Washing—If conditions at the site are such that most of the mud and sediment are not removed by vehicles traveling over the gravel, the tires should be washed. Washing should be done on an area stabilized with crushed stone that drains into a sediment trap or other suitable disposal area. A wash rack may also be used to make washing more convenient and effective.

- Construction 1. Clear the entrance and exit area of all vegetation, roots, and other Specifications objectionable material and properly grade it.
 - 2. Place the gravel to the specific grade and dimensions shown on the plans, and smooth it.
 - 3. Provide drainage to carry water to a sediment trap or other suitable
 - 4. Use geotextile fabrics because they improve stability of the foundation in locations subject to seepage or high water table.

basin as needed

is complete.

designed.

6 inches to allow for settlement

compacting under the pipe haunches.

to pull the skimmer to the side for maintenance.

1999. J. W. Faircloth & Son.).

Stabilization).

the skimmer.

plugging with ice.

flowing underneath or around them.

Maintenance Maintain the gravel pad in a condition to prevent mud or sediment from leaving the construction site. This may require periodic topdressing with 2inch stone. After each rainfall, inspect any structure used to trap sediment and clean it out as necessary. Immediately remove all objectionable materials spilled, washed, or tracked onto public roadways.

Construction 1. Clear, grub, and strip the area under the embankment of all vegetation and

and stockpile or dispose of it properly. Haul all objectionable material to the

designated disposal area. Place temporary sediment control measures below

2. Ensure that fill material for the embankment is free of roots, woody

vegetation, organic matter, and other objectionable material. Place the fill in

lifts not to exceed 9 inches, and machine compact it. Over fill the embankment

3. Shape the basin to the specified dimensions. Prevent the skimming device

from settling into the mud by excavating a shallow pit under the skimmer or

4. Place the barrel (typically 4-inch Schedule 40 PVC pipe) on a firm, smooth

foundation of impervious soil. Do not use pervious material such as sand,

gravel, or crushed stone as backfill around the pipe. Place the fill material

around the pipe spillway in 4-inch layers and compact it under and around

the pipe to at least the same density as the adjacent embankment. Care must

be taken not to raise the pipe from the firm contact with its foundation when

Place a minimum depth of 2 feet of compacted backfill over the pipe spillway

before crossing it with construction equipment. In no case should the pipe

conduit be installed by cutting a trench through the dam after the embankment

5. Assemble the skimmer following the manufacturers instructions, or as

6. Lay the assembled skimmer on the bottom of the basin with the flexible

joint at the inlet of the barrel pipe. Attach the flexible joint to the barrel pipe

and position the skimmer over the excavated pit or support. Be sure to attach

a rope to the skimmer and anchor it to the side of the basin. This will be used

7. Earthen spillways—Install the spillway in undisturbed soil to the greatest

extent possible. The achievement of planned elevations, grade, design width,

and entrance and exit channel slopes are critical to the successful operation

of the spillway. The spillway should be lined with laminated plastic or

cover the bottom and sides and extend onto the top of the dam for anchoring

in a trench. The edges may be secured with 8-inch staples or pins. The fabric

must be long enough to extend down the slope and exit onto stable ground.

The width of the fabric must be one piece, not joined or spliced; otherwise

water can get under the fabric. If the length of the fabric is insufficient for the

entire length of the spillway, multiple sections, spanning the complete width,

may be used. The upper section(s) should overlap the lower section(s) so

that water cannot flow under the fabric. Secure the upper edge and sides

of the fabric in a trench with staples or pins. (Adapted from "A Manual for

Designing, Installing and Maintaining Skimmer Sediment Basins." February,

8. Inlets—Discharge water into the basin in a manner to prevent erosion. Use

temporary slope drains or diversions with outlet protection to divert sediment-

laden water to the upper end of the pool area to improve basin trap efficiency

9. Erosion control—Construct the structure so that the disturbed area is

minimized. Divert surface water away from bare areas. Complete the

embankment before the area is cleared. Stabilize the emergency spillway

embankment and all other disturbed areas above the crest of the principal

spillway immediately after construction (References: Surface Stabilization).

11. After all the sediment-producing areas have been permanently stabilized,

remove the structure and all the unstable sediment. Smooth the area to

blend with the adjoining areas and stabilize properly (References: Surface

(one-half inch or greater) rainfall event and repair immediately. Remove

sediment and restore the basin to its original dimensions when sediment

accumulates to one-half the height of the first baffle. Pull the skimmer to

one side so that the sediment underneath it can be excavated. Excavate the

sediment from the entire basin, not just around the skimmer or the first cell.

Make sure vegetation growing in the bottom of the basin does not hold down

Repair the baffles if they are damaged. Re-anchor the baffles if water is

If the skimmer is clogged with trash and there is water in the basin, usually jerking on the rope will make the skimmer bob up and down and dislodge

the debris and restore flow. If this does not work, pull the skimmer over to

the side of the basin and remove the debris. Also check the orifice inside the

If the skimmer arm or barrel pipe is clogged, the orifice can be removed and

the obstruction cleared with a plumber's snake or by flushing with water. Be

Check the fabric lined spillway for damage and make any required repairs

with fabric that spans the full width of the spillway. Check the embankment,

spillways, and outlet for erosion damage, and inspect the embankment for

piping and settlement. Make all necessary repairs immediately. Remove all

Freezing weather can result in ice forming in the basin. Some special

precautions should be taken in the winter to prevent the skimmer from

10. Install porous baffles as specified in Practice 6.65, *Porous Baffles*.

Maintenance Inspect skimmer sediment basins at least weekly and after each significant

skimmer to see if it is clogged; if so remove the debris.

sure and replace the orifice before repositioning the skimmer.

trash and other debris from the skimmer and pool areas.

(References: Runoff Control Measures and Outlet Protection).

impermeable geotextile fabric. The fabric must be wide and long enough to

providing a low support under the skimmer of stone or timber.

Specifications root mat. Remove all surface soil containing high amounts of organic matter

Construction 1. Remove and properly dispose of all trees, brush, stumps, and other objectionable material.

2. Ensure that the minimum constructed cross section meets all design

3. Ensure that the top of the dike is not lower at any point than the design elevation plus the specified settlement.

4. Provide sufficient room around diversions to permit machine regrading and

5. Vegetate the ridge immediately after construction, unless it will remain in place less than 30 working days.

Maintenance Inspect temporary diversions once a week and after every rainfall. Immediately remove sediment from the flow area and repair the diversion ridge. Carefully check outlets and make timely repairs as needed. When the area protected is permanently stabilized, remove the ridge and the channel to blend with the natural ground level and appropriately stabilize it.

CHECK DAM

Specifications

- Construction 1. Place stone to the lines and dimensions shown in the plan on a filter fabric
 - 2. Keep the center stone section at least 9 inches below natural ground level where the dam abuts the channel banks.
 - 3. Extend stone at least 1.5 feet beyond the ditch bank (Figure 6.83b) to keep water from cutting around the ends of the check dam.
 - 4. Set spacing between dams to assure that the elevation at the top of the lower dam is the same as the toe elevation of the upper dam.
 - 5. Protect the channel after the lowest check dam from heavy flow that could
 - **6.** Make sure that the channel reach above the most upstream dam is stable.
 - 7. Ensure that other areas of the channel, such as culvert entrances below the check dams, are not subject to damage or blockage from displaced stones.

Maintenance Inspect check dams and channels at least weekly and after each significant (1/2 inch or greater) rainfall event and repair immediately. Clean out sediment, straw, limbs, or other debris that could clog the channel when needed.

> Anticipate submergence and deposition above the check dam and erosion from high flows around the edges of the dam. Correct all damage immediately. If significant erosion occurs between dams, additional measures can be taken such as, installing a protective riprap liner in that portion of the channel (Practice 6.31, *Riprap-line and Paved Channels*).

Remove sediment accumulated behind the dams as needed to prevent damage to channel vegetation, allow the channel to drain through the stone check dam, and prevent large flows from carrying sediment over the dam. Add stones to dams as needed to maintain design height and cross section.

RIPRAP

Construction Subgrade preparation—Prepare the subgrade for riprap and filter to the d lines and grades shown on the plans. Compact any fill required in Specifications the subgrade to a density approximating that of the surrounding undisturbed material or overfill depressions with riprap. Remove brush, trees, stumps, and other objectionable material. Cut the subgrade sufficiently deep that the finished grade of the riprap will be at the elevation of the surrounding area. Channels should be excavated sufficiently to allow placement of the riprap in a manner such that the finished inside dimensions and grade of the riprap meet design specifications.

> Sand and gravel filter blanket—Place the filter blanket immediately after the ground foundation is prepared. For gravel, spread filter stone in a uniform layer to the specified depth. Where more than one layer of filter material is used, spread the layers with minimal mixing.

Synthetic filter fabric—Place the cloth filter directly on the prepared foundation. Overlap the edges by at least 12 inches, and space anchor pins every 3 ft along the overlap. Bury the upstream end of the cloth a minimum of 12 inches below ground and where necessary, bury the lower end of the cloth or over lap with the next section as required. See Figure 6.14a Page 6.14.6. Take care not to damage the cloth when placing riprap. If damage occurs remove the riprap, and repair the sheet by adding another layer of filter material with a minimum overlap of 12 inches around the damaged area. If extensive damage is suspected, remove and replace the entire sheet.

Where large stones are used or machine placement is difficult, a 4-inch layer of fine gravel or sand may be needed to protect the filter cloth.

Stone placement—Placement of riprap should follow immediately after placement of the filter. Place riprap so that it forms a dense, well-graded mass of stone with a minimum of voids. The desired distribution of stones throughout the mass may be obtained by selective loading at the quarry, and controlled dumping during final placement. Place riprap to its full thickness in one operation. Do not place riprap by dumping through chutes or other methods that cause segregation of stone sizes. Take care not to dislodge the underlying base or filter when placing the stones.

The toe of the riprap slope should be keyed to a stable foundation at its base as shown in Figure 6.15b. The toe should be excavated to a depth about 1.5 times the design thickness of the riprap, and should extend horizontally from

The finished slope should be free of pockets of small stone or clusters of large stones. Hand placing may be necessary to achieve the proper distribution of stone sizes to produce a relatively smooth, uniform surface. The finished grade of the riprap should blend with the surrounding area. No overfall or protrusion of riprap should be apparent.

Construction 1. Ensure that the subgrade for the filter and riprap follows the required lines Specifications and grades shown in the plan. Compact any fill required in the subgrade to the density of the surrounding undisturbed material. Low areas in the subgrade on Specifications below the crest of the storm drain. Place the bottom row of blocks against undisturbed soil may also be filled by increasing the riprap thickness.

2. The riprap and gravel filter must conform to the specified grading limits

3. Filter cloth, when used, must meet design requirements and be properly protected from punching or tearing during installation. Repair any damage by removing the riprap and placing another piece of filter cloth over the damaged area. All connecting joints should overlap so the top layer is above the downstream layer a minimum of 1 foot. If the damage is extensive, replace the entire filter cloth.

- **4.** Riprap may be placed by equipment, but take care to avoid damaging the
- 5. The minimum thickness of the riprap should be 1.5 times the maximum
- 6. Riprap may be field stone or rough quarry stone. It should be hard, angular, highly weather-resistant and well graded.
- 7. Construct the apron on zero grade with no overfill at the end. Make the top of the riprap at the downstream end level with the receiving area or slightly
- 8. Ensure that the apron is properly aligned with the receiving stream and preferably straight throughout its length. If a curve is needed to fit site conditions, place it in the upper section of the apron.
- 9. Immediately after construction, stabilize all disturbed areas with vegetation (Practices 6.10, *Temporary Seeding*, and 6.11, *Permanent Seeding*).

Maintenance Inspect riprap outlet structures weekly and after significant (1/2 inch or greater) rainfall events to see if any erosion around or below the riprap has taken place, or if stones have been dislodged. Immediately make all needed repairs to prevent further damage.

control practices such as, dikes, waterways, and basins. Minimize steep slopes

because they make seedbed preparation difficult and increase the erosion

hazard. If soils become compacted during grading, loosen them to a depth of

Good seedbed preparation is essential to successful plant establishment. A

good seedbed is well-pulverized, loose, and uniform. Where hydroseeding

Liming—Apply lime according to soil test recommendations. If the pH (acidity)

textured soils is usually sufficient. Apply limestone uniformly and incorporate

Fertilizer—Base application rates on soil tests. When these are not possible,

apply a 10-10-10 grade fertilizer at 700-1,000 lb/acre. Both fertilizer and lime

should be incorporated into the top 4-6 inches of soil. If a hydraulic seeder is

used, do not mix seed and fertilizer more than 30 minutes before application.

Surface roughening—If recent tillage operations have resulted in a loose

surface, additional roughening may not be required, except to break up large

clods. If rainfall causes the surface to become sealed or crusted, loosen it

just prior to seeding by disking, raking, harrowing, or other suitable methods.

Select an appropriate species or species mixture from Table 6.10a for seeding

in late winter and early spring, Table 6.10b for summer, and Table 6.10c for

In the Mountains, December and January seedings have poor chances of

success. When it is necessary to plant at these times, use recommendations

Evenly apply seed using a cyclone seeder (broadcast), drill, cultipacker seeder,

or hydroseeder. Use seeding rates given in Tables 6.10a-6.10c. Broadcast

seeding and hydroseeding are appropriate for steep slopes where equipment

cannot be driven. Hand broadcasting is not recommended because of the

Small grains should be planted no more than 1 inch deep, and grasses and

legumes no more than 1/2 inch. Broadcast seed must be covered by raking

or chain dragging, and then lightly firmed with a roller or cultipacker.

The use of an appropriate mulch will help ensure establishment under normal

conditions, and is essential to seeding success under harsh site conditions

• seeding in fall for winter cover (wood fiber mulches are not considered

If the area to be mulched is subject to concentrated waterflow, as in channels,

Hydroseeded mixtures should include a wood fiber (cellulose) mulch.

• adverse soils (shallow, rocky, or high in clay or sand), and

(Practice 6.14, *Mulching*). Harsh site conditions include:

Groove or furrow slopes steeper than 3:1 on the contour before seeding

into the top 4-6 inches of soil. Soils with a pH of 6 or higher need not be

of the soil is not known, an application of ground agricultural limestone at the

methods are used, the surface may be left with a more irregular surface of

TEMPORARY SEEDING

Specifications Complete grading before preparing seedbeds, and install all necessary erosion

6-8 inches using a ripper, harrow, or chisel plow.

SEEDBED PREPARATION

(Practice 6.03, Surface Roughening).

for fall and a securely tacked mulch.

difficulty in achieving a uniform distribution.

PLANT SELECTION

MULCHING

adequate for this use),

• slopes steeper than 3:1,

• excessively hot or dry weather,

areas receiving concentrated flow.

anchor mulch with netting (Practice 6.14, Mulching).

large clods and stones.

Construction

MATERIALS Specifications

1. Use matting made of 100% coconut fiber (coir) twine woven into high strength matrix with the properties shown in Table 6.65a.

Construction 1. Lay one block on each side of the structure on its side in the bottom row

2 x 4 wood studs through block openings.

washed stone is recommended.

rainfall and make repairs as needed.

thickness of 1 foot.

subsequent rains.

over all block openings to hold gravel in place.

Maintenance Inspect the barrier at least weekly and after each significant (½ inch or greater)

Appropriately stabilize all bare areas around the inlet.

POROUS BAFFLES

4. Use 9-gauge high tension wire for support wire.

to allow pool drainage. The foundation should be excavated at least 2 inches

the edge of the storm drain for lateral support and to avoid washouts when

overflow occurs. If needed, give lateral support to subsequent rows by placing

2. Carefully fit hardware cloth or comparable wire mesh with ½-inch openings

3. Use clean gravel, ³/₄- to ¹/₂-inch in diameter, placed 2 inches below the top

of the block on a 2:1 slope or flatter and smooth it to an even grade. DOT #57

4. If only stone and gravel are used, keep the slope toward the inlet no steeper than 3:1. Leave a minimum 1-foot wide level stone area between the structure

and around the inlet to prevent gravel from entering inlet. On the slope toward

the inlet, use stone 3 inches in diameter or larger. On the slope away from

the inlet use ½ - ¾-inch gravel (NCDOT #57 washed stone) at a minimum

Remove sediment as necessary to provide adequate storage volume for

When the contributing drainage area has been adequately stabilized, remove

all materials and any unstable soil, and either salvage or dispose of it properly.

Bring the disturbed area to proper grade, then smooth and compact it.

2. Staples should be made of 0.125 inch diameter new steel wire formed into a 'U' shape not less than 12 inches in length with a throat of 1 inch in width. The staples anchor the porous baffles into the sides and bottom of the basin.

3. Ensure that steel posts for porous baffles are of a sufficient height to support baffles at desired height. Posts should be approximately 1-3/8" wide measured parallel to the fence, and have a minimum weight of 1.25 lb/linear ft. The posts must be equipped with an anchor plate having a minimum area of 14.0 square inches and be of the self-fastener angle steel type to have a means of retaining wire and coir fiber mat in the desired position without displacement.

Table 6.65a Specifications rate of 1 to 1 1/2 tons/acre on coarse-textured soils and 2-3 tons/acre on fine-

Coir Fiber Baffle Material Property Requirements 0.30 in. minimum Tensile Strength (Wet) 900 x 680 lb/ft minimum 69% x 34% maximum Elongation (Wet) 10-12 ft/sec Flow Velocity 20 oz/SY (680 g/m²) minimum Minimum Width 6.5 feet

Open Area

1. Grade the basin so that the bottom is level front to back and side to side.

2. Install the coir fiber baffles immediately upon excavation of the basins.

50% maximum

3. Install posts across the width of the sediment trap (Practice 6.62, Sediment

4. Steel posts should be driven to a depth of 24 inches and spaced a maximum of 4 feet apart. The top of the fabric should be a minimum of 6 inches higher than the invert of the spillway. Tops of baffles should be a minimum of 2 inches lower than the top of the earthen embankment.

5. Install at least three rows of baffles between the inlet and outlet discharge

6. Attach a 9 gauge high tension wire strand to the steel posts at a height of 6 inches above the spillway elevation with plastic ties or wire fasteners to prevent sagging. If the temporary sediment basin will be converted to a permanent stormwater basin of a greater depth, the baffle height should be based on the pool depth during use as a temporary sediment basin.

7. Extend 9 gauge minimum high tension wire strand to side of basin or install steel T-posts to anchor baffle to side of basin and secure to vertical end posts as shown in Figure 6.65b.

8. Drape the coir fiber mat over the wire strand mounted at a height of 6 inches above the spillway elevation. Secure the coir fiber mat to the wire strand with plastic ties or wire fasteners. Anchor the matting to the sides and floor of the basin with 12 inch wire staples, approximately 1 ft apart, along the bottom and side slopes of the basin.

9. Do not splice the fabric, but use a continuous piece across the basin

10. Adjustments may be required in the stapling requirements to fit individual

Inspect baffles at least once a week and after each rainfall. Make any required

Be sure to maintain access to the baffles. Should the fabric of a baffle collapse, tear, decompose, or become ineffective, replace it promptly.

Remove sediment deposits when it reaches half full, to provide adequate storage volume for the next rain and to reduce pressure on the baffles. Take care to avoid damaging the baffles during cleanout, and replace if damaged during cleanout operations. Sediment depth should never exceed half the designed storage depth.

After the contributing drainage area has been properly stabilized, remove all baffle materials and unstable sediment deposits, bring the area to grade, and stabilize it.

Construction MATERIALS

1. Use a synthetic filter fabric of at least 95% by weight of polyolefins or Specifications

1. Use a symmetre internation of at least symmetre and the polyester, which is certified by the manufacturer or supplier as conforming to the requirements in ASTM D 6461, which is shown in part in Table 6.62b.

Synthetic filter fabric should contain ultraviolet ray inhibitors and stabilizers to provide a minimum of 6 months of expected usable construction life at a

- temperature range of 0 to 120° F. 2. Ensure that posts for sediment fences are 1.25 lb/linear ft minimum steel with a minimum length of 5 feet. Make sure that steel posts have
- projections to facilitate fastening the fabric. 3. For reinforcement of standard strength filter fabric, use wire fence with a

minimum 14 gauge and a maximum mesh spacing of 6 inches. CONSTRUCTION

1. Construct the sediment barrier of standard strength or extra strength synthetic filter fabrics.

- **8.** Place 12 inches of the fabric along the bottom and side of the trench.
- 9. Backfill the trench with soil placed over the filter fabric and compact. Thorough compaction of the backfill is critical to silt fence performance.
- 10. Do not attach filter fabric to existing trees.

SEDIMENT FENCE INSTALLATION USING THE SLICING METHOD Instead of excavating a trench, placing fabric and then backfilling trench, sediment fence may be installed using specially designed equipment that

middle of the fence. Check with a level if necessary.

3. Install posts 2 feet deep on the downstream side of the silt fence, and

- as close as possible to the fabric, enabling posts to support the fabric from upstream water pressure.
- 4. Install posts with the nipples facing away from the silt fabric.
- inches of the fabric. Attach each tie diagonally 45 degrees through the fabric, with each puncture at least 1 inch vertically apart. Also, each tie should be positioned to hang on a post nipple when tightened to prevent sagging.
- with 3 ties.

- immediately next to the silt fence fabric with the front wheel of the tractor, skid steer, or roller exerting at least 60 pounds per square inch. Compact the upstream side first, and then each side twice for a total of 4 trips.

required repairs immediately.

ineffective, replace it promptly.

Construction 1. Clear the area of all debris that might hinder excavation and disposal of

2. Install the Class B or Class I riprap in a semi-circle around the pipe inlet. The stone should be built up higher on each end where it ties into the embankment. The minimum crest width of the riprap should be 3 feet, with a minimum bottom width of 11 feet. The minimum height should be 2 feet, but also 1 foot lower than the shoulder of the embankment or diversions.

3. A 1 foot thick layer of NC DOT #5 or #57 stone should be placed on the outside slope of the riprap.

stone horseshoe 18 inches below natural grade.

and establish final grading elevations, compact area properly, and stabilize with ground cover.

inch or greater) rainfall event and repair immediately. Remove sediment and restore the sediment storage area to its original dimensions when the sediment

> part of the gravel facing. Check the structure for damage. Any riprap displaced from the stone horseshoe

After all the sediment-producing areas have been permanently stabilized, remove the structure and all the unstable sediment. Smooth the area to



FINAL DESIGN

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2. Ensure that the height of the sediment fence does not exceed 24 inches above the ground surface. (Higher fences may impound volumes of water sufficient to cause failure of the structure.) 3. Construct the filter fabric from a continuous roll cut to the length of the barrier to avoid joints. When joints are necessary, securely fasten the filter cloth only at a support post with 4 feet minimum overlap to the next post. 4. Support standard strength filter fabric by wire mesh fastened securely to the **upslope** side of the posts. Extend the wire mesh support to the bottom of the trench. Fasten the wire reinforcement, then fabric on the upslope side of the fence post. Wire or plastic zip ties should have minimum 50 pound tensile 5. When a wire mesh support fence is used, space posts a maximum of 8 feet apart. Support posts should be driven securely into the ground a minimum of **6.** Extra strength filter fabric with 6 feet post spacing does not require wire mesh support fence. Securely fasten the filter fabric directly to posts. Wire or plastic zip ties should have minimum 50 pound tensile strength. 7. Excavate a trench approximately 4 inches wide and 8 inches deep along the proposed line of posts and upslope from the barrier (Figure 6.62a).

inserts the fabric into a cut sliced in the ground with a disc (Figure 6.62b).

Installation 1. The base of both end posts should be at least one foot higher than the Specifications 2. Install posts 4 feet apart in critical areas and 6 feet apart on standard

5. Attach the fabric to each post with three ties, all spaced within the top 8

6. Wrap approximately 6 inches of fabric around the end posts and secure

7. No more than 24 inches of a 36 inch fabric is allowed above ground

8. The installation should be checked and corrected for any deviations before

9. Compaction is vitally important for effective results. Compact the soil

Maintenance Inspect sediment fences at least once a week and after each rainfall. Make any

Remove sediment deposits as necessary to provide adequate storage volume for the next rain and to reduce pressure on the fence. Take care to avoid undermining the fence during cleanout.

Should the fabric of a sediment fence collapse, tear, decompose or become

Remove all fencing materials and unstable sediment deposits and bring the area to grade and stabilize it after the contributing drainage area has been properly stabilized.

Specifications spoil.

4. The sediment storage area should be excavated around the outside of the

5. When the contributing drainage area has been stabilized, fill depression

Maintenance Inspect rock pipe inlet protection at least weekly and after each significant (1/2 has accumulated to one-half the design depth of the trap. Place the sediment that is removed in the designated disposal area and replace the contaminated

must be replaced immediately.

blend with the adjoining areas and provide permanent ground cover (Surface

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