



MAN MADE GEOHAZARDS

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- ▣ **ABSTRACT:** Numerous slope/fill failures occur every year on our highways in Appalachia. Some of these failures are caused by manmade reasons. This presentation explores some of the manmade causes of slope/fill failures and excessive movement within highway embankments. Examples of slope/fill failures within highway embankments will be presented in the following photographs.

ROUTE 9 CHARLESTOWN, WV



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ROUTE 9 CHARLESTOWN, WV

- ▣ Conclusion: The on-site fill material was classified by project personnel as hard shale and placed in accordance with the specifications that govern durable rock fill. The on-site fill material actually consisted of soft sandy shale and should have been placed with the specifications that govern random (soil) fill.

ROUTE 14 MINERAL WELLS, WV



ROUTE 14 MINERAL WELLS, WV



ROUTE 14 MINERAL WELLS, WV



ROUTE 14 MINERAL WELLS, WV



ROUTE 14 MINERAL WELLS, WV

- ▣ Conclusion: Durable rock for select embankment was not available on-site. Project personnel opted to use the less durable on-site rock as select embankment. The softer rock used as select embankment broke down due to weathering and the weight of the fill and jeopardized the integrity of the fill toe. Additionally, many on-site springs in the existing slopes did not have proper drainage installed to divert the ground water away from the fill.

ROUTE 35 PUTNAM COUNTY, WV



ROUTE 35 PUTNAM COUNTY, WV



ROUTE 35 PUTNAM COUNTY, WV



ROUTE 35 PUTNAM COUNTY, WV

- ▣ Conclusion: The on-site fill material was classified by project personnel as rock and placed in accordance with the specifications that govern durable rock fill. The on-site fill material actually consisted of soft claystone and should have been placed with the specifications that govern random (soil) fill.

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- ▣ Who is liable and responsible for man made geohazards?
- ▣ Design?
- ▣ Construction/Inspection?
- ▣ Maintenance?

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▣ Design Excuses:

1. Budget. (Limited subsurface investigation, labwork, etc.)
2. Time constraints. (Need this project to bid Asap!)
3. Don't blame us, its construction's fault!

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- ▣ Construction/Inspection Excuses:
 1. Budget. (Insufficient Equipment, Work Force, etc.)
 2. Time Constraints. (Not taking the time to sufficiently compact and work the fill.)
 3. Don't blame us it is the Maintenance Division's fault.

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▣ Maintenance Excuses:

1. Budget. (Budget went to filling potholes, cannot afford to clean the debris in the drainage pipes.)
2. Time constraints. (Do not have the time to remove eroded material on cut benches, have potholes to fix.)
3. Don't blame us, it's the engineer's fault.

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- ▣ Considering all of the Excuses, what is the real reason we have man made geohazards?
 1. Money.
 2. Time.
 3. Lack of Experience or Expertise in Geotechnical work.

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- ▣ Conclusion: Most man made geohazards are preventable and are often attributed to something simple for those of us in the geotechnical field. In the WVDOH, we are trying to eliminate the excuses by passing on our:
 - ▣ EDUCATION/TRAINING
 - ▣ EXPERIENCE
 - ▣ Some good old fashioned mentoring will go a long way in preventing man made geohazards.

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- ▣ Additionally, Geotechnical work is a team effort. We need to have good communication and cooperation from the design phase to the opening of the road.

QUESTIONS or COMMENTS?

