

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

**January 24, 1984**

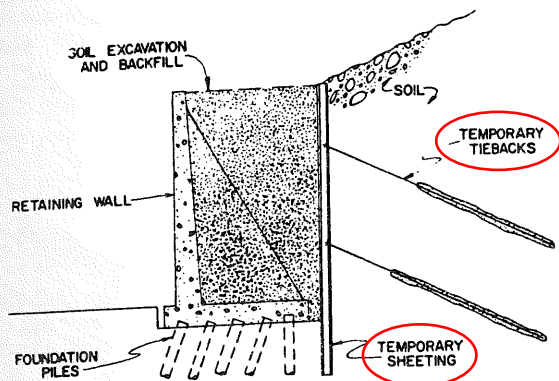
**Minneapolis, MN**

**Earth-Retention Systems  
Temporary and Permanent**

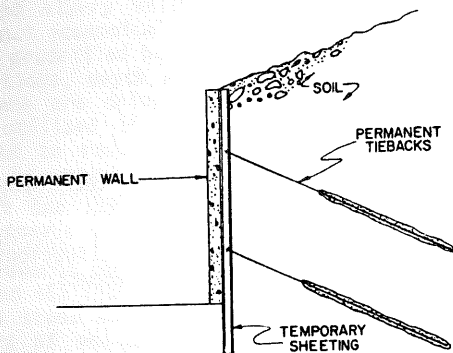
Thomas C. Anderson

**Meeting Preprint**

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



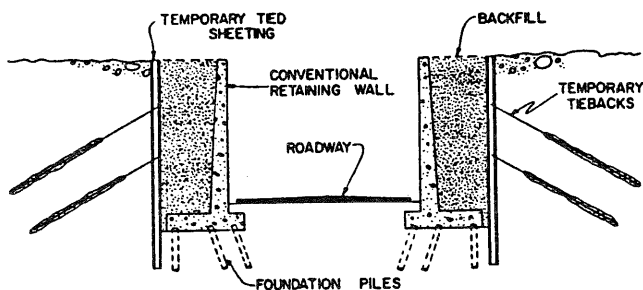
**3a. Conventional Retaining Wall**



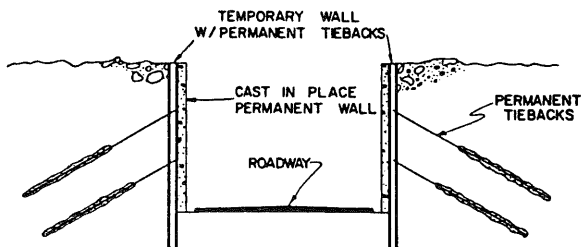
**3b. Permanently Tiedback Wall**

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**



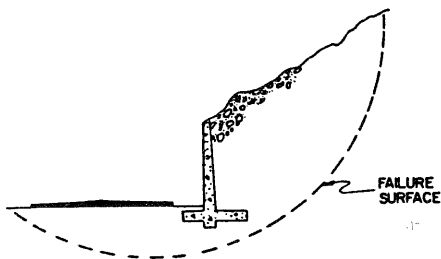
**4a. Conventional Retaining Wall**



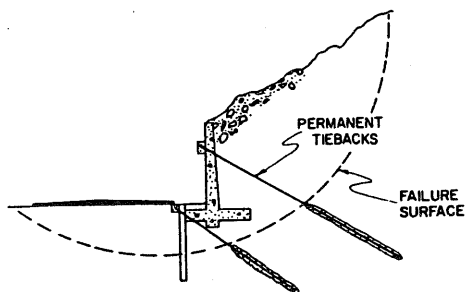
**4b. Permanently Tiedback Wall**

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**

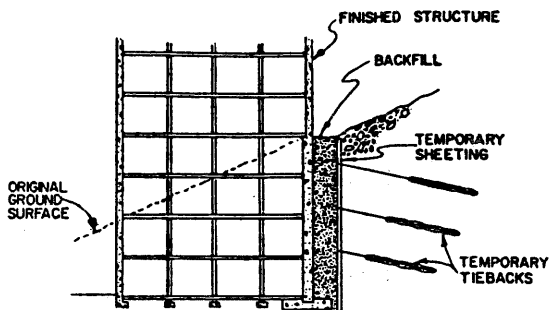


**5b. Permanent Tiebacks Used to Stabilize Existing Wall**

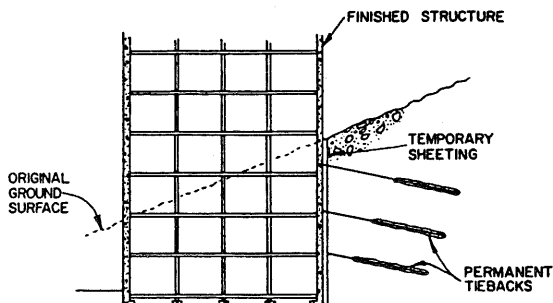
### C. Unbalanced Lateral Pressure

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 tiedback 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 tiedback 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

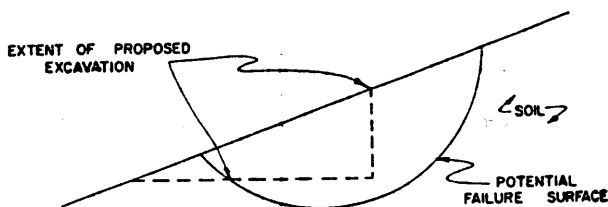


10b. Permanent Tiebacks Used to  
Resist Unbalanced Lateral Pressures

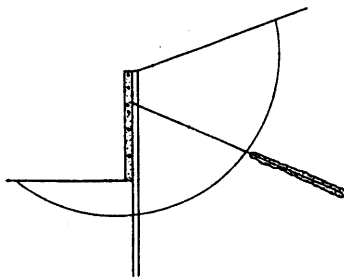
#### D. Landslide Stabilization

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

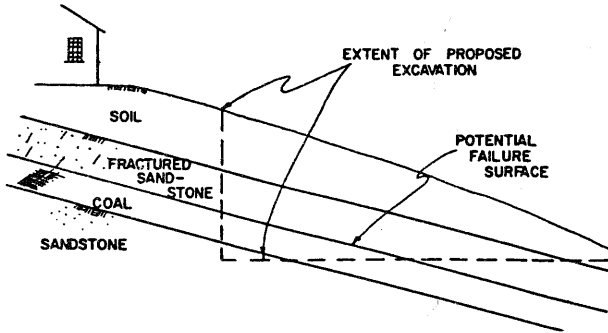


11a. Excavation Could Cause a Landslide  
and Site Normally  
Would not be Developed

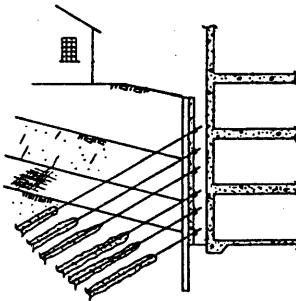


11b. Permanent Tiebacks Allowed  
this Site to be Developed

**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**