

**REVISIONS**

| NO. | DATE     | DESCRIPTION        |
|-----|----------|--------------------|
| 1   | 1/1/2016 | ISSUED FOR BIDDING |

**PLAN VIEW**

**ELEVATION**

**SECTION**

**JOINING SECTIONS OF SILT FENCE**

**TYPICAL BMP DETAIL**

**SILT FENCE**

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**SILT FENCE**

**PHYSICAL DESCRIPTION** - Silt fences are used as temporary perimeter controls, appropriate to the BMP, at sites where construction activities will disturb the soil. They can also be used on the interior of the site. A silt fence consists of a length of filter fabric stretched between anchoring posts spaced at regular intervals along the site at low and down slope areas. The filter fabric should be entrenched in the ground. When installed correctly and inspected frequently, silt fence can be an effective barrier to silt leaving the site in storm water runoff.

**WHERE BMP IS TO BE INSTALLED** - Silt fences apply to construction sites with relatively small drainage areas. They are appropriate in areas where runoff will occur as low-level flow, not exceeding 0.5 c.f.s. The drainage area for silt fences should not exceed 0.25 acre per 100-foot fence length (100 square feet per foot of fence). The slope length above the fence should not exceed 100 feet (NAHB, 1995). The fence should be designed to withstand the runoff from a 10-year peak storm event.

**CONDITIONS FOR EFFECTIVE USE OF BMPs** - Spacing of parallel lengths of silt fence along slopes is relative to slope steepness as follows:

| Type of Flow:              | Sheet flow only.  |
|----------------------------|---|
| Contributing Slope Length: | 30-foot maximum for 3:1 slopes<br>50 foot maximum for slopes between 3:1 and 10:1<br>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. Install on the perimeter of the site (where storm water exits the site) prior to disturbance of natural vegetation, around material stockpiles and interior to the site along slopes, at the base of slopes and at intervals during construction of slopes.

**INSTALLATION / CONSTRUCTION PROCEDURES**

- Drive post 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.

If a standard-strength fabric is used, it can be reinforced with wire mesh behind the filter fabric. This increases the effective life of the fence. The maximum life expectancy for synthetic fabric silt fences is about 6 months, depending on the amount of rainfall and runoff.

The stakes used to anchor the filter fabric should be wood or metal. Wooden stakes should have minimum dimensions of 2 by 2 inches if a hardwood like oak is used. Stakes from soft woods like No. 2 Southern Pine, should have minimum dimensions of 4 by 4 inches. When using steel (standard U, T, L or C shape sections) posts in place of wooden stakes, they should weigh no less than 1.0 lb/linear foot. If metal posts are used, attachment points are needed for fastening the filter fabric with wire ties. Posts should be least 5 feet long and driven or placed at a slight upstream angle into the ground to a

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minimum depth of 18 inches. Depth shall be increased to a minimum of 22 inches if fence is placed on a slope of 3:1 or greater. When the post embedment depth is impossible to obtain, the posts shall be adequately secured to prevent overturning of the fence due to sediment loading.

Erect silt fence in a continuous fashion from a single roll of fabric to eliminate gaps in the fence. If a continuous roll of fabric is not available, overlap the fabric from both directions only at stakes or posts. Overlap at least 6 inches.

The Geosynthetic filter fabric and wire mesh (when applicable) shall be no less than 30 inches above ground and are stapled or wired to the upslope side of the post. Staples should be a 17-gauge wire and 1/2 inch long. Excavate a trench to bury the bottom of the fabric fence in a "J" configuration at least 6 inches below the ground surface. The trench shall be backfilled with native soil and the soil compacted over the geotextile. This helps to prevent gaps from forming near the ground surface. Gaps would make the fencing useless as a sediment barrier.

The height of the fence posts should be 38 inches (22-inch embedment) to 42 inches (18-inch embedment) above the original ground surface. If standard-strength fabric is used with 14-gauge steel wire with a mesh spacing of 6 inches by 6 inches (or a prefabricated polymeric mesh of equivalent strength), space the posts no more than 4 feet apart. If extra-strength fabric is used without wire mesh reinforcement, space the posts no more than 4 feet apart with woven or 6 feet apart with non-woven geosynthetic.

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

**LIMITATIONS** - Do not install silt fences along areas where rocks or other hard surfaces will prevent you from uniformly anchoring the fence posts and entrenching the filter fabric. Installing fences in such an area greatly reduces their effectiveness and can create runoff channels leading offsite. Silt fences are not suitable for areas where large amounts of concentrated runoff are likely. Fence shall not be used when slope is 1:1 or greater and water flow rates exceed 2 cubic feet per minute. Open, windy areas present a maintenance challenge, too, because high winds can make the filter fabric deteriorate faster. Do not install silt fences across streams, ditches, or waterways (Smolen et al., 1988).

When the pores of the fence fabric become clogged with sediment, pools of water are likely to form on the uphill side of the fence. Setting and design of the silt fence should account for this. Take care to avoid unnecessarily diverting stormwater from these pools, causing further erosion damage.

**MAINTENANCE CONSIDERATIONS** - Inspect silt fences regularly and frequently, as well as after each rainfall event, to make sure that they are intact and that there are no gaps where the fence meets the ground or tears along the length of the fence. If you find gaps or tears, repair or replace the fabric immediately. Remove accumulated sediments from the fence base when the sediment reaches one-third to one-half the fence height. Remove sediment more frequently if accumulated sediment is creating noticeable strain on the fabric and the fence might fail from a sudden storm event. When you remove the silt fence, remove the accumulated sediment, dress the area disturbed to give it a pleasing appearance and vegetate all bare areas as well.

**O&M PROCEDURES**

- Inspect every week and after every storm.
- Remove sediment buildup deeper than 1/2 the fence height or 12", whichever is less.
- Replace torn or clogged fabric; repair loose fabric.

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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.

**SILTING AND DESIGN CONSIDERATIONS** - The material for silt fences should be a pervious sheet of synthetic fabric such as polypropylene, nylon, and polyester or polyethylene yarn. Choose the material based on the minimum synthetic fabric requirements shown in Table 1 below.

**Table 1- Temporary Silt Fence Property Requirements**

| Physical Property                                   | Test Method             | Units             | MARV Geotextile Requirements      |   |   |
|---|-------------------------|-------------------|-----------------------------------|---|---|
|   |                         |                   | Supported Silt Fence <sup>2</sup> | Woven Unsupported Silt Fence <sup>1</sup> | Non-Woven Unsupported Silt Fence <sup>1</sup> |
| Post Spacing (Maximum)                              |                         | feet              | 4                                 | 4   | 6   |
| Height of Wire / Polymer Fence (Minimum)            |                         | inches            | 30                                | —   | —   |
| Grab Strength (Minimum):                            | Machine Direction       | pounds            | 90                                | 125                                       | 125   |
|   | Cross Machine Direction |                   | 90                                | 100                                       | 100   |
| Permittivity (Minimum)                              | ASTM D 4491             | sec <sup>-1</sup> | 0.05                              | 0.05                                      | 0.05  |
| Apparent Opening Size (AOS) <sup>3</sup>            | ASTM D 4751             | Sieve Number      | 30                                | 30  | 30  |
| Ultraviolet Stability (Minimum) (retained strength) | ASTM D 4355             |                   | 70% after 500 h of exposure       |   |   |

**Notes:**

MARV Minimum Average Roll Value

<sup>1</sup> Elongation measured in accordance with ASTM D 4632

<sup>2</sup> Silt Fence Support - 14-gauge steel wire with a mesh spacing of 6 inches by 6 inches (or a prefabricated polymeric mesh of equivalent strength)

<sup>3</sup> Maximum Average Roll Value

**SITE CONDITIONS FOR REMOVAL** - After permanent vegetation of slope is established. Remove fence and post, re-grade trench area and vegetate.

**TYPICAL DETAIL** - 806-70.0

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**H1 SILT FENCE DETAIL**

NTS SN:

**CONCRETE WASTE MANAGEMENT**

**DESCRIPTION** - The purpose of this specification is to set forth procedures and practices designed to eliminate the discharge of concrete waste materials to storm drainage systems, drainage areas, streets or watercourses, which shall be required of the contractor.

**APPROPRIATE APPLICATION OF BMP** - Concrete waste management procedures and practices will be implemented on construction projects as follows:

- Where concrete is used as a construction material or where concrete dust and debris result from demolition activities.
- Where slurries containing Portland cement concrete (PCC), asphaltic concrete (AC) or bituminous concrete (BC) are generated, such as from saw cutting, coring, grinding, grooving and hydro-concrete demolition.
- Where concrete trucks and other concrete-coated equipment are washed on-site, when approved by the Resident Engineer or Construction Inspector.
- Where mortar-mixing station exist.

**AWARENESS / ENFORCEMENT**

- Contractor's and / or permit holder's superintendent or representative shall oversee and enforce concrete waste management procedures.
- Discuss the concrete management techniques described in this BMP (such as handling of concrete waste and washout) with the ready-mix concrete supplier before any deliveries are made.

The site superintendent shall make drivers aware of the presence of the concrete waste management facilities. The site superintendent should post signage indicating the location and designated use of the concrete waste management areas, and provide careful oversight to inspect for evidence of improper dumping of concrete waste and wash water.

**IMPLEMENTATION**

- Contractors, private individuals, public agencies, etc. using concrete material, shall incorporate requirements for concrete waste management into material supplier and subcontractor agreements. Include requirements in contracts with concrete delivery companies that drivers must use designated concrete washout facilities.
- Store dry and wet materials under cover, away from drainage areas.
- Avoid mixing excess amounts of fresh concrete.
- Do not allow excess concrete to be dumped on-site, except in designated areas.
- Cover the structures before predicted rainstorms to prevent overflows.
- Monitor on site concrete waste storage and disposal procedures at least weekly or as directed by the Resident Engineer or Construction Inspector.

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In St. Louis County, the contractor is required by Missouri State Law (10 CSR 10-6.170) and County Ordinance (612.340) to control fugitive dust blown from the construction site, signal installation, etc. Dust control, including saw-cut material etc., on the construction site shall be monitored for safety purposes and to prevent nuisances. The contractor / permittee shall apply reasonable measures to control dust and particulate matter (of any size or source) due to roadway / construction traffic, grading, clearing and grubbing, building demolition, saw-cutting etc. from migrating off the site of origin. Operations residue from grinding, saw-cutting etc. should be picked up (cleaned-up) by means of a vacuum device or swept up. Compressed or blown air may be used to clean negligible residual dust that the vacuum or sweeping did not clean up, as long as the above dust control procedures (and law and ordinance) are met. Saw cutting residue, slurry or dry, should not be allowed to enter storm drains or watercourses. Saw cutting residue should not be allowed to flow across the pavement and should not be left on the surface of the pavement when traffic is present, when precipitation is anticipated before cleanup or overnight. In approved locations, saw-cut slurry may flow into the dirt (where it can soak into the ground) adjacent to the saw-cutting operation and be buried, on a 2' minimum below finished grade. Other dust control and clean-up procedures may be acceptable as approved by the Engineer or St. Louis County. See additional Concrete Waste Management requirements in this Manual.

**WASHOUT AREA PROTOCOL**

- Contain concrete washout on site or take it offsite for disposal in designated areas only.
- Do not wash out concrete trucks into storm drains, open ditches, streets, or streams.
- For onsite washout:
  - Locate washout area on-site at least 50 feet from storm drains, open ditches, or water bodies. Do not allow runoff from this area by constructing a temporary pit or bermed area large enough to contain liquid and solid waste. Locate it in a dirt area where the liquid portion of the washout can soak into the ground. They are preferably built below-grade to prevent breaches and reduce the likelihood of runoff. Discontinue use of the washout once it reaches 75% capacity. Washouts should be sized to handle solids and wash water to prevent overflow. It is estimated that 7 gallons of wash water are used to wash one truck chute and 50 gallons are used to wash out the hopper of a concrete pump. Implement a maintenance schedule for washout areas.
  - Temporary washout facilities should have pit or bermed areas of sufficient volume to completely contain all liquid and waste concrete materials generated during washout procedures.
  - Wash out wastes into the pit where the concrete can set, be broken up, and used on site; or buried on site; or disposed of properly.
- Do not wash sweepings from exposed aggregate concrete into the street or storm drain. Collect and return sweepings to aggregate base stockpile or dispose of in the trash.
- Do not place concrete wash water in a pit that is connected to the storm drain system or that drains to nearby waterways.

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Locate concrete washout facilities in an area that allows convenient access for concrete trucks, preferably near the area where the concrete is being poured. Appropriate gravel or rock should cover paths to concrete washout facilities if the facilities are located on undeveloped property. These areas should be far enough away from other construction traffic to reduce the likelihood of accidental damage and spills. The number of facilities you install should depend on the expected demand for storage capacity. On large sites with extensive concrete work, place washouts in multiple locations for ease of use. If the dried concrete washout is buried on the site it shall have a 2-foot cover minimum. The 2-foot cover shall match with surrounding finished grade.

- Concrete washed out in areas other than those designated for such activity, shall be cleaned up by the contractor.
- Install signage adjacent to each washout facility to inform concrete equipment operators to utilize the proper facilities.
- Perform washout of concrete mixers, delivery trucks and other delivery systems in designated areas only.
- Wash out concrete from concrete pumper bins into concrete pumper trucks and discharge into designated washout area.
- Equipment that cannot be easily moved, such as concrete pavers, shall only be washed in designated areas that do not drain to waterways or storm drain systems.
- Backfill and repair holes or other ground disturbance caused by the removal of the temporary concrete washout facilities.
- Wash out concrete on site into a future designated final concrete pour location. This location cannot be within 50 feet of a storm or sanitary sewer, or water course; or where it can drain off site. The washout cannot jeopardize the integrity of the final concrete pour. Concrete to be removed from the site shall be disposed of in conformance with the provisions in Standard Specification Manual, Section 202, all as directed by the Engineer. No additional payment will be made for complying with the above specification.
- A self-contained and watertight container may be used to control, capture, and contain concrete wastewater and washout material. The container must be portable and temporary, damage resistant, protect against spills and leaks, and sized to handle solids and wash water to prevent overflow. The container should be emptied and cleaned when 75% of its capacity is reached. After all liquids evaporate or are pumped or vacuumed, and the remaining slurry solidified, the Contractor may bury the solids on site. On County roadway projects, the solids may be buried on site if approved by the Engineer. In either case, solids shall be buried a minimum of 2 feet below finished grade. Disposal of container contents that are removed from the site shall be made at an approved landfill. In order to prevent overflows caused by natural occurrences and to provide security for safety purposes and against acts of vandalism, the container shall be covered at the end of each workday and remain covered until the beginning of the next workday. The cover shall remain on site with the container at all times. Container shall be free of liquids during any on-site relocation process or transport to another site. On County roadway projects, location(s) for the container shall be approved by the Engineer.

**TYPICAL DETAIL** - 806-46.03

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**A1 CONCRETE WASTE MANAGEMENT DETAIL**

NTS SN:

**CONCRETE WASHOUT SIGN DETAIL (OR EQUIVALENT AS APPROVED BY COUNTY)**

**GENERAL NOTES**

- DO NOT SCALE DRAWING. FOLLOW DIMENSIONS.
- ACTUAL LAYOUT DETERMINED IN THE FIELD.
- THE "CONCRETE WASHOUT" SIGN SHALL BE INSTALLED WITHIN 30 FEET OF EACH TEMPORARY CONCRETE WASHOUT FACILITY.

**TYPICAL BMP DETAIL**

**CONCRETE WASTE MANAGEMENT (CONCRETE WASHOUT SIGN)**

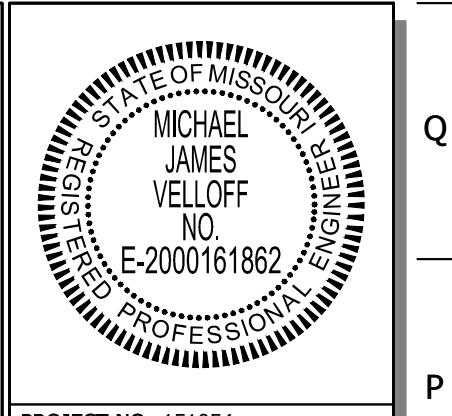
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**CONCRETE WASTE MANAGEMENT**

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**CONCRETE WASTE MANAGEMENT**

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PROJECT NO.: 151054  
 NAME: MICHAEL J. VELLOFF  
 LICENSE NUMBER: E-2000161862  
 DISCIPLINE: CIVIL  
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 140 FALLON LOOP ROAD  
 O'FALLON, MISSOURI 63368

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| 09-15-16 | CONSTRUCTION SET |             |
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