

Keeping Buried Services out of Slopes

This gives guidelines on keeping buried services out of slopes and on dealing with cases where it is not possible to do so. These guidelines are not exhaustive and professional judgement must be exercised in all cases.

Importance of keeping Buried Services out of Slopes

2. Persistent leakage of water from buried services not only causes nuisance, but can also be a serious risk to the stability of slopes and retaining walls. Water-carrying services including stormwater drains, sewers, water mains, catchwater channels and water tunnels are prone to leak. Other conduits such as telephone ducts, electric cable ducts or disused pipes can also transmit a significant amount of water into the ground : their potential effect on the stability of a slope or retaining wall should therefore not be disregarded.

3. As a long-term preventive measure, authorized persons/registered structural engineers (APs/RSEs) should keep buried services out of slopes in their designs as practicable. Otherwise, adequate provision should be made to cater for the case where it is impractical to do so.

Routing of Buried Services away from Slopes

4. It is a poor engineering practice to route buried services close to the crest of a slope. As a general rule, buried services should not be placed in a slope nearer to the crest than a distance equal to its vertical height. Reference should be made to Section 9.7, Geotechnical Manual for Slopes in this regard.

Resiting of Existing Buried Services in Slopes

5. Applying the same rule, consideration should be given to re-routing all existing buried services in existing slopes. Opportunities to re-route existing services may arise when existing slopes within or adjacent to a lot are being upgraded or when existing services are being relaid or repaired.

Siting of Buried Services in the Crest Area

6. In cases where the siting of buried services outside the crest area is impractical, the slope should be designed to the factors of safety as given in Chapter 5 of Geotechnical Manual for Slopes, taking into account the effects of possible water leakage. Alternatively, other measures as detailed below should be considered in the design to minimize the effects of possible water leakage :

/(a) laying

- (a) laying the services on or above the ground surface -- Additional provisions as a result of their exposure should be made to ensure aesthetic acceptability as well as suitable protection against corrosion or damage.
- (b) housing the services within a ducting system, sealed trench or sleeve drained to a suitable discharge point at a surface water drainage system or natural stream -- The discharge from the ducting system should be monitored regularly. Measures such as inspection chambers should be provided to allow access for monitoring.
- (c) for water mains which have to be routed within the crest area, installing stop valves at each side of the slope -- This will enable any leakage to be easily controlled when spotted.

7. When the laying of services inside the crest area of a fill slope is unavoidable, the design should allow for differential settlement of the buried services and their ancillary facilities, especially after any leakage.

8. For those sewers and stormwater drains in fill slopes where differential settlement may be large, any breakage of the pipe itself or widening of pipe-joints will cause leakage. Rigid pipelines should, therefore, be avoided and flexible jointings with short pipe pieces should be provided to enhance the degree of flexibility along the pipeline. Non-brittle pipe materials should be considered to avoid shearing of the pipe if settlement occurs.

Accurate as-built Record of Buried Services

9. To facilitate future maintenance and inspection of all newly constructed buried services, APs/RSEs should compile an accurate as-built record of the buried services. This should include updating of those building plans, drainage plans, site formation plans and water services plans submitted to government departments. Such information should be incorporated in the slope and retaining wall record plans referred to in PNAP 168. Copies should be distributed to the developers as well as the property owners or building managers who would take over the future maintenance of the buried services.



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