

**32nd Annual Soil Mechanics and Foundation
Engineering Conference Proceedings**

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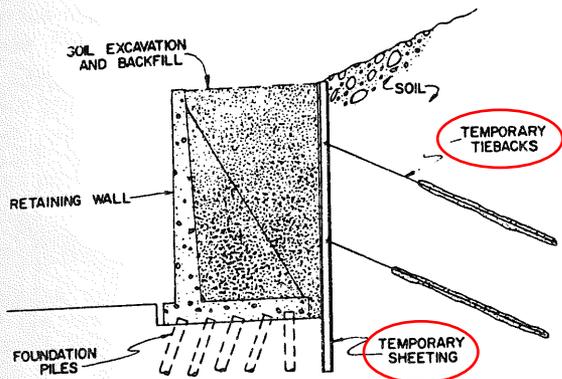
Minneapolis, MN

**Earth-Retention Systems
Temporary and Permanent**

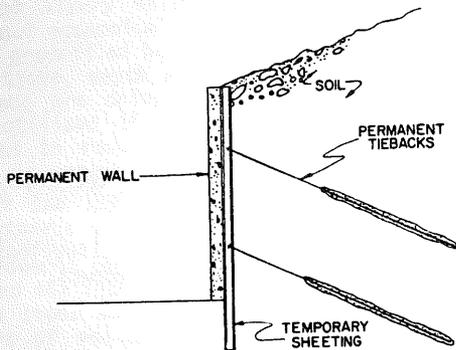
Thomas C. Anderson

Meeting Preprint

FIGURE 3.
COMPARISON BETWEEN CONVENTIONAL RETAINING WALL
AND PERMANENTLY TIEBACK WALL



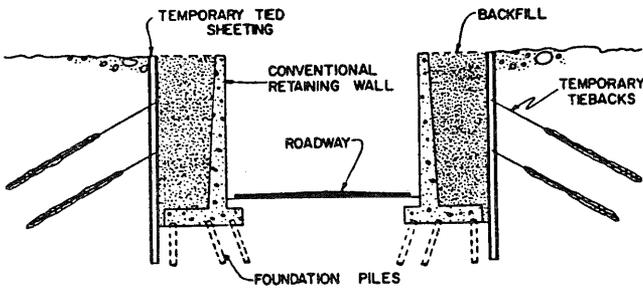
3a. Conventional Retaining Wall



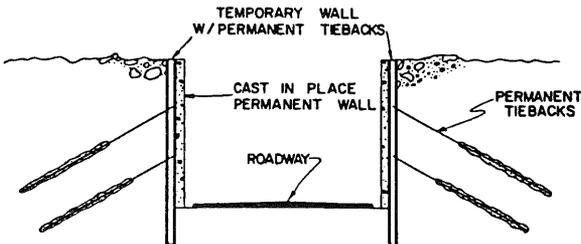
3b. Permanently Tiedback Wall

A similar application is that of depressed roadway construction where retaining walls are required on both sides of the roadway. As seen in Figure 4, tiedback walls do not require wide construction easements. Only a narrow temporary easement is necessary for the construction of permanently tiedback walls, since footings are not required.

FIGURE 4.
DEPRESSED ROADWAYS



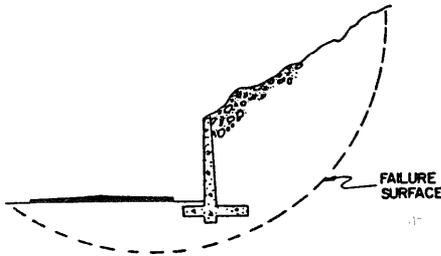
4a. Conventional Retaining Wall



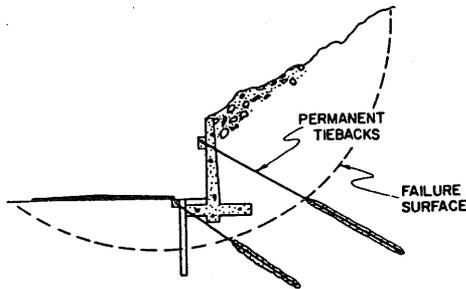
4b. Permanently Tiedback Wall

Permanent tiebacks also are used to stabilize or repair existing retaining walls which are overturning or founded on soil or rock which is part of a slide. Figure 5 shows a permanent tieback and pile system used to save a failing wall. Normally, an existing wall can be stabilized with permanent tiebacks at a fraction of the cost of constructing a new wall and without disturbing the rock or soil behind the wall.

FIGURE 5.
WALL REPAIR



5a. Unstable Wall Would Be Replaced

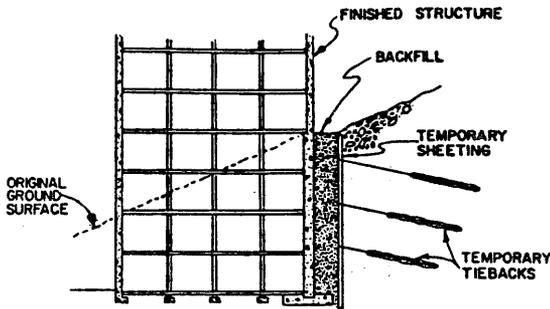


5b. Permanent Tiebacks Used to Stabilize Existing Wall

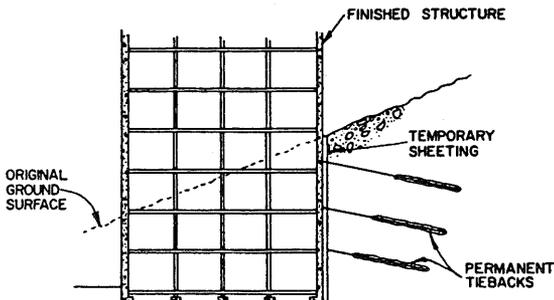
C. Unbalanced Lateral Pressure

Figure 10 shows permanent tiebacks used to support unbalanced earth pressures which result when a building is constructed on a sloping site or into a hillside. A normal building foundation is not designed to resist these forces. When designing tieback walls of this type, care must be taken to ensure that the wall and the building can accommodate relative movements. If the wall is rigidly connected to the structure, relative movements could cause damage. A separate retaining wall may be built in order to prevent wall deformations from affecting the building, or the building can be designed to accommodate the movements. This application is illustrated in the permanently tieback wall constructed along the cliff for the Adult Detention Center for Ramsey County in Downtown St. Paul.

FIGURE 10.
UNBALANCED LATERAL PRESSURES



10a. Structure Designed to Resist
Unbalanced Lateral Pressures



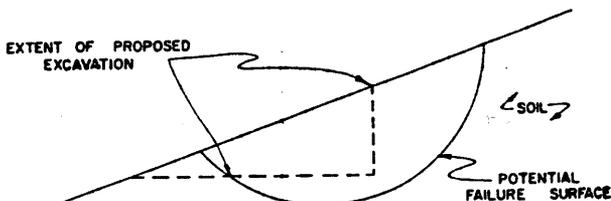
10b. Permanent Tiebacks Used to
Resist Unbalanced Lateral Pressures

D. Landslide Stabilization

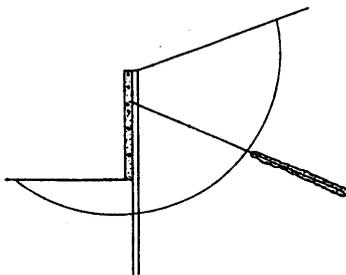
Permanent tiebacks have been used effectively to stabilize or to prevent landslides. Permanently tiedback walls can be constructed to stabilize cut and fill slides associated with highway and railroad construction. Often these walls can be built without disrupting traffic on the existing roadway or railroad. Permanently tiedback walls also are used to prevent slides from occurring, as well as allow structures to be built into a potential slide area. As shown in Figures 11 and 12, a landslide may develop when an excavation is made into a hillside. Tiedback walls will enable the maximum development of these types of sites. In landslide applications, the permanent tiebacks extend below the failure surface and provide the force required for equilibrium.

FIGURE 11.

SITE DEVELOPMENT SLOPE STABILIZATION

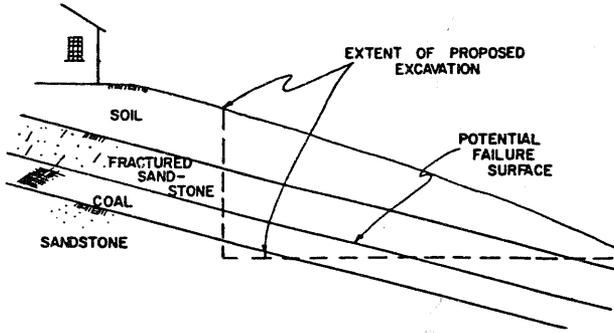


**11a. Excavation Could Cause a Landslide
and Site Normally
Would not be Developed**

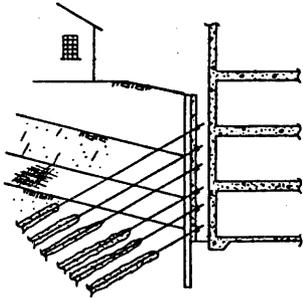


**11b. Permanent Tiebacks Allowed
this Site to be Developed**

FIGURE 12.
SLOPE STABILIZATION
MERCY HOSPITAL
SCRANTON, PENNSYLVANIA



**12a. Excavation Could Cause a Landslide
and Site Normally
Would not be Developed**



Permanent anchored wall
should not be rigidly
connected to the building.

**12b. Permanent Tiebacks Allowed
this Site to be Developed**