Kentucky Geohazards In Transportation
Isaiah 40:4

“Every valley shall be lifted up, and every mountain and hill be made low; the uneven ground shall become level, and the rough places a plain.”
From Then to Now

The Herald-Dispatch
FRIDAY
June 3, 2005

Landslides part of life in West Virginia

BY JENNIFER BUNNY
The Associated Press

CHARLESTON — West Virginia Division of Highways crews are faced with repairing 1,598 slips and landslides, which a state geologist calls "an underestimated danger of living in West Virginia."

"We are one of the states with landslide problems because we've got hills and mountains. It's going to continue to happen," said Steve McClelland, a geologist with the West Virginia Geological and Economic Survey in Morgantown.

In fact, West Virginia has 13 percent of the economic damage caused by landslides in the United States, second only to California, which has 40 percent, according to a U.S. Geological Survey study of damage from 1979-1993. That is the most recent estimate, said J. Steven Kite, a geographer and geologist at West Virginia University.

A landslide in Laguna Beach, Calif., Wednesday destroyed 17 multimillion-dollar houses. The cause is still under investigation, but Ed Harp of the USGS said it was almost certainly related to the winter storms that drenched the area. The area had its second-rainiest season on record.

Please see LANDSLIDES/SA

Landslides
Continued from 1A

The USGS study said West Virginia and Utah had the most per capita damage from landslides. But most of Utah's damage was from one event, Kite said. Per capita figures were not available.

"We have not only high mountains, we have steep valleys. It's really the steep valleys where your problems are," Kite said.

Of the 1,598 slides, 937 are in DOH District 6, which stretches from Tyler County to Hancock County.

"We've never had anything at all like this before," said Bob Whipp, District 6 engineer. "The State Journal. "We've got hundreds of slips at once and hundreds of slides."

"Much of the $107 million in road repair costs will be reimbursed by the Federal Emergency Management Agency because most problems stemmed from flooding. About $40 million will not be reimbursed, said state Highway Engineer Marvin Murphy. Normally, the state spends about $4 million a year fixing landslides, Murphy said. Since last July 1, it has fixed 936 slides at a cost of $18.5 million. It will take three or four years to repair all the slides that now exist, he said."

The Northern Panhandle has more problems than elsewhere in part because the Ohio River has carved a deep valley over the last 150 million years. "It takes a long time for the slopes to adjust," Kite said.

Also, the Northern Panhandle — and the Morgantown area — has a lot of soil and bedrock rich in a certain type of clay. The soil expands when it is wet and gets heavy, which can cause landslides. It shrinks when it is dry and when it shrinks, it loses strength, which also can cause landslides.

"And there is the old West Virginia approach to slope engineering: trial and error," Kite said.

California and Colorado have county geologists that have to approve developments, he said.

"Around here a lot of counties don't even have zoning. You can pretty much build whatever you want wherever you want. The result is sometimes the experiments go wrong," Kite said.

McClelland said landslides are "just something we have to be on the alert for. When people talk about buying houses and worry about being over a coal mine, I tell them you better think about slope stability, too."
Known Landslides & Rockfalls
Active Projects
Landslide and Rockfall Costs

- $44 Million Dollars Spent since 1998
- Six Year Plan
  - Nearly $50 Million over next six years
Kentucky Highway Districts

KENTUCKY HIGHWAY DISTRICTS
Kentucky Geohazards

- Low Cost Landslide Repairs
- Rockfall Mitigation
- Tied Back Retaining Wall
- Gabion Baskets
- Granular Correction
- New Technology
  - Lightweight Fill - Geofoam and Wood Chips
  - Soil Nail Retaining Wall
I have done everything as a citizen that I know to do and, for what it’s worth, thought I would contact you as my Governor. I love the house and land I live on, which is an old log house built in 1842, and is one of the oldest in the State. However, the road to my house is so dangerous I sometimes wonder if I will ever make it home. I know of many other citizens who have spoken of the hazardous condition of Route 2, and many of us have contacted local district office and county officials about the road’s condition. The hazardous condition of Route 2 was declared an emergency in April by the Greenup Fiscal Court and that decision was supported by Tanya Pullin, Charlie Borders, and the DOT. It was not until I contacted Rep. Pullin in the latter part of June, along with Janet Doe of your office, that anything was actually done to start repair of this road. A news release was issued 6/26 by the DOT saying Rt. 2 would be closed for one day on 6/29 and that construction would last 2 weeks. The problems with this state road begin approximately a mile off U.S. 23 and last through the next few miles. There is serious road sliding going on in 4 places in addition to the potholes, and a speed bump crossing both lanes approximately 1.5 miles out. This is the road some people would take to get to the Jesse Stuart home place. How embarrassing it should be for us for people from outside the State to see the disrepair. How dangerous to my family and I who travel that road every day. What is worse is that State Rt. 1459 (Low Gap) is used as one of the detours to connect from Rt. 2 to Rt. 1. That narrow road has a hump so big from where a tree is uprooting that it is just like riding a rollercoaster. One day after Rep. Pullin asked the DOT to give it their attention, 8 orange cones were placed around it. This does nothing to secure the safety of travelers because the hump is in and around a curve and both the cones and hump aren’t visible until you come right on it. Governor, please advise me what is going to be done to resolve the situation caused by the deplorable condition of Rt. 2. Rep. Pullin has been very helpful in assisting me; however, it disgusts me that the Highway Department has taken this matter so lightly. I have recently been contacted by Jane Doe of your office. She sent me a letter yesterday after being contacted by Janet Doe. Her letter, though, did not indicate that she really understood my position. I wrote her an e-mail this morning setting forth my concerns and she called me this afternoon. She told me to be looking for a letter from the Transportation Cabinet. I inquired of her whether it would be a response to my concerns and she told me “I would just have to wait until I got it” and that the letter had been prepared and was awaiting a signature. It is obvious to me that the Transportation Cabinet/DOH could care less how many people are injured or killed as a result of the conditions of these roads. I am hoping that you care enough to assist me.
Landslides

Cost

- Used Guardrail
- 100 Railroad Rails (40 ft. nominal length) @$9.50
- Drill- $3.50/ft.
- Stone- $7.50/ton

Total- $52,000
Note: At least one third of the total length of each railroad rail should be embedded into rock socket.
Landslides

Installation of double row of recycled railroad rails at 2’ center
Landslides
Landslides

Cost

- 840 cu. yds. embankment
- 1475 tons granular embankment
- Type 4 Geotextile Fabric

Total - $47,500
Landslides
Landslides

Cost

- Used Guardrail
- 50 Railroad Rails (40 ft. nominal length) @$9.50/ft.
- Drill- $3.50/ft.
- Stone- $7.50/ton

Total- $26,000
Note: At least one third of the total length of each railroad rail should be embedded into rock socket.
Landslides

Realignment of 600’ Roadway
Cost Estimate= $75,000
Landslides
Rock Fall Mitigation

Cost

263,750 c.y.
$17.83/ cubic yard

Total- $4.7 million
Rock Fall Mitigation
Rock Fall Mitigation
Rockfall Mitigation
Rockfall Mitigation
Rock Fall Mitigation
Rock Fall Mitigation
Tied Back Retaining Wall

Cost

8,650 sq. ft.@ $76/ sq. ft.

Total- $657,000
Gabion Wall

Cost of Baskets: $40-$60

Gabion Basket Dimensions

- 6’ X 3’ X 3’
- 9’ X 3’ X 3’
- 12’ X 3’ X 3’
- 6’ X 3’ X 18”

Cost in Place: $50/ c.y.
Granular Correction

Cost

Class II Ch. Lining-$17/ton

Geotextile Fabric Ty4
Type 4- $1.10/ s.y.
Granular Correction

-51,662 tons
Class II Ch. Lining- $17.63/ton

-49,392 tons
KY 2’s – $17.63

-10,435 s.y.
Geotextile Fabric Ty 4- $1.10/ s.y.

Total- $1.8 million
New Technology for Repairs

Geofoam

Typical Roadway Application

Expanded Polystyrene Blocks (Geofoam)
New Technology for Repairs

Geofoam
New Technology for Repairs
Geofoam
New Technology for Repairs

KYTC DEPARTMENT OF HIGHWAYS  
UNIT BID TAB SHEET FOR LETTING 02-04-05  
Call: 301  Contract ID: 05-1004 Sheet 2  
Date Run: February 07, 2005 02:07 pm

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New Technology for Repairs

Soil Nail Retaining Wall
New Technology for Repairs

Lightweight Fill Using Wood Chips
Kentucky Geohazards

- Low Cost Landslide Repairs
- Rockfall Mitigation
- Tied Back Retaining Wall
- Gabion Baskets
- Granular Correction
- New Technology
  - Lightweight Fill- Geofoam and Wood Chips
  - Soil Nail Retaining Wall
Mission Statement

"To provide a safe, secure, and reliable highway system that ensures the efficient mobility of people and goods, thereby enhancing both the quality of life and the economic vitality of the Commonwealth."