

District 11-0 Landslides and Remediation Techniques
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Landslides are the result of numerous contributing factors. Some of these factors include slope steepness, relatively weak soil and/or underlying rock, human alteration of a site and change in moisture conditions. Typical slope failures include pipe failures, stream scour, sheet flow and “true landslides.” A true landslide is a circular or block failure of a slope due to aforementioned contributing factors. Most of the slope instabilities that PENNDOT District 11-0 (Allegheny, Beaver, and Lawrence Counties) faces are caused by failing drainage features or lack thereof. Otherwise stable slopes fail because the roadway does not have adequate drainage features to handle roadway drainage. PENNDOT District 11-0 categorizes its inventory of landslides and similar slope instabilities, or simply geohazards, utilizing several factors: Average Daily Traffic (ADT), type of geohazard, length of roadway impacted, height of failure, roadway impact and surrounding area impact. A value is assigned to each and the list can be sorted to view the highest priority geohazards that require attention. The list of sites is then discussed by the District regularly and a plan of action is developed for each site. The plan could be to program the site on the TIP (transportation improvement plan) for a full construction project. The site could also be given to an on-demand maintenance contractor for the District. If it is within the limits of work, the work could also get included in an existing contract. Department maintenance forces also address 10-20 of the smaller sites each year. Some examples are discussed herein highlighting the following landslide remediation technologies and techniques: soil nails, geogrid reinforced soil slopes, rock embankments, expanded polystyrene (geofoam) blocks, retaining walls, inclusion of structural elements, such as caissons, into geotechnical treatments outside of structural applications, as well as combinations of aforementioned techniques to stabilize a single landslide.