7.70 SUGGESTED EROSION CONTROL DEVICES FOR SPECIFIC SITUATIONS

The best way to control erosion is to minimize the disturbed areas and to get the disturbed areas stabilized as soon as possible. Stabilizing seeding should be the first option. This requires planning and coordination to get "things" finished and seeded. When seeding is done late in the season, the growth may not be enough to provide adequate protection to the soils. Thus, mulching should be considered along with the seeding. Also, there are many cases during the construction projects that special care or devices need to be utilized. Following are some situations/information and solutions that should be used as guidelines during construction:

Types of Soils

Sand and silt will be more erodible. Clay, on the other hand, will be much less erodible. More erosion devices are needed for silt and sand. Erosion control devices must be appropriate for the types of soil throughout the project. The soil classifications that these guidelines should be used for are: sand, loamy sand, sandy loam, silty loam, silty clay loam, and silt. The inspector/engineer needs to review the soil sheets and soil report for the project.

Ditch Grade (% Slope) and Length

The steeper and longer the ditch, the faster and stronger the flow would be. Again, the ditches should be seeded. Nevertheless, silt fence ditch checks are still needed. Most of the time, the silt fence ditch checks would work. However, sometimes rock checks are needed. The frequency and the distance between the checks must be determined.

The following guidelines are recommended for ditch checks:

Ditch Grade	Approximate Spacing
1.0% to 2.0%	400 feet
2.1% to 4.0%	300 feet
4.1% to 6.0%	200 feet
More than 6.0%	100 feet

In addition to these guidelines, the length of the ditch must be considered, especially when the ditch grade is 3% or more. When the length of the ditch is more than 1,000 feet, one or maybe two rock checks should be placed. The first one should be about 100 feet from the lowest elevation and the second one may be 100 feet below the mid point of the ditch length.

For ditches with grades steeper than 4.0% and longer than 1,000 feet, a rock flume is more appropriate than a rock ditch check. The rock flume, 30 to 40 feet in length, is constructed by placing erosion stone at the lower end of the ditch. Additional rock flumes should be placed as needed for steeper ditch grades.

Drainage Ways/Ponds/Lakes/Wetlands, etc.

If the construction work is close to drainage ways/ponds/lakes/wetlands, silt needs to be prevented from leaving our project! Silt basins, riprap dams, silt fences, seeding, and available ROW should be looked at.

ROW or at least temporary easement must be available to install the necessary erosion control devices near these "sensitive" areas. Depending on the situation, a silt basin or even a silt retention basin should be created to allow the silt to settle. A little dike at the

lower side of the silt retention basin would certainly increase the storage volume. The overflow location of the dike could be armored with riprap to make sure that the water energy is minimal before leaving the ROW. Finally, a silt fence should be placed to catch the silt from escaping the project.

Height of the Fills for Bridge Berms
As the fills and/or the bridge berms get higher, the potential for erosion increases significantly. Without some seeding or mulching, there will be gullies on the slopes. Seeding or some sort of stabilization must be done as the fill is going up. Rough grading of the unseeded areas would decrease the velocity of the water.

Height of the Backslope
When the backslope is not too high (less than 10 feet) and the drainage area above the backslope is small, the potential for erosion on the backslope is low. However, when the backslope is high and the drainage area onto the backslope is large, something must be done. For example, a small intercepting ditch next to the top of the backslope could be utilized to carry the water along the top of the backslope down to the ditch to avoid the erosion on the backslope. Sometimes the runoff will be concentrated at one location. If this is the case, a letdown flume should be placed to minimize or prevent erosion.

When a sandy backslope is encountered, topsoil or cohesive soil should be used to dress the slope. A wood excelsior mat or straw mat would be the next choice for slope protection.

Culvert Ends
Since culverts are at the lowest spots, this is where the water will drain off. Most of the time, the water will be drained into a creek or drainage way. Silt fences must be placed on both sides of the wing from the end of the wing at least around the toe and up onto the foreslope to catch the silt from the area right next to the culverts. Seeding has to be done as soon as possible.

In case of water discharging strongly from the pipe onto an adjoining property/farm/pond, etc., especially in the no-ditch situation, many things may be needed. First, the ROW has to be available. Second, one or two riprap dams or a splash basin may be needed to slow down the water. Finally, one or two silt fences adjacent to the ROW line to catch silt would be beneficial.

End of Ditches
At the end of the ditch, water is going to drain off the highway project. Depending on the situation, riprap dams, rock checks, rock flumes, and silt fences should be looked at. For example, the slope of the ditch may be steep and carrying a large volume of water. The soil for the project is very sandy. In this case, a riprap dam may be needed near the end of the ditch. Also, where a steeper slope occurs, a rock flume may be added. In contrast, if the project is in a flat area with mainly cohesive soil, maybe a silt ditch check is all that is required.

Letdown Pipes
The slope of letdown pipes is very steep. Thus, the velocity of the water at the outlet of the pipe is very high. This water will cause severe erosion. In this case, a silt retention basin at the top allowing water into the pipe slowly should be considered. Also, a layer

of riprap with engineering fabric underneath or even a flume of riprap will need to be installed to dissipate the water velocity or energy.

Sometimes the outlet of the letdown pipe is right next to a creek. Because the water flow rate in the creek can be very high in the spring, the pipe must be protected. This means that riprap must be installed on both sides of the pipe and maybe even on the top to prevent scouring around the culvert and uplifting of the pipe.

Berm Face
Drainage from the median and ditches can cause erosion on the berm face. Rock flumes sometimes are needed to minimize the erosion on the berm face.

Drop Inlet or Intake
The flow rate at this location may be high. Turbulent flow may cause erosion. Silt may enter the storm sewers or farm tiles. In order to minimize erosion, preventive actions should have been taken at other places so that the water flow rate and siltation are minimal. Silt fences should be placed around the drop inlets or intakes.

Bridge Deck Drain
When the deck is wide and high above the ground, the water dropping on the ground from the deck drain can cause erosion. Erosion stone or riprap may have to be placed under the deck drain to absorb the energy from the water impact.

Borrow Area
Sometimes the borrow is located on a hill. After the topsoil is stripped and excavation begins, water runoff from the borrow could be high. Silt fences may not be able to hold the water. A small dike along the low side of the borrow would minimize the potential of the silt leaving the borrow.

Terraces would certainly be helpful.

V-Ditch
A V-Ditch is not the most desirable shape for a ditch; but, due to site conditions, they exist. Some seeding or mulching must be done. In addition, straw bales should be placed in the ditch to slow down the water velocity.

Area of Super Elevated Curve
Due to the increased slope of super-elevated curves, surface water in the curve will flow to a concentrated area. During the grading project, erosion problems may be minimal. However, after the pavement is completed, the velocity of the water draining off the pavement will increase significantly. A letdown flume may be needed to be constructed on the “low” side of the super-elevated curve.