Subcategory Good Housekeeping/Materials Management

Construction Site Stormwater Runoff Control

Minimum Measure

Description of Concrete Washout at Construction Sites Concrete and its ingredients

Concrete is a mixture of cement, water, and aggregate material. Portland cement is made by heating a mixture of limestone and clay containing oxides of calcium, aluminum, silicon and other metals in a kiln and then pulverizing the resulting clinker. The fine aggregate particles are usually sand. Coarse aggregate is generally gravel or crushed stone. When cement is mixed with water, a chemical reaction called hydration occurs, which produces glue that binds the aggregates together to make

Concrete washout

After concrete is poured at a construction site, the chutes of ready mixed concrete trucks and hoppers of concrete pump trucks must be washed out to remove the remaining concrete before it hardens. Equipment such as wheelbarrows and hand paths to nearby surface waters. Rainfall may cause concrete tools also need to be washed down. At the end of each work washout containers that are uncovered to overflow and also day, the drums of concrete trucks must be washed out. This is transport the washwater to surface waters. Rainwater polluted oustomarily done at the ready mixed batch plants, which are with concrete washwater can percolate down through the usually off site facilities, however large or rural construction soil and after the soil chemistry, inhibit plant growth, and projects may have on-site batch plants. Gementitious (having contaminate the groundwater. Its high pH can increase the properties of cement) washwater and solids also come from — the loxicity of other substances in the surface waters and using such construction materials as mortar, plaster, stucco, soils. Figures 1 and 2 illustrate the need for better washout management practices.

Environmental and Human Health Impacts Best Management Practice Objectives Concrete washout water (or washwater) is a sturry containing. The best management practice objectives for concrete washout toxic metals. It's also caustic and corrosive, having a pH are to (a) collect and retain at the concrete washout water and near 12. In comparison, Drano liquid drain cleaner has a pH solids in leak proof containers, so that this caustic material of 13.5. Caustic washwater can harm fish gills and eyes and does not reach the soil surface and then migrate to surface interfere with reproduction. The safe pH ranges for aquatic life waters or into the ground water, and (b) recycle 100 percent habitats are 6.5 – 9 for freshwater and 6.5 – 8.5 for saltwater. Of the collected concrete washout water and solids. Another

Construction workers should handle wet concrete and washout water with care because it may cause skin irritation and eve damage. If the washwater is dumped on the ground (Fig. 1), it can run off the construction site to adjoining roads and enter roads de storm drains, which discharge to surface waters such as rivers, lakes, or estuaries. The red arrow in Figure 2 points to a ready mixed truck chute that's being washed out into a roll off bin, which isn't watertight I caking



Washwater from concrete truck chutes, hand mixers, or other equipment can be passed through a system of weirs or filters to remove

Table 1 - Recycling concrete washout materials

solids and then be reused to wash own more chutes and equipment at the construction site or as an ingredient for making additional concrete. A three chamber washou filter is shown in Figure 3. The first stage collects the coarse aggregate. The middle stage filters out the small grit and sanc. The third stage has an array of tablets that filter out fines and reduces the pH. The filtered washwater is then discharged through a filter sock. An alternative is to ournp the

washout water out of the washout container (Fig 4) and treat the washwater off site to remove metals and reduce its pH, so it can be delivered to a publicly owned treatment works (POTW), also known as a municipal wastewater treatment plant, which provides additional treatment allowing the washwater to be discharged to a surface water. The POTW should be

objective is to support the diversion of recyclable materials from - contacted to inquire landfills. Table 1 shows how concrete washout materials can be about any pretreatment. requirements, i.e., the National Pretreatment Standards for Prohibited

Concrete Washout Materials D schargers (40CFR 403.5) before discharging the washwater to the POTW. he washwater can also be retained in the washout

container and allowed to evaporate, leaving only the hardened cementitious solids to be

Solids recycling he course aggregate materials that are washed off concrete truck chutes into a washout container can be either separated by a screen and placed in aggregate bins to be reused at the construction site or returned to the ready mixed plant and washed into a reclaimer (Fig. 5). When washed out into a reclaimer, the fine and course aggregates are separated out and placed in different

A chute washout box is mounted on the back of the ready mixed truck. If the truck has three chutes, the following

pasket near the top of the

Wet concrete recycling:

and surface water contamination.

Washout Containers

hoppers at construction sites.

ne coarse aggregates so ney can be placed in a bin for reuse either at the construction site or back at the cement plant.

drum to be returned to the

their being washed out into bale-linee pits. Vinvl washout container

Stormwater Best Management Practice: Concrete Washout

and the container is full of washwater, the washwater can be

services, such as, picking up the roll-off bins after the

washwater has evaporated and the solids have hardened,

driver then washes down the chute into the bucket to remove any comprtitious material before it harcens nused concrete can be returned to the ready mixed plant and After washing out the chute either (1) used to pour precast concrete products (e.g., highway the driver pumps (ye low arrow points to the pump) the washwater, sand, and other fine solids from the bucket up into the truck's

ortable, reusable, and asier to Install than a y balo washout pit. e biodecradab e filter construction sites because this can contribute to ground water ready mixed plant, where it can be washed into a reclaimer. bag (Fig. 12) assists in A removable screen at the bottom of the washout bucket extracting the concrete solids and prolongs the life of the vinyl prevents course aggregate from entering the pump. This container. When the bag is lifted, the water is filtered out and course aggregate can also be returned to the plant and added the remaining concrete solids and the bag can be disposed of to the coarse aggregate pile to be reused. All the materials are together in a landfill, or the hardened concrete can be delivered to a recycler. After the solids have been removed several times

filter bag in the container

and spreading water gelling

granules evenly across the

water. In about five minutes

disposed to together.

Metal washout container

empty washout bins, and

delivering the hardened

concrete to a recycler

(Fig. 15), rather than a

landfill. Some providers will

vacuum off the washwater,

treat it to remove metals an

reduce the pH, deliver it to a

for additional treatment and into a roll-off bin

I lay bale and plastic washout pit A washout pit made with hay bales and a plastic lining is shown in Figure 9. Such pits can be dug into the ground or built above rade. The plastic lining should be free of tears or holes that would allow the washwater to escape (Fig. 10). After the pit is used to wash down the chutes of multiple ready mixed trucks procedure is used to perform the washout from the top down: and the washwater has evaporated or has been vacuumed off. the water in the filter bag will I) after the pour is completed, the driver attaches the extension—the remaining hardened solids can be broken up and removed turn into a gel that can be chute to the washout box, (2) the driver then rotates the main from the pit, This process may damage the hay bales and removed with the bad. Then chute over the extension chute (Fig. 7) and washes down the plast clining. It damage occurs, the pit will need to be repaired the gel and filter bag can be hopper first then the main chute, (3) finally the driver washes and relined with new plastic. When the hardened solids are own the flop down chute and last the extension chute hanging removed, they may be bound up with the plastic lining and have on the box. All washwater and solids are captured in the box. to be sent to a landfill rather than recycled. Recyclers usually After the wash down, accept only unmixed material. If the pit is going to be emptied washwater and sol ds are and repaired more than a few times, the hay bales and plastic



trucks can use hay bale washout pits, but concrete pump subsequent discharge to a surface water. Everything is recycled trucks have a low hanging hopper in the back that may prevent or treated sufficiently to be returned to a natural surface water.

container (Fig. 11) is

allowed to evaporate, so the container can be reused. The Another metal, ponable, washout container, which has a washwater can be removed more quickly by placing another rain cover to prevent overflowing, is shown in Figure 16. It is accompanied by an onsite washwater treatment unit, which educes the pl | and uses a forced weir tank system to remove e coarse aggregate, fine aggregate, and cement fines. The

site to wash out other mixe truck chutes and equipment. Figure 16. Washout container with a rain The solids are The metal roll-off bin (Fig. 13) is designed to securely contain allowed to harden concrete washwater and solids and is portable and reusable. together and can

It also has a ramp that allows concrete pump trucks to wash be taken to a concrete out their hoppers (Fig. 14). Rol -off providers after recycling recycler (Fig. 17) to be crushed and used as road base or aggregate for making precast products, such as retaining wall blocks. All materials are recycled

oncrete washout facilities, such as washout pits and vinyl r metal washout containers, should be placed in locations that provide convenient access to concrete trucks, preferably wastewater treatment plant Figure 13. Mixer truck being washed out near the area where concrete is being poured. However they should not be placed within 50 feet of storm drains, open ditches or waterbodies. Appropriate gravel or rock should cover approaches to concrete washout facilities when they are

www.concreterecycling.org

Stormwater Best Management Practice: Concrete Washout

for ease of use by ready mixed truck drivers. If the washout

facility is not within view from the pour location, signage will be

sidewalls have been damaged by construction activities, and

75 percent of its capacity, the washwater should be vacuumed

removed and recycled. Damages to the container should be

determine whether they have been filled to over 75 percent

capacity. When the washout container is filled to over

Operating and Inspecting Washout

needed to direct the truck drivers.

with concrete delivery companies.

Facilities

NRMCA 2009. Environmental Management in the Ready located on undeveloped property. On large sites with extensive Mixed Concrete Industry, 2PEMRM, 1st edition. By Gary M Mullins, Silver Springs, MD: National Ready Mixed Concrete concrete work, washouts should be placed at multiple locations

> Websites and Videos Construction Materials Recycling Association

Concrete washout facilities should be inspected daily and after heavy rains to check for leaks, identify any plastic linings and _____www.nmca.org National Ready Mixed Concrete Research and Education www.rmc-foundation.org

off or allowed to evaporate to avoid overflows. Then when the Add tional information and videos on concrete washout remaining comentitious solids have hardened, they should be

repaired promptly. Before heavy rains, the washout container's liquid level should be lowered or the container should be Photograph Credits covered to avoid an everflow during the rain storm. Figure 3. Mark Shaw, Ultra Tech International, Inc. Educating Concrete Subcontractors Figure 4. Mark Jenkins, Concrete Washout Systems, Inc. The construction site superintendent should make ready mixed Figure 6. Christophor Crouch, CCI Consulting truck drivers aware of washout facility locations and be watchful Figure 6. William Tuney, Construction Materials Recycling Association for improper dumping of dementitious material. In addition.

containers and systems can be found by a web search for "concrete washout" Figures 1, 2. Mark Jenkins, Concrete Washout Systems. Inc.

Figure 7. Brad Burke, Innovative Concrete Solutions, LLC concrete washout requirements should be included in contracts Figure 8. Pon Lankester, Enviroguard Figures 9, 10. Mark Jenkins, Concrete Washout Systems, inc. Ligures 11, 12, Iom Card, RIC Supply

- EXISTING GROUND

Figures 13: 14: 15: Mark Jenkins, Concrete Washout Systems, Inc. Ligures 16, 17 Bick Anney Sr., Waste Crete Systems, LLP

Please note that EPA has provided external links because they provide additional information that may be useful or interesting. EPA cannot attest to the accuracy of non-EPA information provided by these info-party wabsites and does not endorse any non-government organizations or their products or sa

CONSTRUCTION ROAD STABILIZATION

Temporary Access Roads and Parking Areas Temporary roads shall follow the contour of the natural terrain to the extent possible. Slopes should not exceed 10 percent.

Temporary parking areas should be located on naturally flat areas to minimize grading. Grades should be sufficient to provide drainage but should not exceed 4

Roadbeds shall be at least 14 feet wide for one-way traffic and 20 feet wide for two-

All cuts and fills shall be 2:1 or flatter to the extent possible.

Drainage ditches shall be provided as needed and shall be designed and constructed in accordance with STORMWATER CONVEYANCE CHANNEL, Std. & Spec.

The roadbed or parking surface shall be cleared of all vegetation, roots and other objectionable material.

A 6-inch course of VDOT #1 Coarse Aggregate shall be applied immediately after grading or the completion of utility installation within the right-of-way. Filter fabric may be applied to the roadbed for additional stability. Design specifications for filter fabric can be found within Std. & Spec. 3.02, TEMPORARY STONE CONSTRUCTION ENTRANCE. In "heavy duty" traffic situations (see Table 3.02-A), stone should be placed at an 8- to 10-inch depth to avoid excessive dissipation or maintenance needs.

Permanent Roads and Parking Areas

Permanent roads and parking areas shall be designed and constructed in accordance with applicable VDOT or local criteria except that an initial base course of gravel of at least 6 inches shall be applied immediately following grading.

All roadside ditches, cuts, fills and disturbed areas adjacent to parking areas and roads shall be stabilized with appropriate temporary or permanent vegetation according to the applicable standards and specifications contained in this handbook.

Maintenance

Both temporary and permanent roads and parking areas may require periodic top dressing with new gravel. Seeded areas adjacent to the roads and parking areas should be checked periodically to ensure that a vigorous stand of vegetation is maintained. Roadside ditches and other drainage structures should be checked regularly to ensure that they do not become clogged with silt or other debris.

MULCHING TABLE 3.35-A ORGANIC MULCH MATERIALS AND APPLICATION RATES

	RA	TES:	2-00-00-00-00-00-00-00-00-00-00-00-00-00
MULCHES:	Per Acre	Per 1000 sq. ft.	NOTES:
Straw or Hay	1½ - 2 tons (Minimum 2 tons for winter cover)	70 - 90 lbs.	Free from weeds and coarse matter. Must be anchored. Spread with mulch blower or by hand.
Fiber Mulch	Minimum 1500 lbs.	35 lbs.	Do not use as mulch for winter cover or during hot, dry periods.* Apply as slurry.
Corn Stalks	4 - 6 tons	185 - 275 lbs.	Cut or shredded in 4-6" lengths. Air-dried. Do not use in fine turf areas. Apply with mulch blower or by hand.
Wood Chips	4 - 6 tons	185 - 275 lbs.	Free of coarse matter. Airdried. Treat with 12 lbs

nitrogen per ton. Do not use in fine turf areas. Appl with mulch blower, chip handler, or by hand. Bark Chips 50 - 70 cu. 1-2 cu. yds. Free of coarse matter. Airdried. Do not use in fine Shredded turf areas. Apply with Bark mulch blower, chip handler,

When fiber mulch is the only available mulch during periods when straw should be used, apply at a minimum rate of 2000 lbs./ac. or 45 lbs./1000 sq. ft.

TABLE 3.30-A CUBIC YARDS OF TOPSOIL REQUIRED FOR APPLICATION TO VARIOUS DEPTHS (inches) Square Feet Per Acre

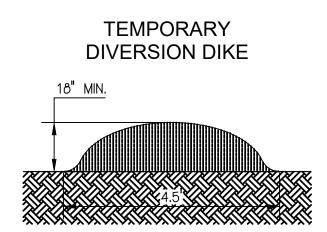
TOP60ILING

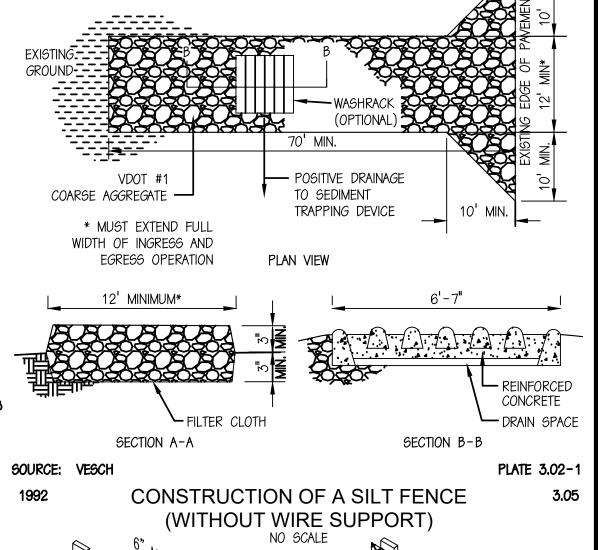
ADHESIVES USED FOR DUST CONTROL Dilution Rate Gallons/Acre (Adhesive: Water) Nozzle Asphalt Emulsion Coarse Spray 1,200 12.5:1 Latex Emulsion Fine Spray Resin in Water Fine Spray Acrylic Emulsion (Non-Traffic) Coarse Spray Acrylic Emulsion (Traffic) Coarse Spray Source: Va. DSWC



COMMON NAME (Botanical Name)	Life Cycle	Scason	pH Range	Germination Time In Days	Optimum Germination Temperature (*P)	Winter Hardiness	Drought Tolerance	Fertility	Soil Drainage Tolerance	Seeds Per Pound	MAINTENANCE REQUIREMENTS	REMARKS	Suggested Varieties for Virginia
TALL FESCUE (Festuca arundinacea)	P	С	5.5- 6.2	10-14	60-85	F	F	М	SPD	225K	Low when used for erosion control; high when used in lawn	Better suited for erosion control and rough turf application.	Ky 31
TALL FESCUES (Improved)	P	c	5.5- 6.2	10-14	60-85	F	G	М	SPD	220K	Responds well to high maintenance.	Excellent for lawn and fine turf.	See current VCIA list.
KENTUCKY BLUEGRASS (Pos praiense)	P	С	6.0- 6.5	14	60-75	G	P	М	SPD	2.2m	Needs fertile soil, favorable moisture. Requires several years to become well established.	Excellent for fine turfs-takes traffic, mowing. Poor drought/heat tolerance.	See current VCIA list.
PERENNIAL RYEGRASS (Lolium perenne)	P	с	5.8- 6.2	7-10	60-75	F	F	м-н	SPD	227K	Will tolerate traffic.	May be added to mixes. * Improved varieties will perform well all year.	See current VCIA list.

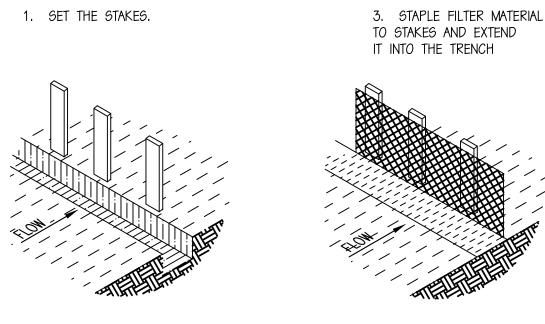
TABLE 3,32-D	
SITE SPECIFIC SEEDING MIXTURES FOR PIE	DMONT AREA
	Total Lbs.
	Per Acre
Minimum Care Lawn	
- Commercial or Residential	175-200 lbs.
 Kentucky 31 or Turf-Type Tall Fescue 	95-100%
- Improved Perennial Ryegrass	0-5%
- Kentucky Bluegrass	0-5%
High-Maintenance Lawn	200-250 lbs.
- Kentucky 31 or Turf-Type Tall Fescue	100%
General Slope (3:1 or less)	
- Kentucky 31 Fescue	128 lbs.
- Red Top Grass	2 lbs
- Seasonal Nurse Crop *	20 lbs
	150 lbs
Low-Maintenance Slope (Steeper than 3:1)	
- Kentucky 31 Fescue	108 lbs
- Red Top Grass	2 lbs
- Seasonal Nurse Crop *	20 lbs
- Crownvetch **	20 lbs
	150 lbs
* Use seasonal nurse crop in accordance with seeding de	ates as stated below:
February 16th through April	
May 1st through August 15th	
August 16th through October	
November through February 15th	





STONE CONSTRUCTION ENTRANCE

SIDE ELEVATION



21442

TABLE 3.31-A ACCEPTABLE TEMPORARY SEEDING PLANT MATERIALS LIMING REQUIREMENTS FOR TEMPORARY SITES "QUICK REFERENCE FOR ALL REGIONS" Recommended Application of Agricultural Limestone (lbs./acre) 3 tons per acre 50/50 Mix of 4.2 to 5.2 2 tons per acre Annual Ryegrass (Lolium multi-florum) 5.2 to 6 50 - 100 Cereal (Winter) Rye (Secale cereale) Source: Va. DSWC 60 - 100 Feb. 16 - Apr. 30 Annual Ryegrass (Lolium multi-florum) (Setaria italica)

Source: Va. DSWC

TEMPORARY SEEDING

TEMPORARY SEEDING PLANT MATERIALS, SEEDING RATES, AND DATES

TABLE 3.31-C

SPECIES	SEEDING I	RATE	1	ORTH	1	5	OUTF	I _p	DV () W	
	Acre	1000 ft ²	3/1 to 4/30	5/1 to 8/L5	8/15 to 11/1	2/15 to 4/30	5/1 to 9/1	9/1 to 11/15	PLANT CHARACTERISTICS	
OATS 3 bu. (up to 100 lbs., Avena sativa) not less than 50 lbs.)		2 lbs.	х	•		х	(8)		Use spring varieties (e.g., Noble).	
RYE ^d (Secale cereale)	2 bu. (up to 110 lbs., not less than 50 lbs.)	2.5 lbs.	х	٠	х	х	870	x	Use for late fall seedings, winter cover. Tolerates cold and low moisture.	
GERMAN MILLET (Setaria italica)	50 lbs.	approx. 1 lb.	-	х	11 9 .81		х	153	Warm-season annual, Dies at first frost. May be added to summer mixes.	
ANNUAL RYEGRASS ⁶ (Lolium multi-florum)	60 lbs.	1½ lbs.	х		х	х	•	x	May be added in mixes. Will mow out of most stands.	
WEEPING LOVEGRASS (Eragrostis curvula)	15 lbs.	514 ozs.	•	x		ħ.	х	-	Warm-season perennial. May bunch. Tolerates hot, dry slopes and acid, infertile soils. May be added to mixes.	
KOREAN LESPEDEZA® (Lespedeza stipulacea)	25 lbs.	approx. 1½ lbs.	х	х		х	х	(4)	Warm season annual legums. Tolerates acid soils. May be added to mixes.	

Southern Piedmont and Coastal Plain. May be used as a cover crop with spring seeding.

May not be planted between these dates.

May be used as a cover crop with fall seeding. May be planted between these dates.

Northern Piedmont and Mountain region. See Plates 3.22-1 and 3.22-2.

piles or bins to be reused in making fresh concrete. Reclaimers with sett inc Washwater recycling, treatment, disposal tanks separate cement fines from the washwater, ind these fines can also

Stormwater Best Management Practice: Concrete Washout

e used in new concrete inless prohibited by the user's concrete quality

ardened concrete recyclina

en the washwater in a construction site concrete washout ontainer has been removed or allowed to evaporate, the ardened concrete that remains can be crushed (Fig. 6) and reused as a construction material. It makes an excellent aggregate for road base and can be used as fill at the

construction site or delivered to a recycler. Concrete recyclers can found at municipal la waste disposal acilities, private recycling plants, or large construction sites.

Source: Va. DSWC

Chute washout bucket and pump After de ivering ready mixed concrete and scraping the last of the customer's concrete down the chute, the driver hangs a washout bucket shown in Figure 8 (see red arrow) on the end of the truck's chute and secures the hose to insure no leaks. The

lant for recycling. A filter

Stormwater Best Management Practice: Concrete Washout

builders often order a little more ready mixed concrete than

ney actually need, so it is common for concrete trucks to

carriers, retaining wall blocks, riorap), (2) used to pave the

(4) dumped on an impervious surface and allowed to harden,

so it can be crushed and recycled as aggregate. Unused wet

concrete should not be dumped on bare ground to harden at

Different types of washout containers are available for

from washing down mixed truck chutes and pump truck

collecting, retaining, and recycling the washwater and solids

ready mixed plant's yard, (3) washed into a reclaimer, or

ave wet concrete remaining in their drum after a delivery. This

DUST CONTROL

TABLE 3.39-A

*													
COMMON NAME (Botanical Name)	Life Cycle	Scason	pH Range	Germination Time In Days	Optimum Germination Temperature (*F)	Winter Hardiness	Drought Tolerance	Fertility	Soil Drainage Tolerance	Seeds Per Pound	MAINTENANCE REQUIREMENTS	REMARKS	Suggested Varieties for Virginia
TALL FESCUE (Festuca arundinacea)	Р	С	5.5- 6.2	10-14	60-85	P	F	М	SPD	225K	Low when used for erosion control; high when used in lawn	Better suited for crosion control and rough turf application.	Ky 31
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KENTUCKY BLUEGRASS (Pos praiense)	P	С	6.0- 6.5	14	60-75	G	P	М	SPD	2.2m	Needs fertile soil, favorable moisture. Requires several years to become well established.	Excellent for fine turfs-takes traffic, mowing. Poor drought/heat tolerance.	See current VCIA list.
PERENNIAL RYEGRASS Lolium perenne)	P	с	5.8- 6.2	7-10	60-75	F	F	м-н	SPD	227K	Will tolerate traffic.	May be added to mixes. * Improved varieties will perform well all year.	See current VCIA list.

A = Annual | P = Perennial | C = Cool Season Plant | W = Warm Season Plant | C = Good | F = Fair | P = Poor | VP = Very Floor | H = Flight | M + Medium | L = Low | SPD = Somewhat Poorly Drained | MPD = Moderate, v Poorly Drained | VPD = Very Poorly Drain

Substitute Sericea lespedeza for Crownvetch east of Farmville, Va. (May through September use hulled Sericea, all other periods, use unhulled Sericea). If Flatpea is used in lieu of Crownvetch, increase rate to 30 lbs./acre. All legume seed must be properly inoculated. Weeping Lovegrass may be added to any slope or low-maintenance mix during warmer seeding periods; add 10-20 lbs./acre in

PIPE OUTLET CONDITIONS

PIPE OUTLET TO FLAT AREA WITH NO DEFINED CHANNEL ENTIRE PERIMETER

PIPE OUTLET TO WELL DEFINED CHANNEL

SOURCE: VA. DSWC

✓── KEY IN 6"-9" AROUND

ENTIRE PERIMETER

PLATE 3.18-1 SOURCE: VA. DSWC

2. EXCAVATE A 4"X4" TRENCH UPSLOPE ALONG THE LINE OF STAKES.

SHEET FLOW INSTALLATION

4. BACKFILL AND COMPACT THE EXCAVATED SOIL. PLATE 3.05-2 (PERSPECTIVE VIEW)

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EMAIL: pno@perkins-orrison.com

RUSSELL H. ORRISON Lic. No. 031849 08/02/2022

· MOUNTABLE BERM

(OPTIONAL)

PAVEMENT

ORCHARD MARKETPLACE **CAR WASH** AMSTERDAM MAGISTERIAL DISTRICT DALEVILLE, VIRGINIA **BOTETOURT COUNTY**

THOMAS BUILDERS

08/02/2022 PER WWWA COMMENTS 06/16/2022 PER COUNTY COMMENT MARK

DATE | DESCRIPTION ISSUE: 04/04/2022 CONTOUR INTERVAL: DESIGNED BY: RHO DRAWN BY: PWS CHECKED BY: RHO

SHEET TITLE

EROSION & SEDIMENT CONTROL DETAILS

JURISDICTION PROJECT # DEV-SITE-22-00005