ADOT Vegetation Management Guidelines – Soil Stabilization

1.0 Purpose of Soil Stabilization

Soil stabilization is one of the basic methods for temporarily controlling erosion until roadside vegetation is able to protect slope integrity. Stabilization methods are used to repair rills and gullies both in natural areas and in areas finished with granite mulch. Erosion and other damage resulting in the need for soil stabilization can be caused by storms, concentrated water flow, broken water lines or errant vehicles. Refer to the Erosion and Pollution Control Manual for Highway Design and Construction on the ADOT Roadway Roadside Development website for more detailed information.

Two key areas are vulnerable to erosion.

1) The shoulder area adjacent to the pavement experiences sheet flow that is proportional to the width of the roadway and can experience significant erosive stormwater flows. Roadside guardrail is especially vulnerable; an eroded slope may compromise the effectiveness of the guardrail system.
2) The back slope of a cut section is often steeper than the natural slope it ties into resulting in rills and a steady migration of material from the slope into the roadside ditch.

2.0 Planning to Stabilize Soil

When planning to perform stabilization activities, consider the appropriate work method for the area needing attention. Temporary erosion control should be installed within 14 days of disturbance. More information is presented in the Erosion and Pollution Control Manual. Standard scenarios include the following:

- Replacing and compacting soil from eroded areas
- Placing compacted millings around guardrail posts
- Repairing granite mulch at slopes and medians
- Using polymeric/acrylic, psyllium, starch or guar soil stabilizers to reinforce soil characteristics for resisting erosion on slopes and drainages, providing stability until plants emerge

Note that when placing material in an eroded area the new material must not be excavated from the roadside. Roadside excavation often disrupts the existing vegetative cover to the detriment of the overall management plan.

Seasonality

The potential for erosion damage is greatest during high intensity rainstorms. Routine repairs should be scheduled as soon as practical after damage has been identified to give the best opportunity for vegetation reestablishment and to prevent further degradation.

Frequency

Soil stabilization activities are generally performed as needed to repair damage. Areas that are repeatedly damaged by storms may need additional action to more permanently prevent damage. Significant reshaping of slopes or alteration of drainage patterns are generally outside the scope of maintenance activities and a standalone construction project to effectively correct a chronic problem should be considered.

3.0 Coordination Ahead of Activity

Environmental Concerns

Prior to stabilization activities in the following areas, maintenance staff shall ensure that all laws, rules, and regulations are adhered to, including requirements specific to:

- National Forest, Bureau of Land Management, or other Federal land
- Native American Tribal Communities
- Environmentally sensitive areas containing endangered species habitat
- Areas with air quality regulations (a dust control permit must be obtained for work in Pima, Pinal, and Maricopa Counties prior to commencing activities); work must minimize generation of dust
- Clean Water Act compliance
  - Care should be taken to remove material from ditches that may result in sediment flow into drainage ways but to leave in place all other existing soils.
  - Material to fill rills requires importation from a suitable borrow source if such sediment is unavailable on site.
  - Only minimal soil disturbance is allowed with this practice. If five (5) or more acres will be disturbed, a SWPPP must be prepared and an NOI must be submitted.

Intra-agency Coordination

The Maintenance Supervisor will notify District Environmental Coordinator or Landscape Architect 10 work days prior to slope stabilization activities for information on site status to avoid damage to sensitive areas.

4.0 Best Practices for Stabilization

Soil stabilization should generally be done with an eye towards supporting revegetation for a more permanent erosion solution.

General

- Investigate to determine the source/cause for the erosion
- If possible, correct the source/cause to prevent future erosion occurrences prior to repair

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- Install storm drain inlet protections, as appropriate, prior to commencing activities
- Repair rills and gullies to re-establish slope to near original condition to minimize erosion of top soil and vegetation
- Use water to eliminate dust and enhance limited soil compaction
- In severely damaged areas additional temporary erosion control measures may be needed. Refer to the ADOT Erosion and Pollution Control Manual.

Rock mulch and rip rap

- Apply pre-emergent herbicide per the manufacturer's recommendations
- Use rock mulch or riprap that matches the existing rock material in color and size
- Ensure that the depth of repair is consistent with the as-built plans (typically 2 inches deep for rock mulch)
- Water-settle the new rock material

Acrylic/polymeric, psyllium, guar

- To stabilize slopes steeper than 3:1, apply acrylic/polymeric, psyllium, or guar soil stabilizers to slopes and drainages by spraying from water tenders or hydroseeders.
- Pre-wet the soil with surfactant treated water, then apply stabilizer.
- Avoid over spray onto the roadway or traffic signs.

Tacked straw or hydraulically-applied straw

- Use certified weed-free straw.
- Apply straw and spray a liquid tackifier into a prepared seedbed to provide temporary soil stabilization

Tag for certified weed-free straw.

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Hydraulically-applied straw

- Use certified weed-free straw.
- Apply straw and tackifier by means of hydroseeder to seeded sites in order to provide a mulch cover to a seedbed for germination and erosion control
- Do not use wood fiber alone or bonded matrix fiber for hydromulching. ADOT research shows it prevents moisture penetration to the soil which inhibits germination of seeds.
- Refer to the seeding special provisions for a recent nearby construction project or consult Roadside Development to determine the application rate for straw and tackifier, which varies with the slope.
- Load tank no more than 15 minutes before spraying
- Avoid wind drift of hydromulch spray onto roadway
- Spray in even swaths