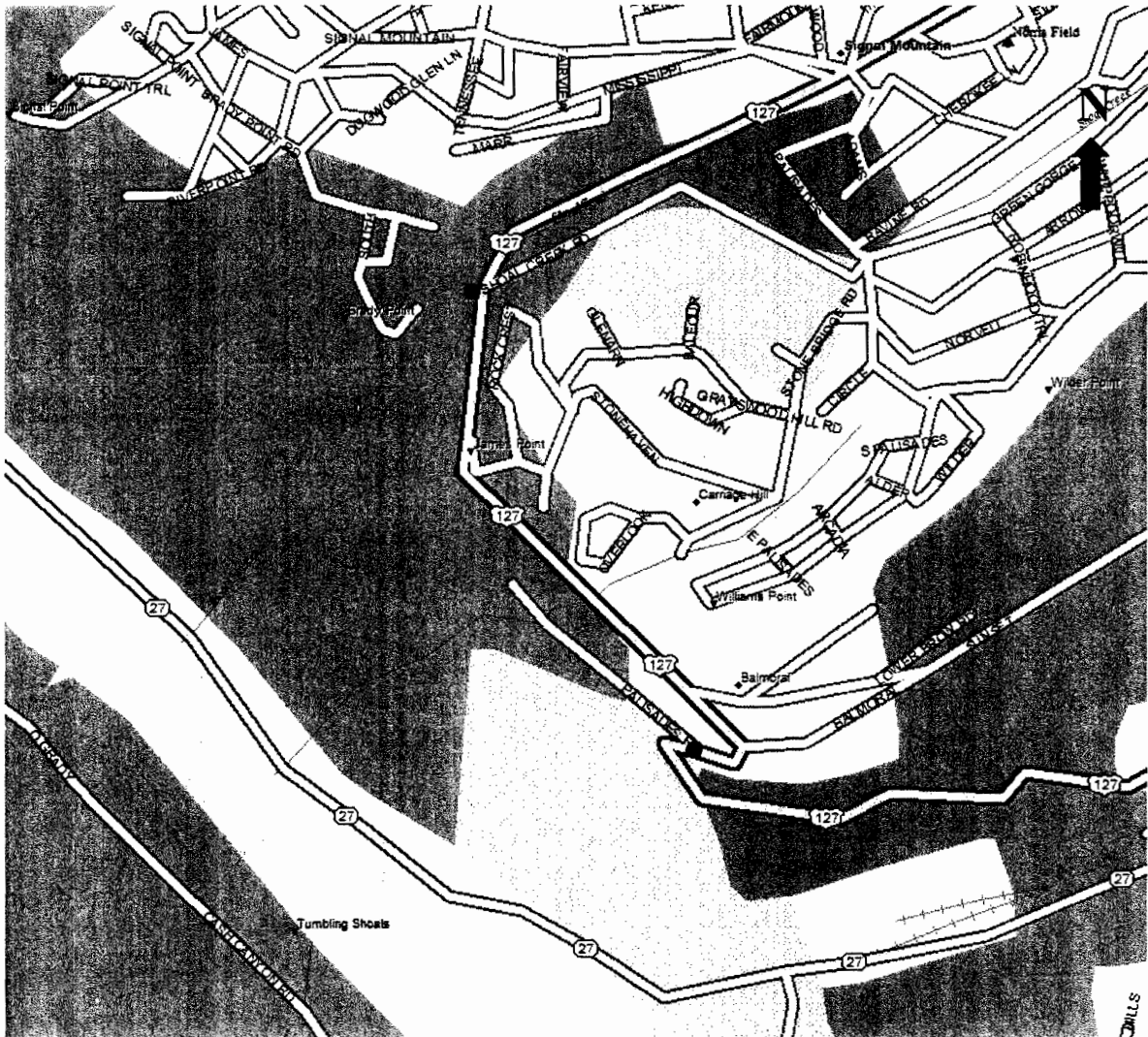


## PRELIMINARY GEOTECHNICAL ASSESSMENT AND TRIP REPORT

State Route 8 (Signal Mountain Road) from Palisades road to Shoal Creek  
Road near LM 16.1

Project No. 33000-4200-04

HAMILTON COUNTY



PRELIMINARY GEOTECHNICAL ASSESSMENT  
AND TRIP REPORT  
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Introduction

This report provides a preliminary assessment and documentation of a site visit to SR 8 (Signal Mountain Road) in Hamilton County from Palisades Road to just above L.M. 16. This site visit occurred as a result of a request by TDOT Region 2. Vanessa Bateman of the Geotechnical Engineering Section met with Don Seaborn, Ray Rucker and Bill Webb of Region 2 on January 18, 2007.

Site Issues

There have been repeated stability problems along this section of State Route 8 over the years that have been primarily mitigated through monitoring and periodic asphalt patching. In the portion of the roadway above Palisades Road a previous geotechnical investigation has been completed that made recommendations for slide repair. A rockfall site assessment was done for the large rock cut along this section of roadway and previous aerial photography of the area has been taken.

The particular area of concern was further up the mountainside in the area of the large rock cut to the right of centerline that was previously identified as a rockfall hazard. Typical of mountainside roads, there is a large rock bluff on the right hand side of the road and SR 8 is perched on the side of the mountain with some sidehill fill underlying the roadway. Typically this kind of fill is made up of

soil and rock from previous construction, rockfall, blasting or sliding. Approximately a 25 foot section, as measured along the roadway slipped and caused a reported 4 inch dip in the roadway. This area has been freshly patched by Region 2 Maintenance and the guardrail was repaired.



**Figure 1.** View of new sliding and patch along State Route 8 in the area near LM 16

The proximate cause of this problem was the too steep outside slope and poor drainage. This area has had previous problems as evidenced by the amount of limestone, pavement and gravel fill along the slope. There have been some fairly significant rain events in the past few weeks and this was a contributing factor to the slide. Seepage due to the rain adds an additional driving force. Maintenance has added additional asphalt to the side and some

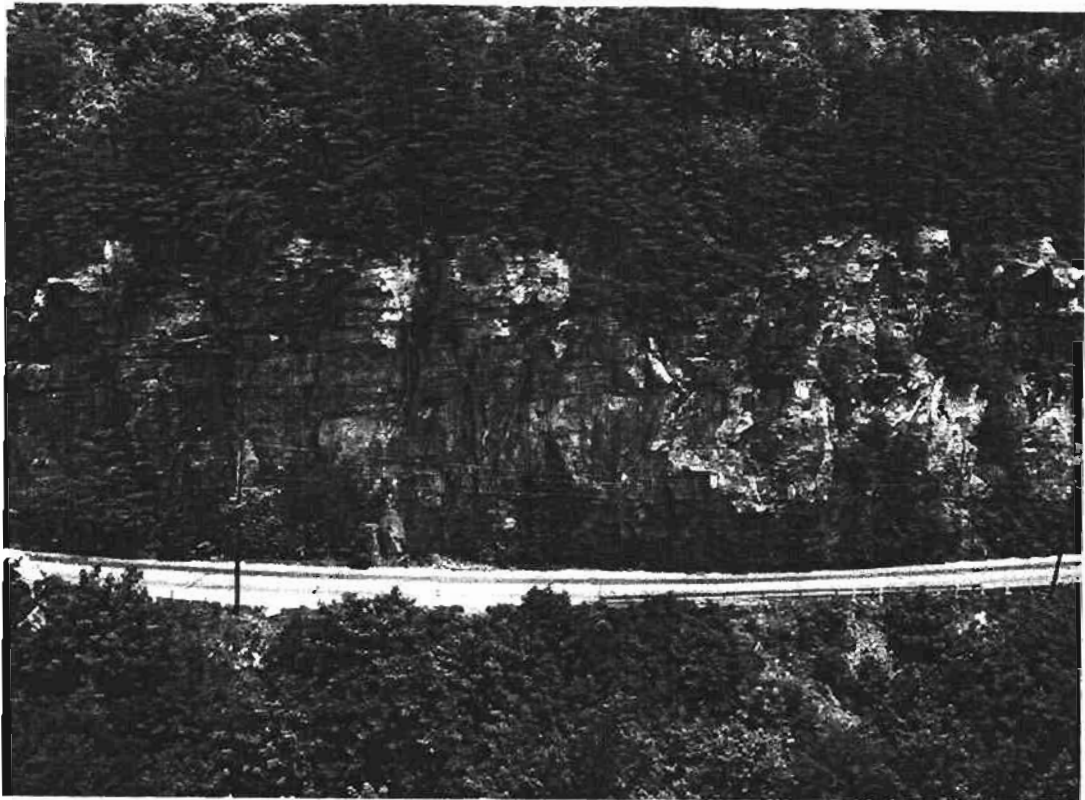
additional large rock fill in an effort to stabilize the road. However, there is no firm foundation on the outside of the slope and this rock is expected to slide down the hill causing further problems. Additionally, there has been an increasing amount of water in the ditch along the site that has caused some water to get out onto and cross the roadway.

There are several areas of concern along State Route 8 starting just above LM 16 and extending downward to Palisades Road. There are several areas where previous sliding has occurred, and Maintenance forces have been regularly required to monitor and patch these areas. Several new slip areas were noted today and will be patched by another layer of asphalt.



**Figure 2.** View of new sliding along State Route 8 in the area of the “Space House Slide”

Additionally, a rockfall assessment has been performed of the rock cut along this section of roadway. This site has received an “A” rating and a score above 500, which puts it in the “High-A: Very High Risk” rockfall site category. This site is one of the 35 highest scoring sites for rockfall risk along state responsible roadways.



**Figure 3.** View of large rock cut along State Route 8 just below L.M. 16, aerial photo from 1982.

This site was rated highly due to the numerous areas along the rock cut that can contribute rockfall and because the roadway is right up against the rock bluff with little or no rockfall catchment ditch. Most rocks that fall off of this cut have no place to go but in the traveled way. The rockfall site assessment indicates that some large rocks (greater than 6 feet along and axis) can be

expected. Wintertime is a particularly problematic time for rock cuts of this type because of freezing and thawing of ice on the rock cut face which can pry rocks loose from the face and cause them to fall. Additionally, areas of overhanging rock are of particular concern.

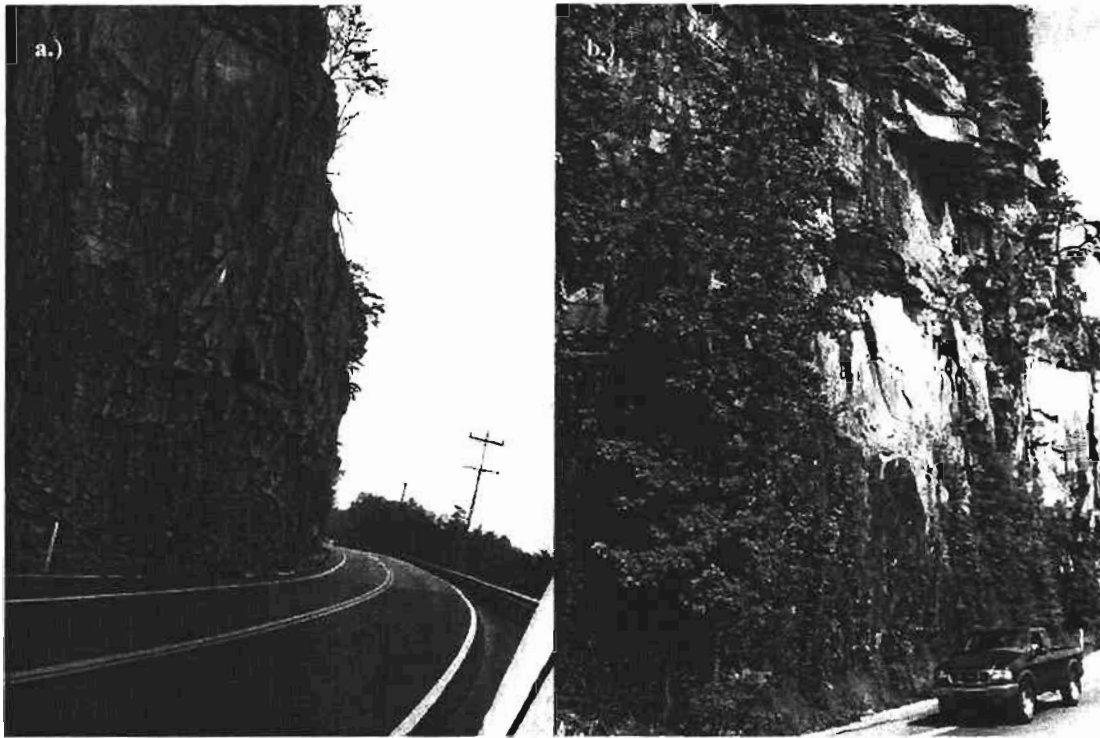


Figure 4. Views of large rock cut along State Route 8 just below L.M. 16 taken a.) Jan 18, 2007 and b.) July 30, 2003.

#### Short Term Recommendations

In the short term, the Geotechnical Engineering Section recommends that the new slide area be excavated using a track hoe, removing material on the outside slope and underneath the near traffic lane to as deep as feasible, expected to be approximately 15-20 feet. The excavated material would then be replaced with clean shot rock and repaved.

Additionally, the GES recommends that some drainage improvements be made to the area. Additional cross drains are recommended. However, these drains will need to be connected to downslope drains on the outside slope that lead downward to the stream below the roadway. These downslope drains will be needed to prevent concentrated water from eroding away an already marginally stable and in places unstable slope. Patching or reconstructing the drainage ditch along the upper side of the slope is also recommended. Water can seep through cracks in the drainage ditch, this seeping water puts additional stress on the roadway and can drive further sliding.

These recommendations were made to Don Seaborn, Ray Rucker and Bill Webb at the time of the site visit on the morning of Jan 18, 2007. It should be noted that these are temporary measures and may not provide a permanent solution to the problem. However, they will increase the stability of the roadway and should slow down some of the sliding in order to have time to design a more permanent repair.

### Long Term Solutions

A full scale geotechnical investigation will need to be undertaken in order to provide a more permanent solution to the stability issues that are presented by State Route 8 in this section. There are several considerations:

1. Sliding in the area of the "Space House" slide near and above Pallisades Road.
2. Sliding along several areas of SR 8 above this area and in the vicinity of the large rock cut.
3. Rockfall hazards presented by a large rock bluff to the right of centerline
4. Additional drainage and runoff coming to the site from ever increasing development in the area.

The scale of the work will require coordination with Design and Survey (as plans, profiles and cross sections of the road and vicinity will be needed), with Maintenance (periodic lane closures will be required) as well as coordination with utility companies (all utilities in the area will need to be located and marked.)

The most obvious and unfortunately most expensive option is to re-cut the slope in the area of the rock cut and move the roadway further into the hillside onto more stable ground. This would have the effect of improving the rockfall hazard as well as preventing sliding of the roadway. This could be done for the portion of the roadway in the area of the rock cut. Other options will be required further down the hill as there are ancient landslides on the up-hill side of the road below the rock cut area. Previous investigation of the Space House slide area indicates that the addition of a properly placed MSE wall along with flattening of the slopes could provide significant relief in that area. Permanent slide repair options for the Space House Slide area have been developed and were submitted to TDOT Maintenance in 2004. Other options such as soil nailing, further retaining walls railroad rail cribbing, rock buttresses or and improvements in drainage can be investigated. If there are questions concerning this report, please contact the Geotechnical Engineering Section.

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