

STORM WATER POLLUTION PREVENTION PLAN

FOR

The Village at Discovery Park – Lot 13

Date:

August 28, 2024



PREPARED BY:

CROCKETT

ENGINEERING CONSULTANTS

1000 W. Nifong Blvd., Bldg. 1, • Columbia, Missouri 65203

GENERAL PROJECT INFORMATION

PROJECT

The Village at Discovery – Lot 13

PROJECT LOCATION

General Location: 250 NE Alura Way. Lot 13 of Village at Discovery Park.

GENERAL DESCRIPTION OF PROJECT

Construction of a 21,162 sq. ft. clubhouse building with parking, sidewalks, and necessary infrastructure.

PROJECT PROPERTY OWNER

Name: Discovery Park Lees Summit, LLC.

Address: 4220 Phillips Farm Rd

City: Columbia State: MO Zip: 65201

Phone: (573) 881-0280

Contact: Brian Maenner

GENERAL CONTRACTOR

Name: _____

Address: _____

City: _____ State: _____ Zip: _____

Phone: _____ Fax: _____

Contact: _____

CONSULTANT

Crockett Engineering Consultants

1000 W. Nifong Blvd., Bldg. 1

Columbia, MO 65203

Phone: 573.447.0292

Contact: Nathan Eckhoff

EROSION CONTROL INSPECTOR

Name: _____

Address: _____

City: _____ State: _____ Zip: _____

Phone: _____ Fax: _____

Contact: _____

NOTE: The Owner must designate an approved **EROSION CONTROL INSPECTOR**, who will be responsible for the inspection logs, updating the **SWPPP**, and reporting to the site manager any noncompliance findings.

The **GENERAL CONTRACTOR** shall notify the **EROSION CONTROL INSPECTOR** when a precipitation event occurs.

The person selected to conduct inspections should be knowledgeable in the principles and practices of erosion and sediment controls, possess the technical skills to assess conditions at the construction site that could impact stormwater quality, and assess the effectiveness of any erosion and sediment control measures selected.

SWPPP OBJECTIVES

- Stabilize the site as soon as possible
- Protect slopes and channels
- Reduce impervious surfaces and promote infiltration
- Control the perimeter of the site
- Protect adjacent receiving waters
- Follow pollution prevention measures
- Minimize the area disturbed and the duration of bare soil exposure

SWPPP REQUIREMENTS

- | | |
|---|---------------------------------|
| • Nature of construction activity | • Installation |
| • Site map | • Sedimentation basins |
| • Site description | • Pollution prevention measures |
| • Selection of permanent and temporary BMPs | • Roadways |
| • Preservation of trees and vegetation | • Dewatering |
| • Surface water buffers | |
| • Measuring buffer width | |
| • Description of BMPs | |
| • Specific instance of BMPs | |
| • Disturbed areas | |

REMINDER

- The SWPPP must remain on site until the site has been closed out.
- A copy of the permit and/or NOI needs to be attached to the SWPPP.
- Modifications and updates to BMPs or drainage areas on the project site should be recorded in or attached to the SWPPP.
- Any additional Federal, State, or Local permits need to be attached to the SWPPP.
- The SWPPP, as well as all supporting documentation (permits, inspection reports, addendums, to the SWPPP, location map, site plan, NOI/NOT etc.), must be retained for three (3) years.
- SWPPP's are amendable and can be changed during the course of the construction process. The goal of the SWPPP is to keep sediment on the project sites and assure water quality standards. If BMPs or procedures are not attaining this goal, then the SWPPP may be changed or updated in order to better address specific conditions.

SITE MAP CONSIDERATIONS

Site maps should show the construction activities and stormwater management practices for each major phase of construction (e.g., initial grading, infrastructure, construction, and stabilization). Site maps should identify the following features:

- Areas and features to be protected
- Disturbed areas (locations and timing of activities)
- Clearing limits
- Identify locations of structural and non-structural BMPs
- Identify locations of Post-construction BMPs
- Areas of stabilization
- Indicate locations of material, waste, borrow, or equipment storage

Site maps should be kept up to date showing changes that have been made to BMPs and for stabilization methods as the site progresses. The Missouri State Operating Permit requires that the SWPPP and site map be kept up to date, so mark up the site map with the locations and dates of any changes being made. Also include the current locations of the following:

- Portable toilets
- Material storage, vehicle and equipment fueling and maintenance areas
- Concrete, paint and stucco washouts
- Dumpster containers
- Spill kits
- Stockpiles
- Any other non-structural non-stormwater BMPs, temporarily removed structural BMPs or changes to the structural BMPs

PROJECT PLANNING & DESIGN

SOIL DISTURBING ACTIVITIES for this project will include the following (check all that apply):

- ☒ Clearing and grubbing of existing vegetation
- ☐ Construction of sediment basins and stormwater detention
- ☒ Stripping of topsoil within the limits of construction
- ☒ Stockpiling and re-spreading topsoil
- ☒ Utility trench excavation and backfill
- ☒ Preparing subgrade for streets and sidewalks
- ☒ Backfilling curbs and sidewalks
- ☐ Disposal areas for excess excavated material
- ☐ Borrow areas for fill material
- ☐ Construction of compacted fill areas for residential/commercial building construction
- ☐ Other (specify): _____

NOTE: The Site Plan must be submitted with the SWPPP.

Limits of Land Disturbance must be clearly shown on the Erosion and Sediment Control Plan.

WHAT IS THE FUNCTION OF THE CONSTRUCTION ACTIVITY?

- ☒ Clearing/Grading
- ☐ Residential Subdivision
- ☐ Municipality

SITE RUNOFF CHARACTERISTICS

Total Site Area: 1.14 acres

Estimated Area to be disturbed by all activities: 1.22 acres

Runoff Coefficient prior project: 0.30

Runoff Coefficient after project: 0.71

Name Watershed and Receiving Waterbody: Tributary to Little Cedar Creek

Pre-Project Peak 10 year outflow: 1.85 cfs

Post-Project Peak 10 year outflow: 4.38 cfs

PROJECT PLANNING & DESIGN

Endangered or threatened species/critical habitats on or near the project? ☐ Yes ☒ No

Description of species and/or critical habitat: _____

Steps taken to address the impact of construction: _____

Historic Sites on or near the construction site: ☐ Yes ☒ No

Steps taken to address the impact of construction: _____

Will there be work done in a 404/401 stream or creek? ☐ Yes ☒ No

Steps taken to address the impact of construction: **There are no streams in this project that would be classified as a 404 or 401 stream.**

NOTE: A Limited Stream Assessment must be submitted

Are there any impaired waters on the site? ☐ Yes ☒ No

If yes, has a Total Maximum Daily Load (TMDL) been developed? ☐ Yes ☐ No

GENERAL DESCRIPTION OF STORMWATER MANAGEMENT PLAN

To ensure that this project does not promote or aggravate an existing off-site erosion, siltation, or drainage problem, erosion best management practices (BMP's) are to be implemented on this site. The BMP that has been chosen for this site is silt fence and inlet protection. Due to the land disturbance within the project scope, it is expected that silt laden runoff will be generated. To ensure proper containment of said silt laden runoff, silt fence will be utilized to filter the runoff prior entering the storm network. The above referenced erosion control devices are to be placed in areas of highly concentrated flows or sources of point flow and sheet flow.

All drainage structures flow to an existing storm network. This existing storm network then conveys runoff to a regional detention facility. This detention facility will reduce peak outflow to less than original conditions as well as provide water quality treatment.

Sheet CE 2.1 contains the location of structural BMPs and designated points where vehicles will exit the site. Sheet CE 3.0 – 3.3 contains the existing and proposed grades. Sheet CE 4.1 contains pipe networks, swales, and other stormwater conveyance items. All above referenced sheets are from The Village at Discovery Park – Lot 13 – FDP Plan Set.

GENERAL DESCRIPTION OF STORMWATER FACTOR AFFECTING RUNOFF

During construction, the site will manage runoff with traditional BMP practices including silt fence and inlet protection. The post-project site will manage the runoff on our site from entering the downstream waters. With the use of these factors the discharge runoff rate on this site will be less than the existing conditions.

CONSTRUCTION PHASE

IMPORTANT RECORDED DATES (to be filled in during construction activities)

Major grading activities begin and end (dates): _____

Construction temporarily or permanently ceased (dates): _____

Stabilization measures initiated (dates): _____

BLASTING (list all contractors who will perform blasting work or handle explosives. Attach insurance certificates for all contractors on this list):

GENERAL SEQUENCE OF CONSTRUCTION:

Describe the general sequence/phasing of construction. (Address any critical construction sequences, time restrictions, etc. of which the contractor must be aware in planning his activities.)

This project will be completed in two general phases. The first task of construction will be the installation and inspection of all erosion control facilities. These facilities must be placed as per the approved land disturbance plan and SWPPP. Once the facilities have been properly installed, grading of the site can begin. Any disturbed slopes shall be fine, seeded, and mulched as soon as practical to provide a stabilized surface.

The second phase will include a majority of the site grading. All disturbed areas that are not covered by new turf shall be seeded and mulched. The erosion control facilities shall remain in place throughout this process. The disturbed areas are to be periodically inspected to check for wash-outs, gulleys, scouring, etc. Should any of these situations exist, the affected area shall be regraded, reseeded, and remulched.

CONSTRUCTION SITE BEST MANAGEMENT PRACTICES

(check all that apply):

- | | |
|--|--|
| ☒ Scheduling | ☐ Slope Drains |
| ☐ Preservation of Existing Vegetation | ☐ Geotextiles, ECBs, or TRMs |
| ☐ Hydraulic/Wood Mulch | ☐ Earth Dikes/Swales & Lined Ditches |
| ☐ Hydroseeding | ☐ Outlet Protection/Velocity Dissipater |
| ☐ Soil Binders | ☐ Stream bank Stabilization |
| ☒ Straw Mulch | ☐ Other (specify) _____ |

TEMPORARY SEDIMENT CONTROL BMPS:

- | | |
|--|--|
| ☐ Silt Fence | ☐ Sediment/Desilting Basin |
| ☐ Sediment Trap | ☐ Check Dam |
| ☐ Top Soil Diversion Berm | ☐ Gravel Bag Berm |
| ☐ Sandbag Barrier | ☒ Street Sweeping and Vacuuming |
| ☒ Storm Drain Inlet Protection | ☒ Other (specify) _____ Straw Wattle _____ |

WIND EROSION & TRACKING CONTROL BMPS:

- | | |
|--|--|
| ☒ Wind Erosion Control | ☒ Stabilized Entrance/Exit |
| ☐ Entrance/Outlet Tire Wash | ☐ Other (specify) _____ |

GOOD HOUSEKEEPING BMPS:

- | | |
|--|--|
| ☐ Water Conservation Practices | ☒ Paving & Grinding Operations |
| ☐ Dewatering Operations | ☐ Illicit/Illegal Discharge |
| ☐ Temporary Stream Crossing | ☐ Detection Vehicle & Equipment |
| ☐ Clear Water Diversion | ☒ Cleaning Vehicle & Equipment Fueling |
| ☐ Potable Water/Irrigation | ☒ Vehicle & Equipment Maintenance |
| ☒ Concrete Curing | ☐ Material/Equipment Use Over Water |
| ☒ Concrete Finishing | ☐ Other (specify) _____ |

WASTE MANAGEMENT & MATERIALS POLLUTION CONTROL BMPS:

- | | |
|---|---|
| ☒ Spill Prevention/Control | ☒ Material Delivery/Storage/Use |
| ☐ Stockpile Management | ☐ Contaminated Waste Management |
| ☒ Concrete Waste Management | ☐ Hazardous Waste Management |
| ☐ Solid Waste Management | ☐ Sanitary/Septic Waste Management |
| ☐ Liquid Waste Management | ☐ Other (specify) _____ |

PERMANENT STABILIZATION BMPS:

- | | |
|---|--|
| ☐ Velocity Dissipation | ☐ Riprap Channel Lining |
| ☐ Vegetative Buffers | ☐ Other (specify) _____ |
| ☐ Sod Channel Lining | |

NOTE: All temporary BMPs must be in place before construction can begin.

ENVIRONMENTALLY SENSITIVE AREAS

WETLAND PROTECTION:

Protection methods for wetlands include:

- Appropriate setbacks that preserve the wetlands or wetland functions;
- Wetland mitigation, including wetland replacement;
- Wetland restoration or enhancement.

SINKHOLE OR CAVE-RELATED NON-BUILDABLE AREAS:

- No grading or installation of parking areas, streets or other infrastructure within non-buildable areas.

DEVELOPMENT IN SINKHOLE DRAINAGE AREAS WITHOUT DISCHARGE TO SINKHOLE:

- Development may occur in the immediate sinkhole drainage area if alternative surface drainage is provided away from the sinkhole,
- The water shall stay in the same surface drainage basin,
- The water shall not go into another sinkhole drainage area off the applicant's property.
- The immediate sinkhole drainage area which cannot be provided with an alternative drain- age system can be deleted from the development area.

DEVELOPMENT IN SINKHOLE DRAINAGE AREAS WITH DISCHARGE TO SINKHOLE: The sinkhole can be used for limited surface runoff drainage where alternative surface drainage methods cannot be provided if the following conditions are met:

- Runoff from the development is completely retained in a retention or detention basin.
- Enough runoff is diverted from the sinkhole drainage area so that the development of the remaining area does not increase the total quantity or deteriorate the water quality of runoff into the sinkhole.
- Where the sinkhole outlet is off site, either the runoff leaving the subject property must be shown to be no greater in flow or in quantity than that which existed before development, or easements must be obtained from owners of property where any increase in flow or quantity of water must go to reach the sinkhole outlet.

FILLING IN SINKHOLES AND SINKHOLE DRAINAGE AREAS:

- No street shall be placed below an elevation of at least one (1) foot above the sinkhole ponding elevation and only when collapse of the sinkhole will not adversely affect the road.
- No increase in the ponding elevation will be allowed by grading or filling without a stormwater analysis approved by the Director.
- It shall be unlawful for any person to place, dump or deposit trash, debris, rubbish, brush, leaves, grass clippings, yard waste, hazardous waste or similar materials within a sinkhole.
- The alteration of land in a sinkhole by means of grading or the use of motorized equipment without a permit is not allowed.

BUFFER ZONE LIMITATIONS AND PROHIBITIONS:

- Natural vegetative cover must be retained within a buffer zone.
- All construction activities including grading and filling are prohibited.
- Wastewater disposal or irrigation is prohibited.

BUFFER ZONE WIDTHS:

- Wetlands (at least 50 ft.)
- Sinkholes (shall not be less than 150 ft., or greater than 300 ft. from the sinkhole eye)
- Other environmentally sensitive areas (the buffer zone shall be at least 50 feet)

GENERAL PRACTICES

GENERAL PRACTICES FOR CONSTRUCTION SITE RUNOFF CONTROL:

- Clearing and grading of natural resources shall not be permitted;
- Clearing techniques that retain natural vegetation and natural drainage patterns shall be used to the *maximum extent practicable*;
- Clearing shall not begin until all sediment control devices have been installed and have been stabilized;
- Cut and fill slopes *shall be no greater* than 33%;
- Phasing shall be required on all sites disturbing greater than 40 acres;
- Soil must be stabilized within 14 days of clearing or inactivity of construction;
- Soil stockpiles shall be protected from allowing sediment to leave the site;
- Techniques shall be employed to prevent the blowing of dust or sediment from the site;
- Techniques that divert upland runoff past disturbed slopes shall be employed;
- Sediment controls shall be provided in the form of settling basins or sediment traps or tanks, and perimeter controls;
- Adjacent properties shall be protected by the use of a vegetated buffer strip, in combination with perimeter controls wherever possible;
- When a watercourse must be crossed regularly during construction, a temporary stream crossing shall be provided. *Note:* Work done within a waterway may need additional federal or state permits;
- A temporary access road or driveway shall be provided at all sites;
- Temporary boundary markers shall be clearly visible and installed at 100-foot intervals prior to clearing, joined with marking tape or fencing, to delineate stream buffer limits.

GENERAL PRACTICES FOR MAINTENANCE AND INSPECTIONS:

- Inspection Frequency: All BMPs must be inspected in accordance to one of the schedules listed below. The inspection frequency shall be documented in the SWPPP, and any changes to the frequency of inspections, including switching between the options listed below, must be documented on the inspection form:
 - (a) At least once every seven (7) calendar days and within 48 hours after any storm event equal to or greater than a 2-year, 24-hour storm has ceased during a normal work day or within 72 hours if the rain event ceases during a non-work day such as a weekend or holiday. A 2-year, 24-hour storm event shall be determined for the project location using the National Oceanic and Atmospheric Administration's National Weather Service Atlas 14 which can be located at https://hdsc.nws.noaa.gov/hdsc/pfds/pfds_map_cont.html ; or
 - (b) Once every 14 calendar days and within 24 hours of the occurrence of a storm event of 0.25 inches of precipitation or greater, or the occurrence of runoff from snowmelt. To determine if a storm event of 0.25 inches or greater has occurred on the site, the permittee shall either keep a properly maintained rain gauge on site, or obtain the storm event information from a weather station near the site location.
 - 1) Inspections are only required during the project's normal working hours.
 - 2) An inspection must be conducted within 24 hours of a storm event which has produced 0.25 inches. The inspection shall be conducted within 24 hours of the event end, or within 72 hours if the rain event ceases during a non-work day such as a weekend or holiday.

- 3) If it is elected to inspect every 14 calendar days and there is a storm event at the site that continues for multiple days, and each day of the storm produces 0.25 inches or more of rain, the permittee shall conduct an inspection within 24 hours of the end of the storm or within 72 hours if the rain event ceases during a non-work day such as a weekend or holiday.

The person responsible for erosion control is to be present on site every day during duration of the project to verify if stormwater runoff occurs, if they are not, they shall daily check the storm event information from a weather station near the site location.

- Parts that have been finally stabilized shall be inspected once per month. All perimeter controls shall be inspected weekly for proper anchorage, leakage, or tears on the control material;
- The responsible party shall make records of the installation and of all maintenance and repairs, and shall retain the records for at least five (5) years;
- Built-up sediment will be removed from silt barriers when it has reached 1/3 of the height of the barrier;
- Sediment basins shall have built-up sediment removed when 1/3 of the basin volume is filled;
- All measures shall be maintained in good working order;
- The project permit may be terminated when all projects are stabilized. This project is considered to be finally stabilized when perennial vegetation, pavement, buildings, or structures using permanent materials cover all areas that have been disturbed. With respect to areas that have been vegetated, vegetations cover shall be at least 70% over 100% of the site.

GOOD HOUSEKEEPING

SPILL PREVENTION:

PETROLEUM PRODUCTS

- Construction equipment and vehicles shall be monitored for leaks and receive regular preventative maintenance to ensure proper operation and reduce the risk for leaks or spills.
- Petroleum products shall be stored in clearly labeled and tightly sealed containers or tanks.
- Any soil contaminated by fuel or oil spills shall be removed and disposed of properly.
- Above-or-below ground petroleum storage facilities must be set back 300 feet from any stream.
- Storage for oils, greases, paints, fuels, and chemicals shall be provided with secondary containment.

FUELING AND SERVICING

- Above-or-below ground fueling storage facilities must be set back 300 feet from any stream.
- Up to 500 gallons of gasoline or diesel fuel is allowed, but must remain outside the stream buffer.
- Secondary containment for fuel shall be provided.

MUD TRACKING

- The permittee is responsible for keeping sediment and debris off streets.

CONCRETE TRUCK WASHOUT

- Washout shall not discharge surplus concrete or drum wash water on the site in such a manner that promotes contact with storm waters or natural streams discharging from the site.
- No concrete trucks will be on site and washout areas are not anticipated to be needed.
- A concrete washout area with proper controls will be made available by contractor if needed

HAZARDOUS MATERIALS

- All hazardous materials shall be disposed of according to state regulation or the manufacturer's recommendations. MU-EHS will handle the disposal of all hazardous materials. Under no circumstances is this material to be removed from the site without EHS approval.

FERTILIZERS

- Fertilizers shall be applied following manufacture's recommendations.
- Fertilizers shall be stored in a covered area or in watertight containers.
- Partially used products shall be properly sealed and stored to avoid spills or leaks.
- Up to 20 gallons of liquid fertilizer or pesticide and up to 100 pounds of granular fertilizer or pesticide storage is allowed if set back from stream 300 feet.
- Storage must remain out of the stream buffer.

CONSTRUCTION WASTE

- All construction waste material shall be collected, deposited, and stored in a manner to prevent contact with storm waters discharging from the site and shall be disposed of by a licensed solid waste management contractor.
- No waste shall be buried on site.

SANITARY WASTE

- A licensed sanitary waste management contractor shall collect all sanitary waste from portable units that will be maintained on a regular basis from any site that cannot provide other means of sanitary waste disposal.

GOOD HOUSEKEEPING

AIR EMISSIONS:

BURNING

- Any burning on the site requires a permit from the Missouri Department of Natural Resources. Contact the DNR Kansas City Region at 816-271-0700.

DUST CONTROL

- The contractor is required by Missouri State law to control dust from the site.
- Watering must be provided in unstabilized areas and mulch applied as soon as possible.

OTHER GOOD HOUSEKEEPING PRACTICES:

- Whenever possible, all of a product will be used up before disposing of the container in accordance with Missouri State law.
- Manufacturer's recommendations for proper use and disposal will be followed.
- The site manager shall inspect materials daily to ensure proper use, storage, and disposal.
- All paint containers will be tightly sealed and stored when not required for use. Excess paint will not be dumped into the stormwater system, but will be properly disposed of according to Missouri State law.

SPILL CONTROLS:

- Manufacturer's recommended methods for spill cleanup will be clearly posted and site personnel will be made aware of the procedures and the location of the information and cleanup supplies.
- All spills will be cleaned up immediately after discovery.
- The spill area will be kept well-ventilated and personnel will wear appropriate protective clothing to prevent injury from contact with a hazardous substance.
- If the permittee or an authorized representative has knowledge of any known or suspected release of materials which are resulting or may result in illegal discharges or pollutants discharging into stormwater, the storm drain system, or water of the U.S., said person shall take all necessary steps to ensure the discovery, containment, and cleanup of such release.
- The permittee or authorized representative is required to notify emergency response agencies of the occurrence via emergency dispatch services and the MDNR Environmental Emergency Response in accordance with 40 CFR 117 and CFR 302 as soon as they have knowledge of the discharge of any hazardous substance or petroleum product in excess of the reportable quantity.
- The applicant shall notify the Owners Representative of any oil spills or if hazardous substances are found during the prosecution of work under this permit. Any Notifications should be made to the Owners Representative, who will contact Missouri Department of Natural Resources at 816-271-0700. If there is an immediate danger to life and health call 911
- The spill prevention plan will be adjusted to include measures to prevent this type of spill from reoccurring and how to clean up the spill if there is another one.

SAMPLING REQUIREMENTS:

- There are no sampling requirements required as a part of this plan.

LOG OF CHANGES TO THE SWPPP

Document changes to the SWPPP here. These should include additions of new BMPs, replacement of failed BMPs, changes in construction activities and times, changes in personnel, inspection, and maintenance procedures, and updates to the site map.

UPDATE

DATE _____

[illegible]

SCHEDULING

PHYSICAL DESCRIPTION

This BMP involves developing, a schedule that includes sequencing of construction activities with the implementation of construction site BMPs such as temporary soil stabilization (erosion control) and temporary sediment control measures for every project. The purpose is to reduce the amount and duration of soil exposed to erosion by wind, rain, runoff and vehicle tracking, and to perform the construction activities and control practices in accordance with the planned schedule.

APPROPRIATE APPLICATIONS:

Construction sequencing shall be scheduled to minimize land disturbance for all projects at all times.

CONDITIONS FOR EFFECTIVE USE:

All land disturbing activities.

WHEN BMP IS TO BE INSTALLED:

Scheduling should take place during the planning stages and be modified throughout the duration of the project.

STANDARDS AND SPECIFICATIONS:

Developing a schedule and planning the project are the very first steps in an effective storm water program. The construction schedule shall be incorporated into the SWPPP. Develop the sequencing and timetable for the start and completion of each item such as site clearing and grubbing, grading, excavation, paving, pouring foundations, installing utilities, etc., to minimize the active construction area during the rainy season. Schedule major grading operations for the non-rainy season when practical. Incorporate staged seeding and re-vegetation of graded slopes as work progresses. Consider the appropriate planting time for specified vegetation when establishing permanent vegetation.

OPERATION AND MAINTENANCE PROCEDURES:

Verify that work is progressing in accordance with the schedule. If progress deviates, take corrective actions. Amend the schedule when changes are warranted.

CONSTRUCTION ENTRANCE/EXIT

PHYSICAL DESCRIPTION

A stabilized entrance to a construction site which is designed to minimize the amount of sediment tracked from the site on vehicles and equipment. Mud and sediment fall off of tires as they travel along the stabilized entrance.

APPROPRIATE APPLICATIONS:

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

CONDITIONS FOR EFFECTIVE USE:

Site conditions will dictate design and need. Ditches or pipes, if needed, sized for 15 year, 20 minute storm; HGL 6" below surface of entrance.

WHEN BMP IS TO BE INSTALLED:

Install stabilized construction entrance/exit prior to vehicles or equipment accessing unpaved areas. This will most likely be the first BMP to be installed on the site.

STANDARDS AND SPECIFICATIONS:

Limit the points of entrance/exit to the construction site. Properly grade and compact each construction entrance/exit to prevent runoff from leaving the site. Install culvert under entrance if needed to maintain positive drainage. Place fabric and cover with aggregate, forming a diversion across the entrance, if needed, to direct runoff away from the roadway. Require all employees, subcontractors, and suppliers to utilize the stabilized construction access.

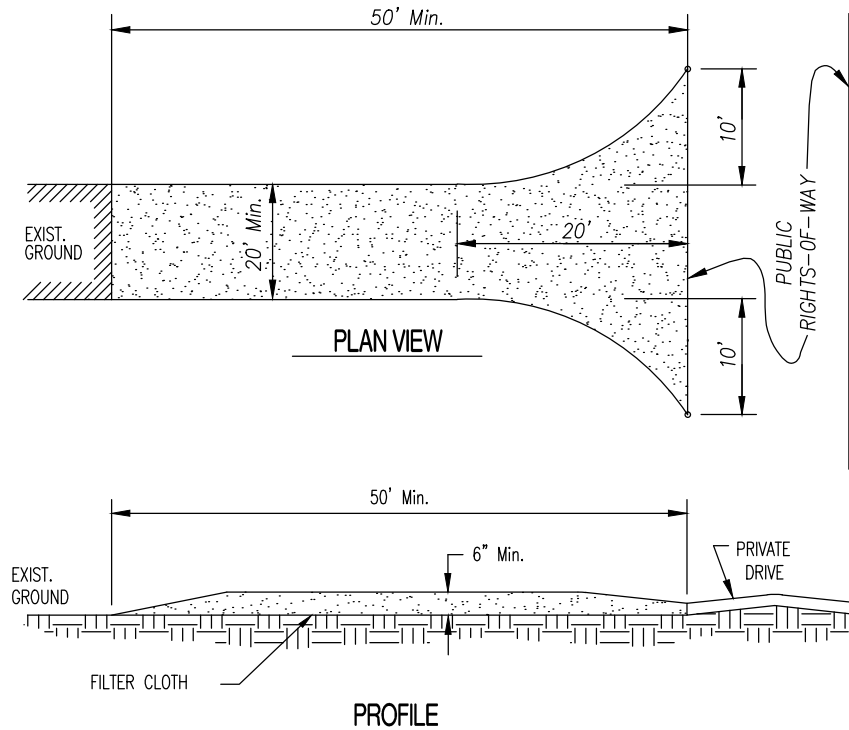
OPERATION AND MAINTENANCE PROCEDURES:

Inspect routinely for damage and assess effectiveness of the BMP. Remove sediment and clods of dirt from construction entrance continuously. Replace rock, as necessary, to maintain a clean surface for traffic. Repair any areas that have settled. Keep all temporary roadway ditches clear. Immediately remove any mud or debris tracked onto paved surfaces.

SITE CONDITIONS FOR REMOVAL:

Remove when vehicles and equipment will no longer require access to unpaved areas.

CONSTRUCTION ENTRANCE/EXIT



CONSTRUCTION SPECIFICATIONS

1. STONE SIZE - USE 2' STONE.
2. LENGTH - AS REQUIRED, BUT NOT LESS THAN 50 FEET.
3. THICKNESS - NOT LESS THAN SIX (6) INCHES.
4. WIDTH - TWENTY (20) FOOT MINIMUM, BUT NOT LESS THAN THE FULL WIDTH AT POINTS WHERE INGRESS OR EGRESS OCCURS.
5. FILTER CLOTH - WILL BE PLACED OVER THE ENTIRE AREA PRIOR TO PLACING OF STONE.
6. SURFACE WATER - ALL SURFACE WATER FLOWING OR DIVERTED TOWARD CONSTRUCTION ENTRANCES SHALL BE PIPED ACROSS THE ENTRANCE. IF PIPING IS IMPRACTICAL, A MOUNTABLE BERM WITH 3:1 SLOPES WILL BE PERMITTED.
7. MAINTENANCE - THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHTS-OF-WAY. THIS MAY REQUIRE PERIODIC TOP DRESSING WITH ADDITIONAL STONE AS CONDITIONS DEMAND AND REPAIR AND/OR CLEANOUT OF ANY MEASURES USED TO TRAP SEDIMENT. ALL SEDIMENT SPILLED, DROPPED, WASHED OR TRACKED ONTO PUBLIC RIGHTS-OF-WAY MUST BE REMOVED IMMEDIATELY.
8. PERIODIC INSPECTION AS NEEDED MAINTENANCE SHALL BE PROVIDED WEEKLY AND AFTER EACH RAIN EVENT GREATER THAN 1/2".

SITE/CIVIL ENGINEER:

CROCKETT

ENGINEERING CONSULTANTS
2608 North Stadium Boulevard
Columbia, Missouri 65202
(313) 447-0292

www.crockettengineering.com

Crockett Engineering Consultants, LLC
Missouri Certificate of Authority
#2000151304

FIBER ROLLS/WATTLES

PHYSICAL DESCRIPTION

Fiber rolls (also called fiber logs or straw wattles) are tube-shaped erosion-control devices filled with straw, flax, rice, coconut fiber material, or composted material. Each roll is wrapped with UV-degradable polypropylene netting for longevity or with 100 percent biodegradable materials like burlap, jute, or coir. These devices reduce erosion on long or steep slopes by breaking up the slope length.

APPROPRIATE APPLICATIONS:

Fiber rolls can be used in areas of low shear stress such as; along the toe, top, face, and at-grade breaks of exposed and erodible slopes to shorten slope length and spread runoff as sheet flow, at the end of a downward slope where it transitions to a steeper slope, along the perimeter of a project or stockpile, as check dams in unlined ditches, and downslope of exposed soil areas.

CONDITIONS FOR EFFECTIVE USE:

Type of Flow: Sheet flow and concentrated flow.

WHEN BMP IS TO BE INSTALLED:

Wattles should be installed immediately after rough grading; prior to seeding or mulching.

STANDARDS AND SPECIFICATIONS:

On slopes, install fiber rolls along the contour with a slight downward angle at the end of each row to prevent ponding at the midsection. Turn the ends of each fiber roll upslope to prevent runoff from flowing around the roll. Determine the vertical spacing for slope installations on the basis of the slope gradient and soil type. A good rule of thumb is: 1:1 slopes=10 feet apart, 2:1 slopes=20 feet apart, 3:1 slopes=30 feet apart, and 4:1 slopes=40 feet apart. Stake fiber rolls securely into the ground and orient them perpendicular to the slope. Fiber rolls can also be used at projects with minimal slopes. Typically, the rolls are installed along sidewalks, on the bare lot side, to keep sediment from washing onto sidewalks and streets and into gutters and storm drains.

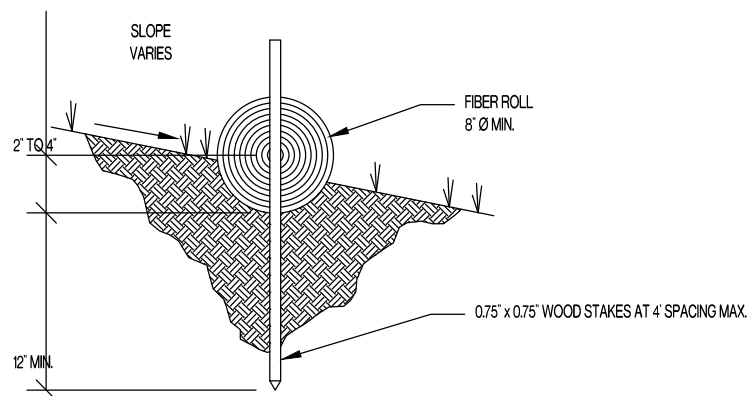
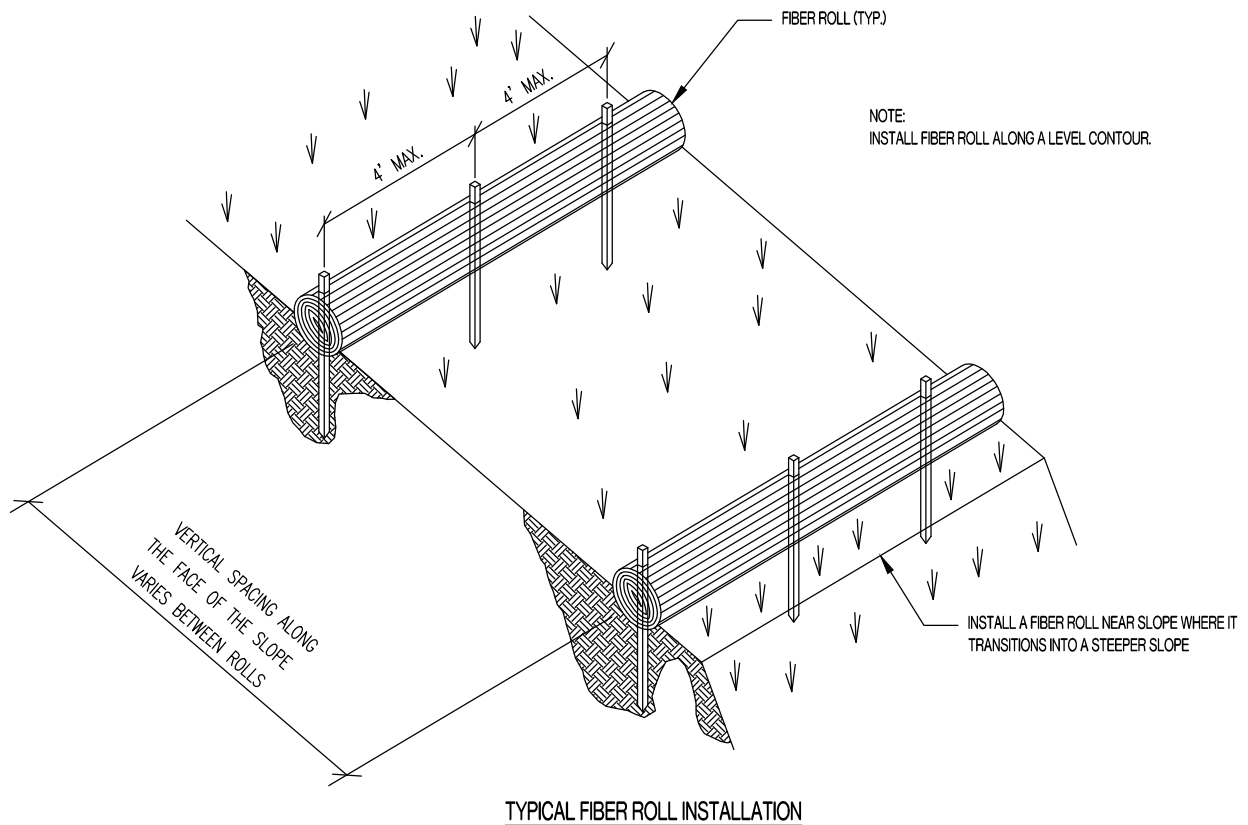
OPERATION AND MAINTENANCE PROCEDURES:

Inspect at least every week and after every storm. Remove sediment accumulation when it reaches $\frac{1}{2}$ the height of the roll/wattle. Repair or replace split, torn, unraveled, or slumping fiber rolls.

SITE CONDITIONS FOR REMOVAL:

Fiber rolls are typically left in place on slopes. If they are removed after stabilization has been achieved, collect and dispose of the accumulated sediment.

FIBER ROLLS/WATTLES



SITE/CIVIL ENGINEER:

CROCKETT

ENGINEERING CONSULTANTS
2608 North Stadium Boulevard
Columbia, Missouri 65202
(313) 647-0292

www.crockettengineering.com

Crockett Engineering Consultants, LLC
Missouri Certificate of Authority
#2000151304

CURB AND GUTTER INLET PROTECTION

PHYSICAL DESCRIPTION

A temporary sediment control barrier consisting of a filter media, such as compost filter socks, gravel and mesh, sandbags, gravel bags, etc., around a curb and gutter inlet designed to prevent sediment from entering the storm sewer. Shallow temporary ponding may occur during and after rainfall events.

APPROPRIATE APPLICATIONS:

Place protection at inlets where runoff may contain sediment-laden water.

CONDITIONS FOR EFFECTIVE USE:

Type of Flow: Sheet flow and concentrated flow.

Contributing Area: Maximum of 1 acre.

WHEN BMP IS TO BE INSTALLED:

Install inlet protection immediately after installation of the inlet, or prior to land disturbing activities beginning on the contributing upstream area to the inlet.

STANDARDS AND SPECIFICATIONS:

Typical types of curb and gutter inlet protection include: fabricated inlet filters (follow manufacturer's instructions), compost filter sock (make sure that both ends of the sock are anchored accordingly), gravel and wire mesh (construct and anchor wood frame, fasten wire mesh and fabric to frame and place the gravel on top of the entire structure), sandbags and gravel bags (may be placed either as a j-hook on the upstream end of the inlet or as a full barrier, sometimes stacked 2 bags high, across the entire opening of the inlet). Incorporate an overflow bypass into the inlet protection structure in areas, such as heavy traffic streets, where excessive ponding of water around the inlet may become a safety issue. Sediment controls behind the curb will be necessary to prevent the discharge of sediment in these bypasses.

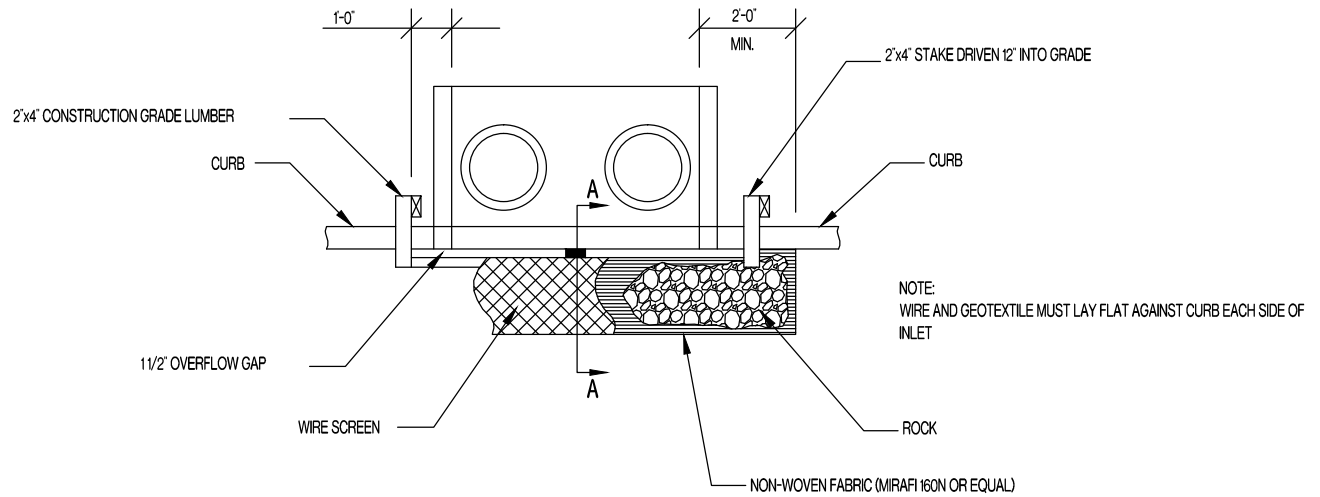
OPERATION AND MAINTENANCE PROCEDURES:

Inspect inlet protection of all media types weekly and after each ½" rainfall event to make sure they are functioning properly. Remove trash and debris. Remove sediment from the inlet protection when half of the protection structure height has been filled. Repair elements to original configuration as needed.

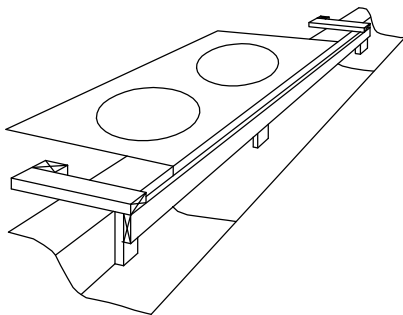
SITE CONDITIONS FOR REMOVAL:

Remove after contributing drainage areas have been adequately stabilized.

CURB AND GUTTER INLET PROTECTION

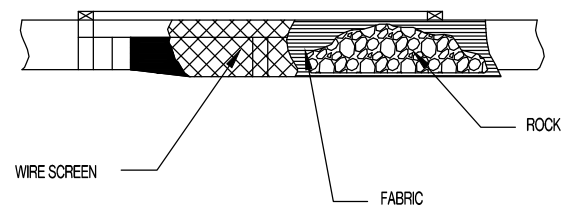


PLAN

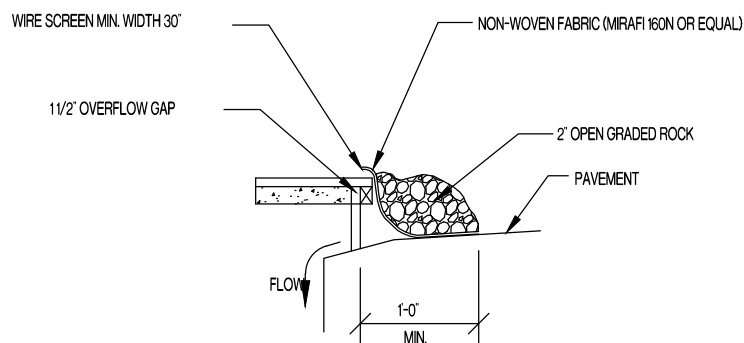


WOODEN FRAME ON VERTICAL CURB

NOTE: ALTERNATIVELY, ROCK CAN BE PLACED IN A FILTER FABRIC BAG (SIMILAR TO SANDBAG) AND PLACED IN THE OPENING WITHOUT THE WOODEN FRAME.



ELEVATION



SECTION A-A

SITE/CIVIL ENGINEER:

CROCKETT

ENGINEERING CONSULTANTS
2606 North Stadium Boulevard
Columbia, Missouri 65202
(573) 447-0292

www.crockettengineering.com

Crockett Engineering Consultants, LLC
Missouri Certificate of Authority
#200015104

DROP INLET PROTECTION

PHYSICAL DESCRIPTION

A temporary sediment control barrier consisting of a filter fabric around a recessed area inlet designed to prevent sediment from entering the storm sewer. Shallow temporary ponding may occur during and after rainfall events.

APPROPRIATE APPLICATIONS:

At recessed area or yard inlets where runoff may contain sediment-laden water.

CONDITIONS FOR EFFECTIVE USE:

Type of Flow: Sheet flow and concentrated flow.

Contributing Area: Maximum of 1 acre.

WHEN BMP IS TO BE INSTALLED:

Place inlet protection immediately after installation of the inlet, or prior to land disturbing activities beginning on the contributing upstream area to the inlet.

STANDARDS AND SPECIFICATIONS:

Typical types of drop inlet protection include: manufactured filtering product or silt fence frames. Follow the manufacture's instruction for placement of proprietary products. For the silt fence protection, install a wood frame, dig a trench around the inlet for fabric to be buried, fasten fabric tightly to frame, backfill and compact trench. Alternatively, a sod filter can be installed by preparing and fertilizing the soil around the inlet and installing sod for a distance of at least 4 feet in each direction. The sod should be staked, stapled and/or netted at the corners and center of sod strips as required and then watered immediately. For safety, inlet protection structures which pond water onto streets, parking lots or driveways should be designed to have some method for allowing excess water from large storms to bypass or overflow.

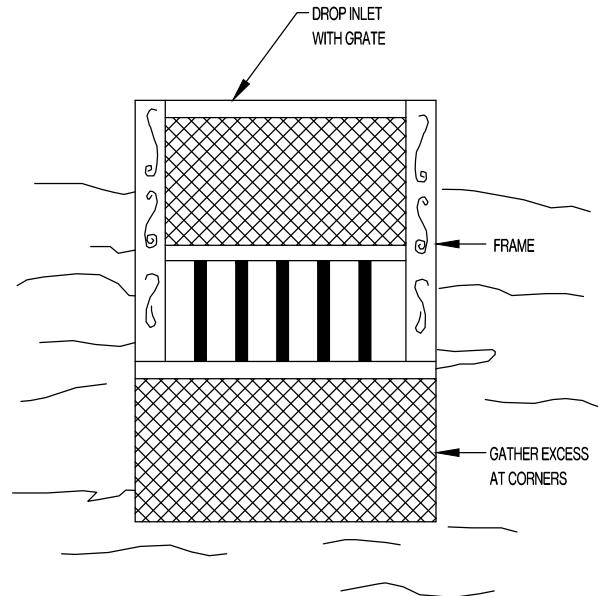
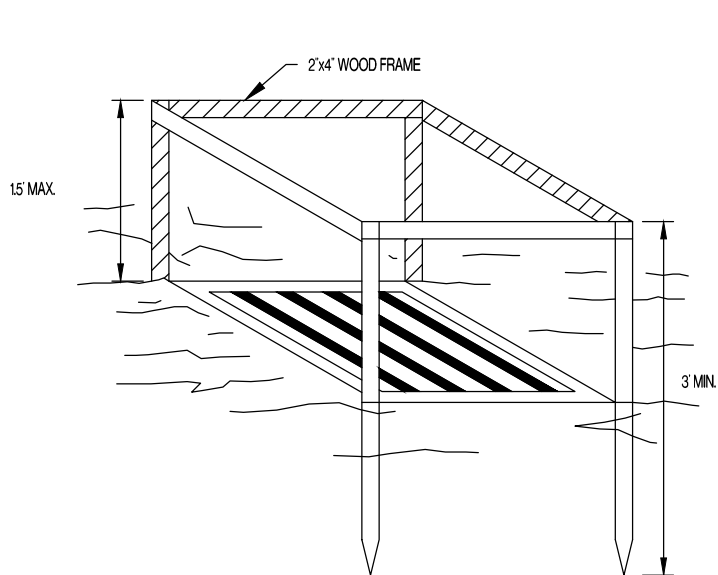
OPERATION AND MAINTENANCE PROCEDURES:

Inspect inlet protection of all media types weekly and after each significant rainfall event to make sure they are functioning properly. Remove trash and debris. Remove sediment from the inlet protection when half of the protection structure height has been filled. Repair elements to original configuration as needed.

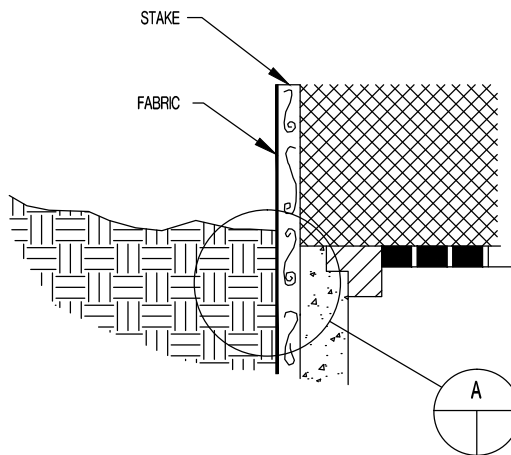
SITE CONDITIONS FOR REMOVAL:

Remove after contributing drainage areas have been adequately stabilized.

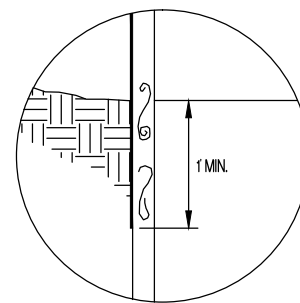
DROP INLET PROTECTION



PERSPECTIVE VIEWS
NOT TO SCALE



ELEVATION OF STAKE AND
FABRIC ORIENTATION



DETAIL A
NOT TO SCALE

SITE/CIVIL ENGINEER:

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#2000151304

DUST (WIND EROSION) CONTROL

PHYSICAL DESCRIPTION

Wind erosion control consists of applying water and/or other dust palliatives as necessary to prevent or alleviate erosion by the forces of wind. Alternatives to applying water or other dust palliatives include mulch or vegetative cover, wind barriers, and minimization of soil disturbance.

APPROPRIATE APPLICATIONS:

This practice is implemented on all exposed soils subject to wind erosion.

CONDITIONS FOR EFFECTIVE USE:

Effectiveness depends on soil, temperature, slope, aspect, humidity and wind velocity.

WHEN BMP IS TO BE INSTALLED:

Dust control should be performed routinely, especially in advance of and during periods of dry weather.

STANDARDS AND SPECIFICATIONS:

Water shall be applied by means of pressure-type distributors or pipelines equipped with a spray system or hoses and nozzles that will ensure even distribution. Phase work to the extent practical to minimize concurrent areas of soil disturbance. For areas not subjected to traffic, vegetation provides the most practical method of dust control and should be established as early as possible. Wind barriers such as 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. Paved areas that have soil on them from construction sites should be cleaned regularly. Mulching offers a fast and effective means of controlling dust when properly applied. Binders and tackifiers may need to be used on organic mulches. NOTE: If calcium chloride or spray-on adhesives are used for dust control, a permit may be required from MoDNR.

OPERATION AND MAINTENANCE PROCEDURES:

Check areas that have been protected to ensure coverage.

SITE CONDITIONS FOR REMOVAL:

Dust control should be implemented when soils are exposed until cover is established

NON-SEDIMENT POLLUTION CONTROL

PHYSICAL DESCRIPTION

These control measures are designed to prohibit chemicals, hazardous materials, solid waste, human waste and construction debris from polluting stormwater. 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, human 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.

APPROPRIATE APPLICATIONS:

Temporary sanitary facilities, 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:

An effective management system requires training and signage to promote proper storage, handling and disposal of materials, and follow up observations of actions and inspection of storage areas by management. Plans should contain notes clearly stating requirements for addressing potential pollutants.

WHEN BMP IS TO BE INSTALLED:

Pollution control practices should begin immediately and continue throughout the project.

STANDARDS AND SPECIFICATIONS:

Place waste receptacles near area of work. All fueling facilities present on the site shall adhere to applicable federal and state regulations concerning underground storage, above ground storage, and dispensers. Hazardous wastes shall be managed according to Missouri Hazardous Waste Laws and Regulations. Install appropriate signage. Post guidelines for proper handling, storage and disposal of materials, and emergency spill cleanup on site. Provide sufficient temporary toilet facilities to serve the number of workers on the site.

OPERATION AND MAINTENANCE PROCEDURES:

Inspect activities on a regular basis. Inspect storage areas and control devices at least every week and after every storm. Maintenance of temporary toilet facilities should be frequent and thorough. Make necessary corrections and repairs.

SITE CONDITIONS FOR REMOVAL:

Remove after contributing drainage areas have been adequately stabilized.

NON-SEDIMENT POLLUTION CONTROL

STANDARD NOTES:

General pollution notes:

1. Handling and disposal of hazardous materials:

DO: Prevent spills

Use up products completely

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 other waste

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. All waste material shall be disposed of at facilities approved for that material.

3. No waste materials shall be buried on-site.

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.

NON-SEDIMENT POLLUTION CONTROL

7. All paint, solvents, petroleum products and petroleum waste products, and storage containers (such as drums, cans, or cartons) shall be stored according to BMPs. The materials exposed to precipitation shall be stored in watertight, structurally sound, closed containers. All containers shall be inspected for leaks or spillage during the once per week inspection of BMPs. 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 properly disposed of. 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 MoDNR (537-634-2436) as soon as practical after discovery. Federal law requires the responsible party to report any release of oil if it reaches or threatens a sewer, lake, creek, stream, river, groundwater, wetland, or area, like a road ditch, that drains into one of the above.

9. Sufficient temporary toilet facilities to serve the number of workers on the site shall be provided. The facilities shall be serviced frequently to maintain a sanitary condition.

SEEDING/MULCHING

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.

APPROPRIATE APPLICATIONS:

Exposed soil after a phase of rough or finish grading has been completed, or areas where no activity will occur for 14 days.

CONDITIONS FOR EFFECTIVE USE:

Type of Flow: Sheet flow and concentrated flow (additional stabilization is necessary).

Minimum Rates: Permanent seeding should consist of 90% tall fescue and 10% annual ryegrass. Seed mixture should be applied at 400 pounds/acre. Temporary seeding shall consist of any combination of tall fescue, annual ryegrass, millet, wheat or oats. Seed mixture should be applied at 200 pounds/acre. Dormant season seeding, seed mix should consist of 80% tall fescue, 10% annual ryegrass and 10% spring oats. Seed mixture is to be applied at 600 pounds/acre.

Acceptable Dates: Permanent seeding may be done March 1 to June 1 and August 15 to November 1. Temporary seeding can occur during any season, however winter is the least tolerant. Dormant season seeding includes December 15 to February 29.

WHEN BMP IS TO BE INSTALLED:

Seed and mulch should be applied immediately after rough or finished grading is completed.

STANDARDS AND SPECIFICATIONS:

Install upstream BMPs to prevent erosion and protect the area to be seeded. Complete grading and remove all debris larger than 1 inch. Loosen compacted soils to a depth of 4 inches. Groove or furrow on the contour if necessary. Spread loose topsoil at a depth of 4 inches.

Soil amendments should be applied per soil tests. When these are not available, lime shall be applied at the rate of 1500 pounds effective neutralizing material per acre. Soils with a pH of six or higher need not be limed. When soil tests are not available, a 13-13-13 grade fertilizer shall be applied at a rate of 500 pounds/acre for permanent seeding and a 10-10-10 grade fertilizer shall be applied at the rate of 200 pounds/acre. Mix soil amendments (lime, fertilizer, etc.) into the top 4 inches of soil.

SEEDING/MULCHING

Plant seed $\frac{1}{4}$ to $\frac{1}{2}$ inches deep using a cyclone seeder, drill, cultipacker seeder, or hydro-seeder. Roll lightly to firm surface. Cover seeded area with mulch. Install additional stabilization (erosion control blankets, netting, bonded fiber matrix, etc.) on slopes steeper than 3:1 and in areas of concentrated flow. Water seeded area immediately. Provide enough water to soak 4 inches into the soil without causing runoff.

OPERATION AND MAINTENANCE PROCEDURES:

Inspect at least weekly and after every storm. Protect seeded areas from vehicular and foot traffic. Reseed and mulch areas that have not sprouted within 21 days of planting. Repair damaged or eroded areas and reseed/mulch and stabilize as needed. Do not mow until 4 inches of growth occurs. During the first 4 months, mow no more than $\frac{1}{3}$ the grass height.

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 flows. Mulch materials may include, but are not limited to, grass, hay, straw, wood chips, wood fibers, and shredded bark.

APPROPRIATE APPLICATIONS:

Typically used for soil stabilization as a temporary surface cover on disturbed areas until soils can be prepared for revegetation and permanent vegetation is established. Mulch can also be installed in land--scape areas for permanent use.

CONDITIONS FOR EFFECTIVE USE:

Type of Flow: Sheet flow only

The use of appropriate mulch will help ensure the vegetation is established under normal conditions and is essential to seeding success under harsh site conditions. General mulch recommendations to protect from raindrop splash and sheet flow include: straw applied at 2-2.5 tons/acre, wood fiber or wood cellulose applied at 0.5-1 ton/acre, wood chips applied at 5-6 tons/acre, and bark applied at 35 yd³/acre. Where slopes are 25 percent (4:1) or greater, hydromulch, bonded fiber matrix, or erosion control blankets are required.

WHEN BMP IS TO BE INSTALLED:

Mulch should be applied immediately after grading landscaped areas or seeding other areas.

STANDARDS AND SPECIFICATIONS:

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 evenly.

OPERATION AND MAINTENANCE PROCEDURES:

Inspect at least every week 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.

SODDING

PHYSICAL DESCRIPTION

Sod consists of a $\frac{3}{4}$ inch to 1 inch mat of vigorous turf, free from 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.

APPROPRIATE APPLICATIONS:

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 subdivisions and off site construction areas.

CONDITIONS FOR EFFECTIVE USE:

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

WHEN BMP IS TO BE INSTALLED:

Sod should be installed immediately after finish grading, installation of area inlets, and installation of underground services and foundations of new homes.

STANDARDS AND SPECIFICATIONS:

Rough grade area and remove all debris larger than $\frac{1}{2}$ 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. Scarify soil and level to provide an even grade. 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, especially areas of concentrated flow. Water should be applied immediately after installation of sod. Provide enough to soak 4 inches into the soil without causing runoff.

OPERATION AND MAINTENANCE PROCEDURES:

Water sod daily for 3 weeks, enough to soak 4 inches into the 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 $\frac{1}{3}$ the grass height.