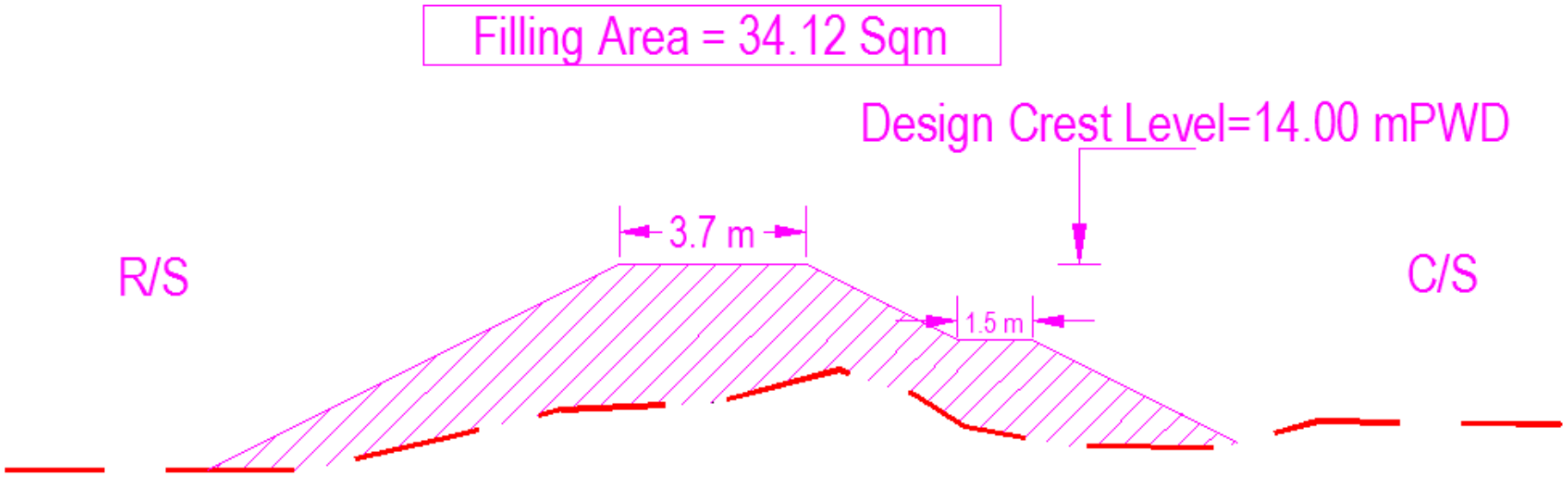
DESIGN CONSIDERATIONS OF CONSTRUCTION OF EMBANKMENT

Taken up by

Local Government Engineering Department

Typical Section of Embankment



Types of Embankment

Submersible Flood Embankments

- It is designed mainly to protect boro rice from the pre-monsoon floods
- During monsoon season these embankments remain submerged and cannot be used for communication

Types of Embankment

High Flood Embankments

- It is designed mainly to protect the subproject area from inundation by excluding both pre-monsoon and monsoon high floods.

Design Considerations

Height of Embankment

Height of embankment or crest level of embankment is fixed up to maintain integrity of the embankment for protection against the design flood.

Crest level of embankment= Design Flood Level + Free Board

Design Considerations

Crest Width of Embankment

Crest width should be designed taking into account soil stability (seepage and slope sliding) and future use of the embankment.

Generally crest width is fixed considering standard crest width of road.

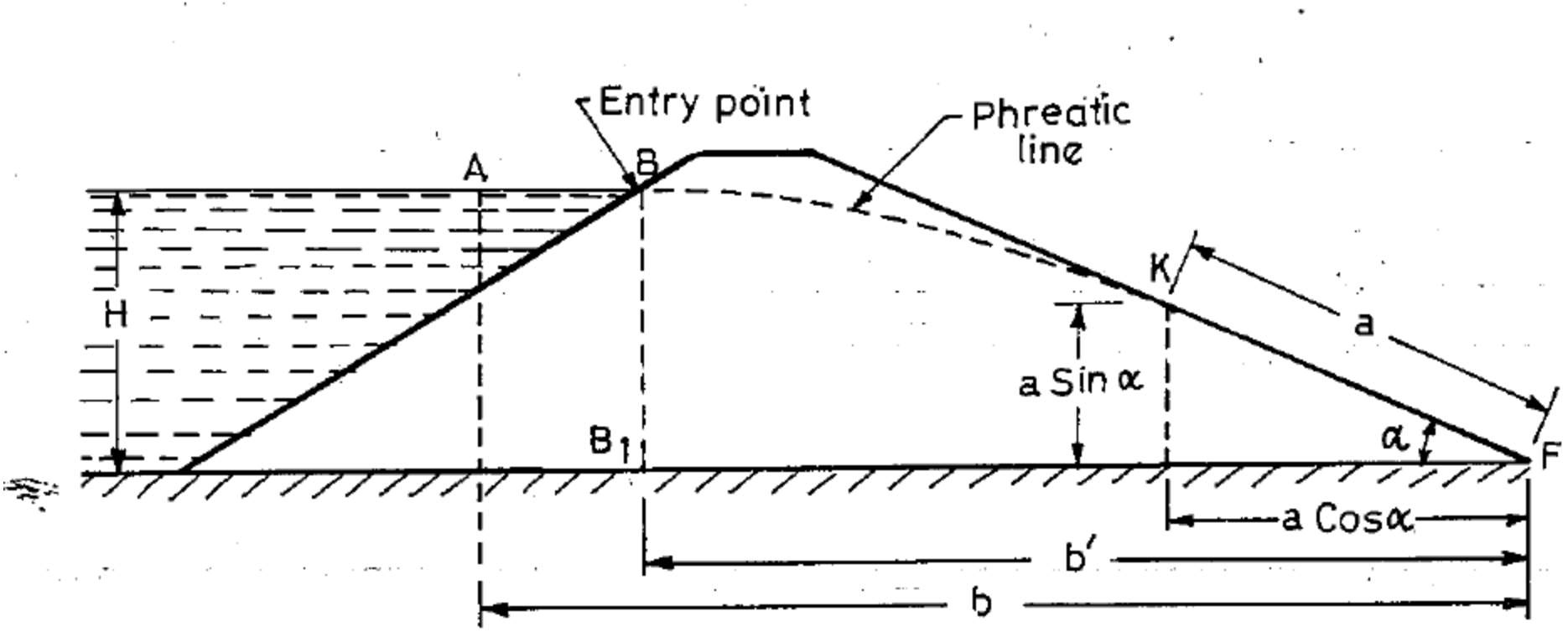
Design Considerations

Side Slope of Embankment

Side slope should also be designed taking into account soil stability (seepage and slope sliding) and future use of the embankment.

Phreatic line analysis and slope stability check should be considered to select the design slope and overall embankment width.

Phreatic Line Analysis



Slope Stability Check

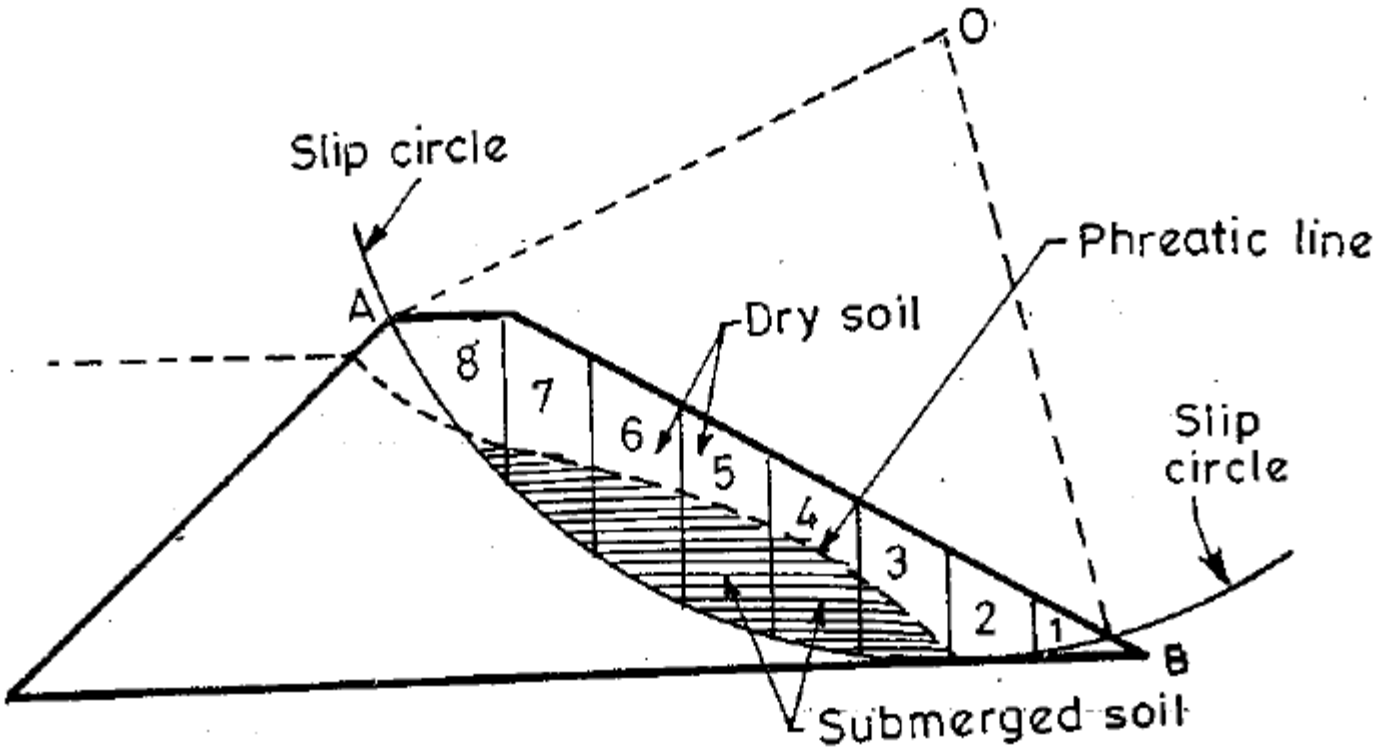


Fig: Swedish Slip Circle Method

Design Considerations

Set Back Distance

The minimum design set back distance, including re-sectioning of existing embankments, shall be 3.0 m. Approximate embankment set back distance (SB) can be determined from the following relation.

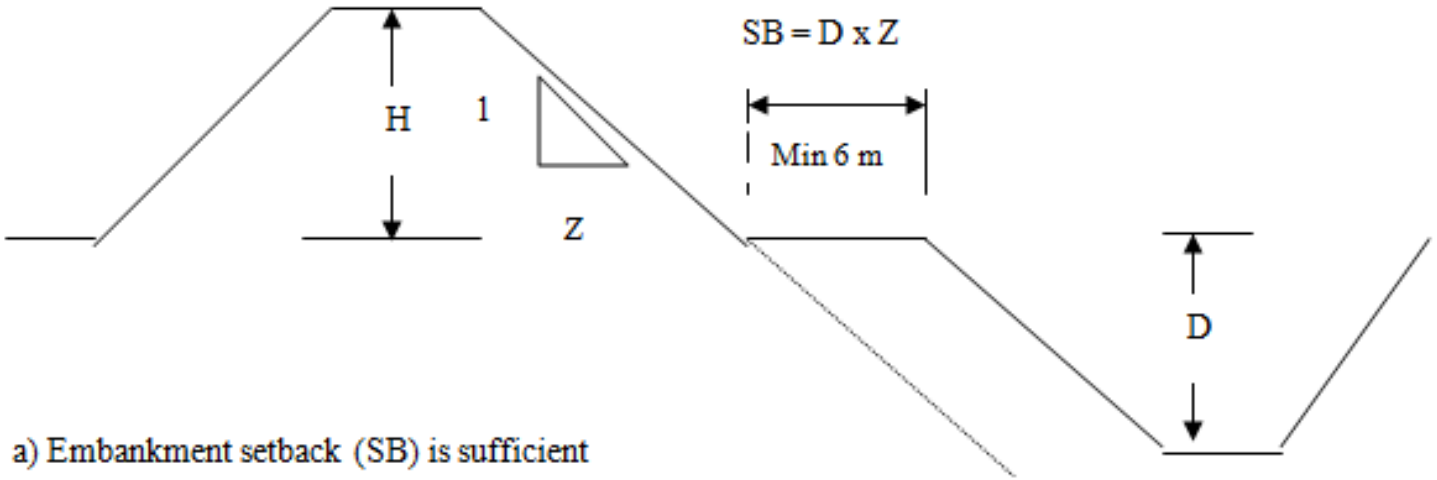
$$SB = Ze \times Dch$$

Where: SB = embankment set back distance (m)

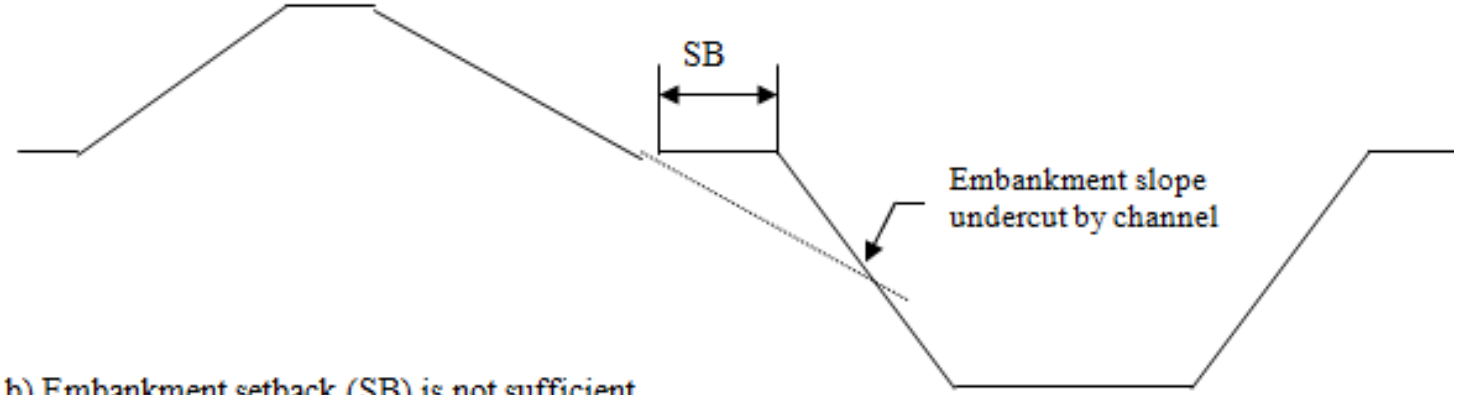
Ze = side slope of embankment

Dch = depth of channel (m)

Set Distance Calculation



a) Embankment setback (SB) is sufficient



b) Embankment setback (SB) is not sufficient.
Berm above doted line will slide down.

Design Considerations

Submersible Flood Embankments

- Design Water Level - 1:10-year Pre-monsoon HFL
- Freeboard - 0.30 m
- Crest Width - 2.50 m
- Side Slopes - 1:2

Design Considerations

High Flood Embankments

- Design Water Level - 1:20-year Annual HFL
- Freeboard - 0.60 m
- Crest Width - Minimum 2.50 m
- Side Slopes - Maximum 1V: 1.5H

Standard Crest Width of Road Embankment

Road Grade	Required crest width (m)
Upazila Road	7.32 m/9.8 m
Union Road	5.5 m
Village Road-type1	4.8 m
Village Road-type2	4.2 m

Recommended Embankment Side Slope

Embankment Height (m)	Side Slope (V:H)
0 – 1.99	1:1.5
2.00 – 3.99	1 : 2
4.00 – 4.99	1 : 2.5
5 and above	Determine from detail slope stability analysis

Reference:

- **Small Scale Water Resources Subproject Planning And Design Guidelines, March-2004**