

# CHAPTER SIX

## ***MISCELLANEOUS CONSTRUCTION***

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## ***BRIDGE DRAINAGE***

The collecting and disposing of rainwater on bridge decks is accomplished by use of a “Drainage System” which is shown in the plans for each individual structure. In most cases the drainage system consists of openings in the deck, referred to as scuppers, which are located at the gutter line just in front of the barrier wall or curb. Rainwater drains off the deck surface to the scuppers and then free falls into a body of water below the bridge. You must make sure that the scuppers are the correct size and are located properly.

When rainwater cannot be discharged directly onto the ground or into a body of water because of pollution restrictions, a closed drainage system is required, much like your plumbing system at home. A closed system, which includes piping, inlets and outlets, collects the water and discharges it into a sewer system or into a retention or detention pond. You must verify that correct drainage system materials are used, that they are the specified size and that they are placed correctly in the forms prior to placement of concrete. Improper drainage system installation can result in improper or inadequate drainage as well as water leaks that can eventually cause corrosion of structural steel and/or rebars.



**Embedded Drainage Structures Prior to Concrete Placement**

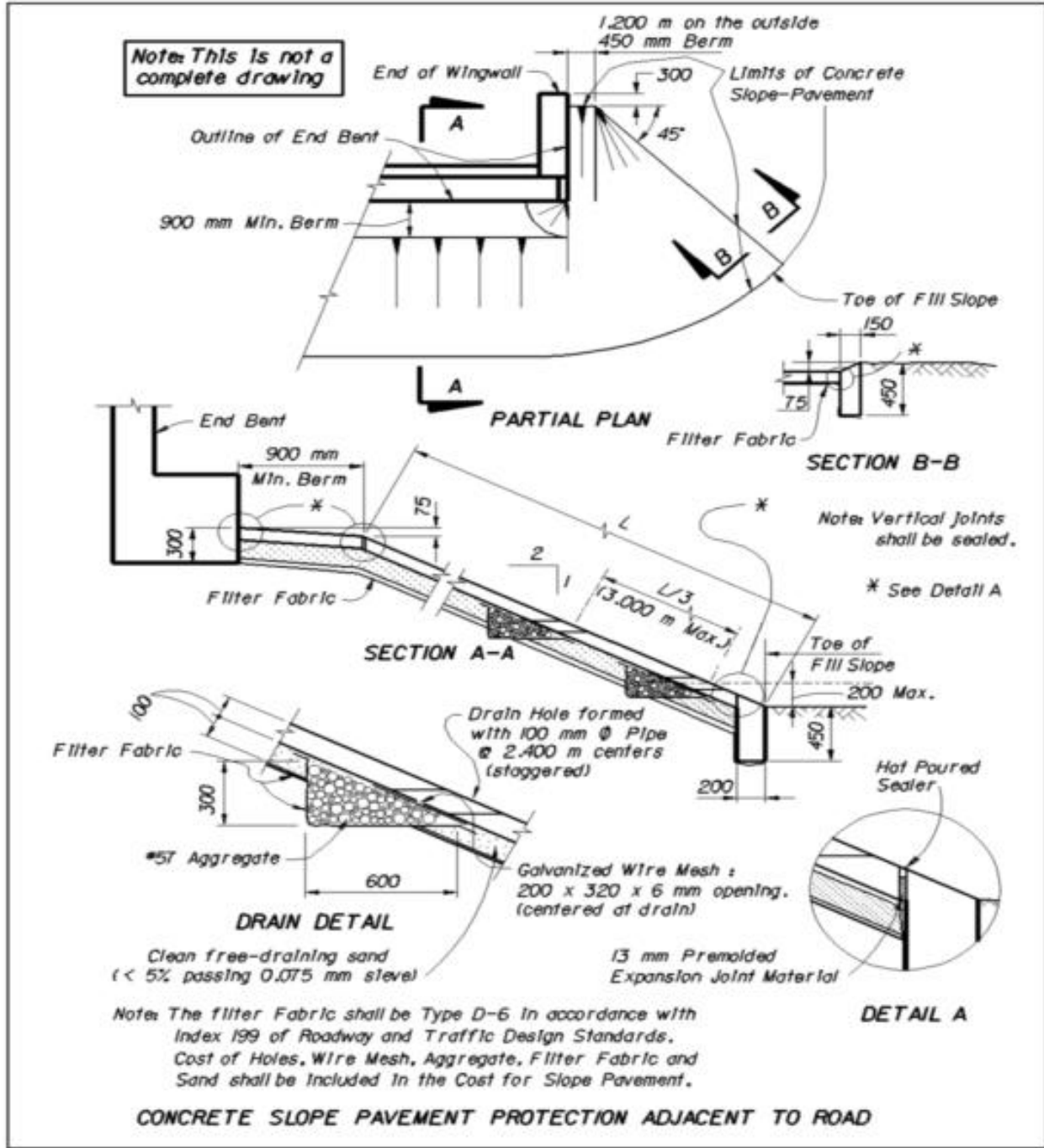
## ***SLOPE PROTECTION***

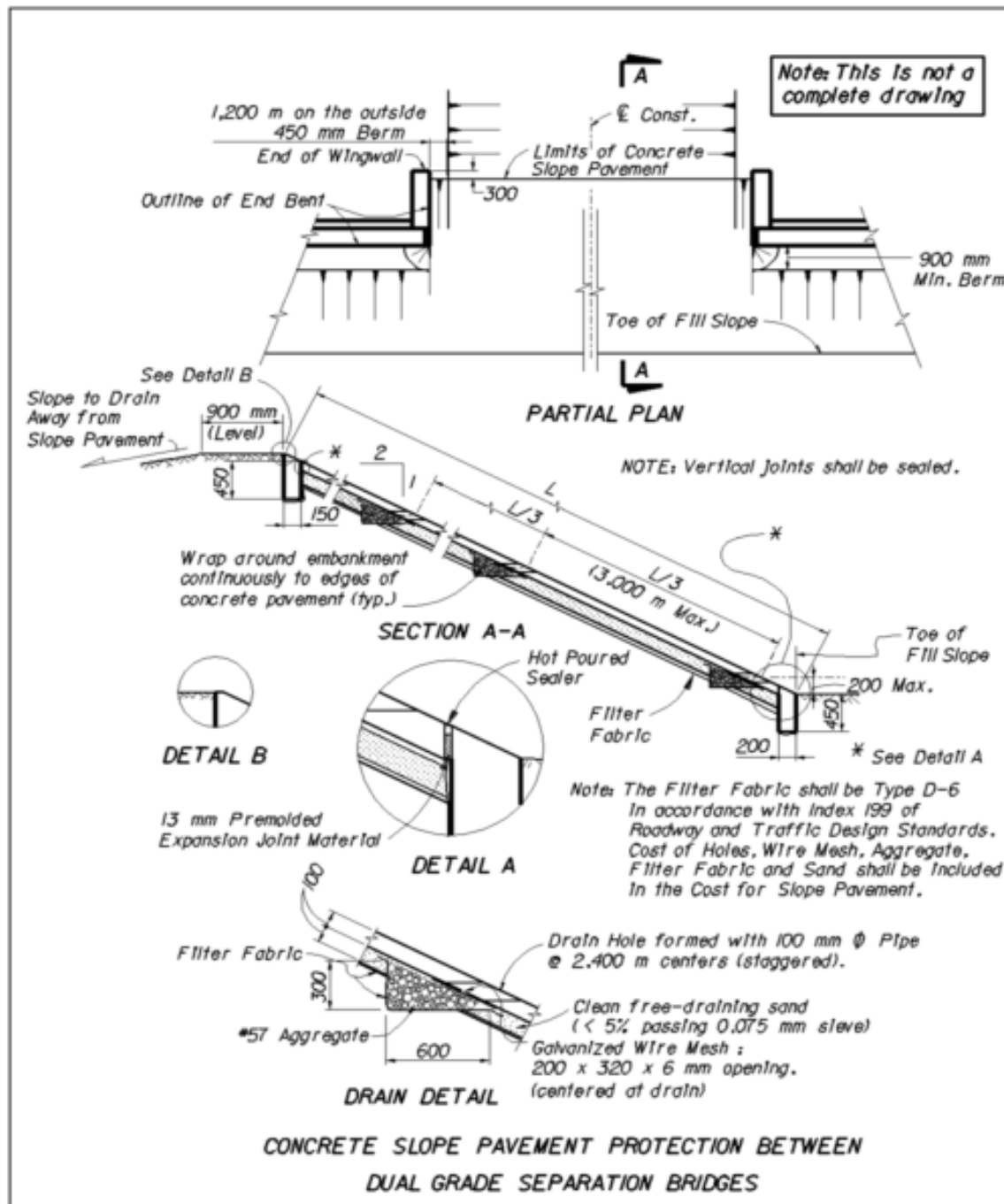
In order to prevent rainwater runoff from eroding embankment slopes at the ends of bridges, the slopes are stabilized in one of three ways. The first method, see illustrations on pages 6-5 and 6-6, which uses concrete slabs or slope pavement to cover the slope, is used when the bridge spans a roadway. The second method (see illustration on page 6-7) uses rubble riprap or large stones to cover the slope and is used when the bridge spans a body of water. The third method (see illustration on page 6-8) uses sand cement riprap or bags of cement and sand mixture and is used when the bridge spans a railroad. Details for construction of slope protection, similar to the illustrations in this chapter, are shown in the plans for each structure.

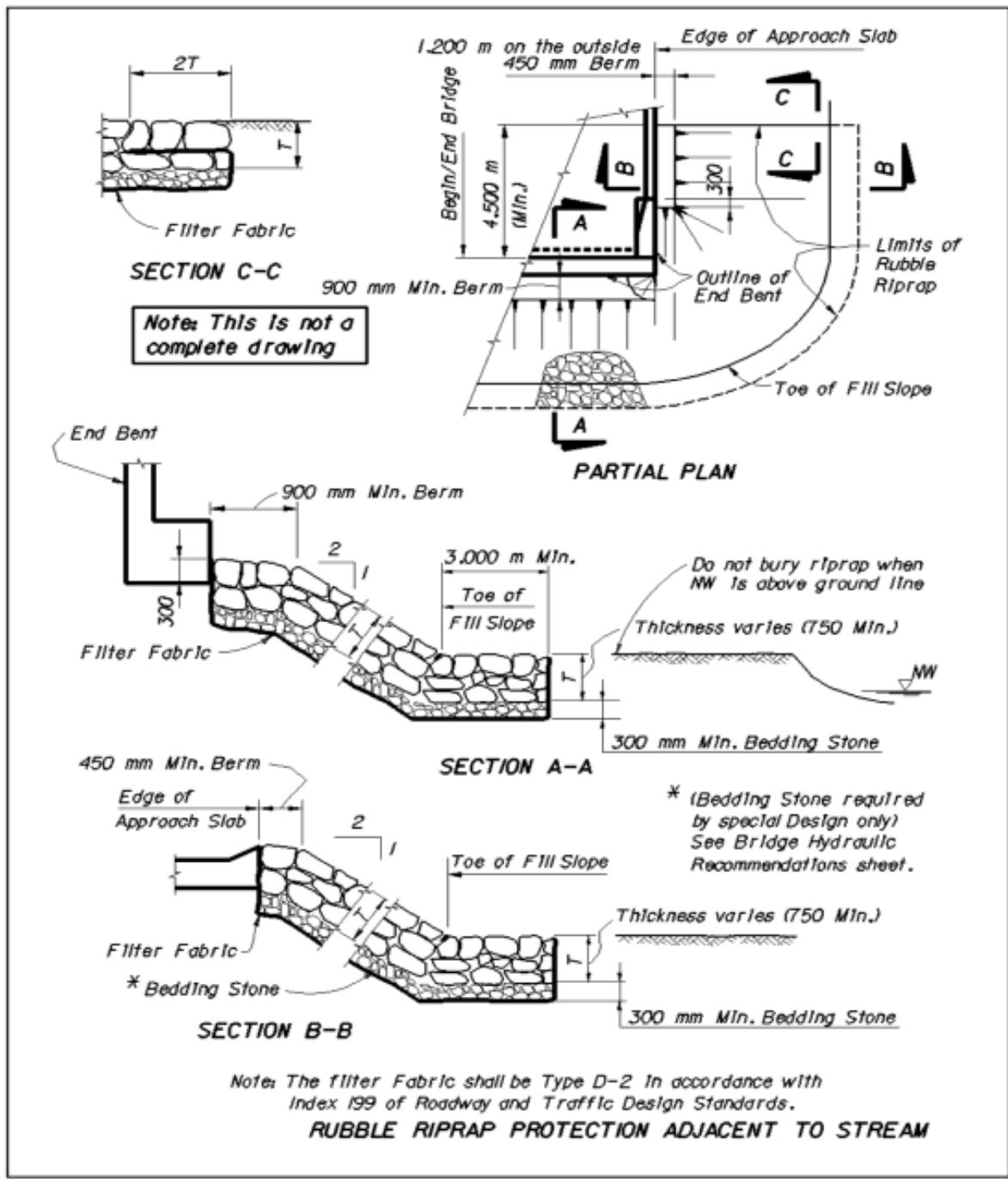
Before construction of slope protection begins, be sure to carefully study the requirements in the plans. Some important facts that you should know are as follows.

- Slope protection must withstand water pressure from beneath it caused by water seeping through the earth. If the pressure is not released by allowing the excess water to escape, the slope protection will eventually be damaged. For this reason, openings called “Weep Holes” are built into the protection system, at regular intervals. The soil end of the weep hole is in contact with stone aggregates and covered with a wire mesh, to prevent soil from being washed through the weep holes.
- Sand-cement slope protection doesn't require weep holes because there are small gaps between the bags to allow seepage water to drain.
- If sand-cement slope protection is used, the sand must be natural silica sand.

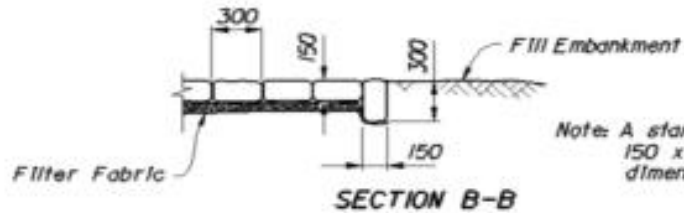
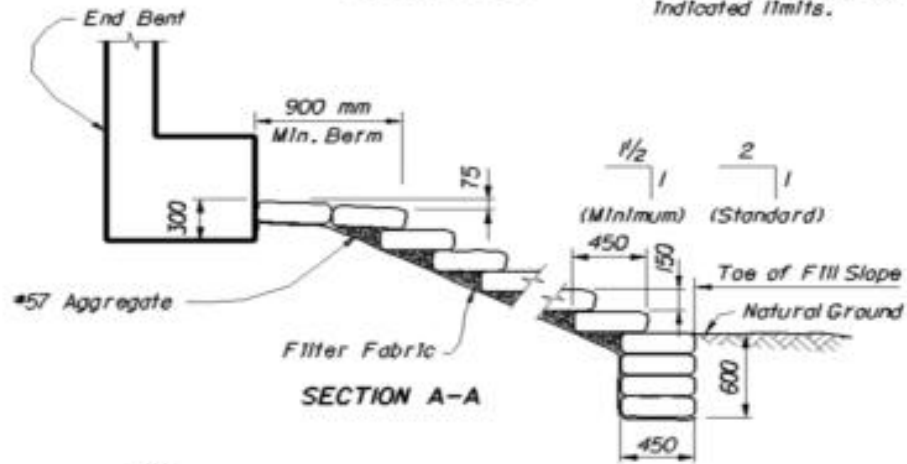
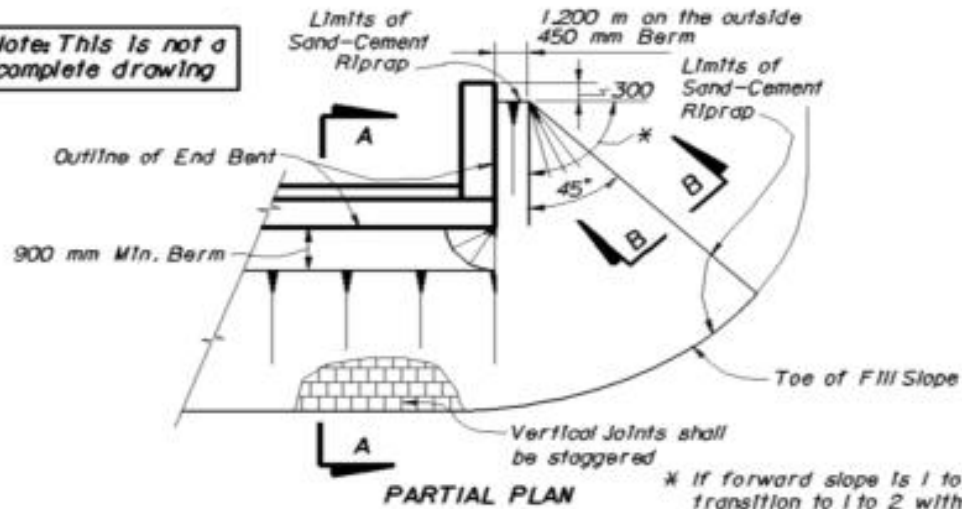
Refer to the illustrations on the following pages and study the slope protection details. You must make sure that the Contractor installs the slope protection according to the details in the plans.







**Note: This is not a complete drawing**



Note: A standard filled bag shall be 150 x 300 x 450 mm in nominal dimensions.

Note: The filter fabric shall be Type D-4 in accordance with Index 199 of Roadway and Traffic Design Standards.

**SAND-CEMENT RIPRAP PROTECTION ADJACENT TO RAILROAD TRACK**



## Q U I Z

- 1) The most common type of drainage system uses openings in the deck called what?
- 2) Drainage system leaks can cause corrosion of \_\_\_\_\_ and/or \_\_\_\_\_ .
- 3) How thick is the slope pavement shown in the illustration on page 6-5?
- 4) How thick is the toe wall on page 6-5?
- 5) True or false: rubble riprap is used to protect slopes of bridges that span railroads.

## ***ANSWERS TO QUESTIONS***

### Page 6-9, Bridge Drainage and Slope Protection

- 1) scuppers
- 2) structural steel, rebar
- 3) 100 mm
- 4) 200mm
- 5) False, sand-cement riprap is used