit paths from unpaved construction sites

CONDITIONS FOR EFFECTIVE USE OF BMP:

Drainage: Downstream BMP sized to treat dirty runoff from washdown station

WHEN BMP IS TO BE INSTALLED:

First order of work, along with construction entrance, prior to vehicles or equipment accessing unpaved areas

INSTALLATION/CONSTRUCTION PROCEDURES:

- Grade and compact area for drainage under washdown pad
- Install steel-ribbed plate on frame or other support to allow a 2 inch drain space
- Grade and vegetate downstream BMP (v-ditch shown on detail)
- Install water supply and hose
- Post sign in advance or station indicating that all exiting vehicles and equipment must use station prior to exiting site

O&M PROCEDURES:

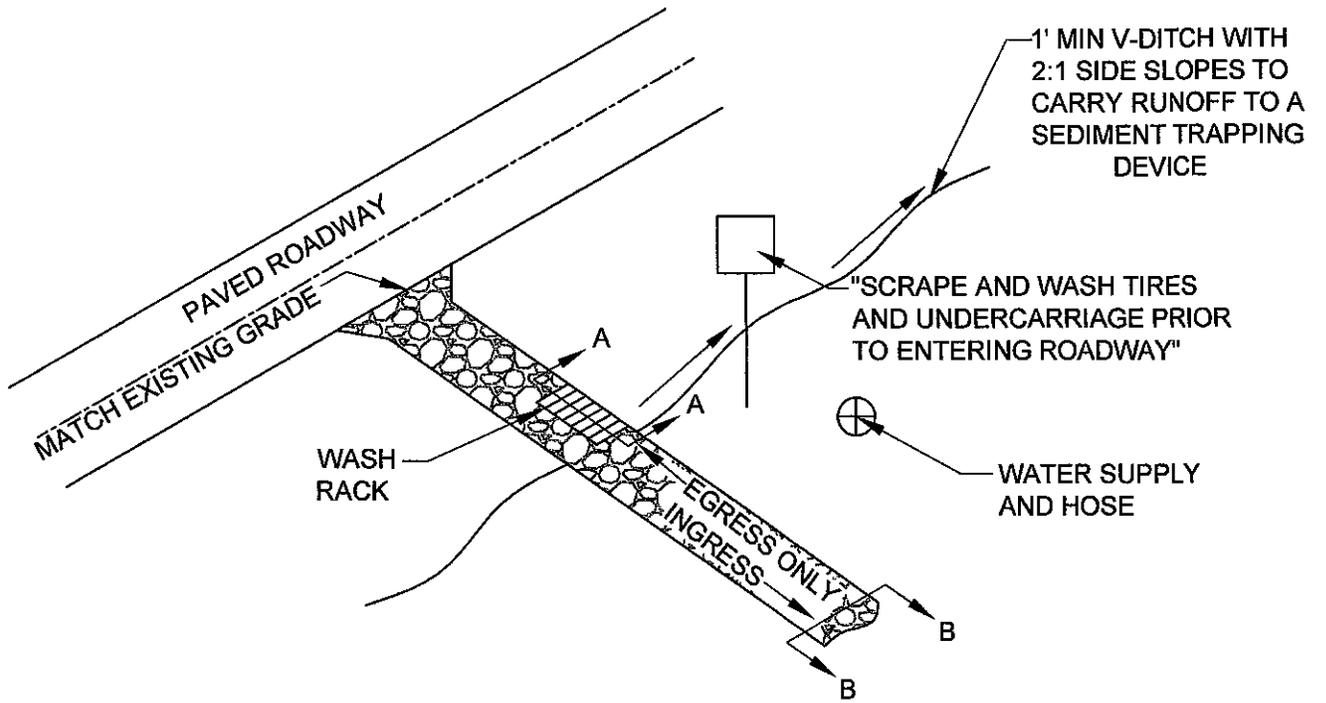
- Remove sediment daily
- Repair settled areas
- Replace rock if necessary to maintain clean surface

SITE CONDITIONS FOR REMOVAL:

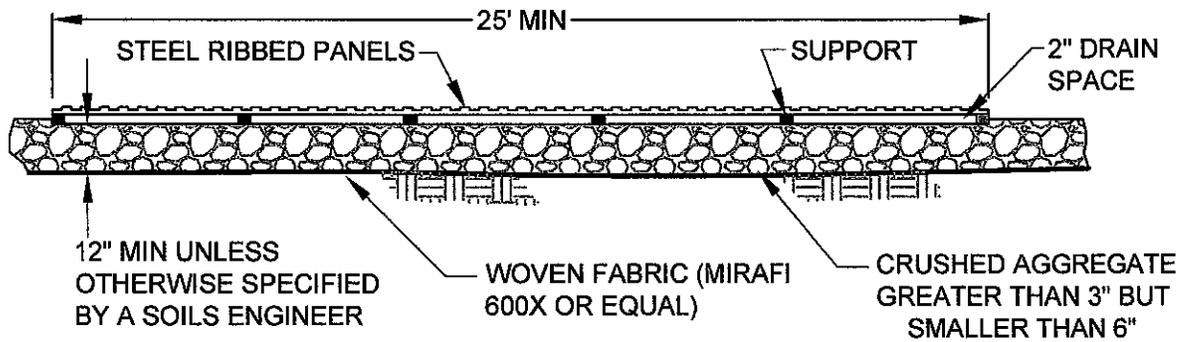
Remove when vehicles and equipment will no longer access unpaved areas

TYPICAL DETAILS:

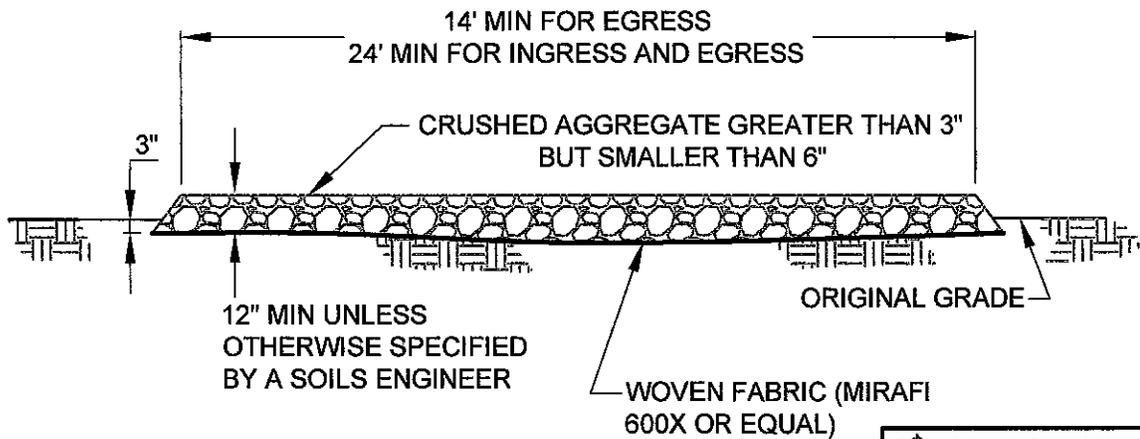
TC-4



PLAN VIEW



SECTION A-A



SECTION B-B

CITY OF CARTHAGE	
TYPICAL BMP DETAIL	
WASHDOWN STATION	
REVISION NUMBER	DRAWING NUMBER
0	TC-4