




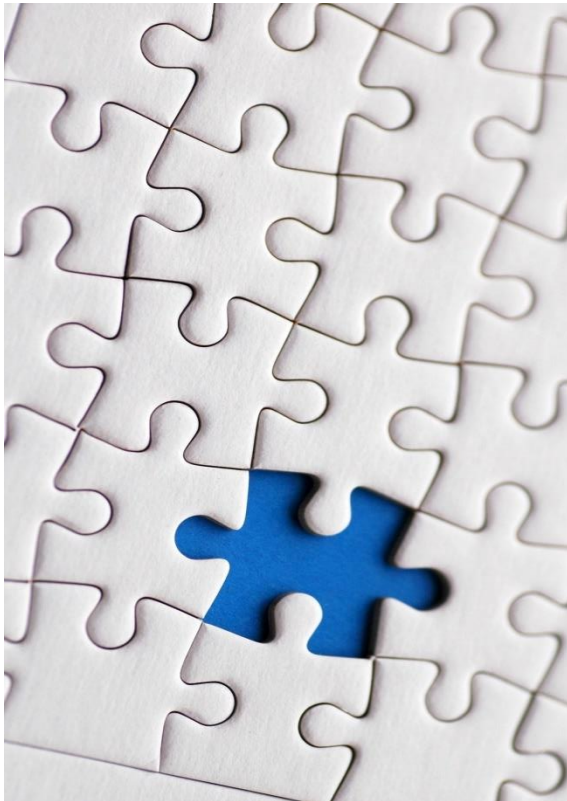
# **Visioning a Statewide Geotechnical Asset Management Program at PennDOT**

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All instabilities affecting our roadways are equal, but some instabilities are more equal than others.

**FHWA requires:** Bridges, Pavements



**Other/undermanaged:** retaining walls, roadway signs, traffic signals, guiderail, end treatments, ITS systems, fences, pavement markings, curb ramps, barriers, sound walls, **geotechnical assets...**

NCHRP Research Report 903 Pre-Publication Draft—  
Subject to Revision

Geotechnical Asset Management for  
Transportation Agencies  
Volume 1: Research Overview

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**NCHRP Research  
Report 903:**  
Geotechnical Asset  
Management for  
Transportation Agencies -  
Research Overview &  
Implementation Manual  
Pre-Publication Draft, September 2018

# Geotechnical Assets

## **ASSETS**

Slopes

Embankments

Subgrade

Inclusions

Instrumentation

Data

Knowledge

## **FAILURES**

Landslides

Rockfalls

Sinkholes

Erosion & Scour

Subsidence & Settlement

## **RISKS**

Safety

Service

\$-Cost

Confidence

# ▶ Phased Development of GAMP

## **PHASE-1 - Info Gathering**

- Survey DGE
- Asset Locations and Types
- Simple Assessment, **A-B-C**

## **PHASE-2 - Core Maturity**

- GIS Mapping
- Quantitative Risk Rating System

## **PHASE-3 - Advanced Maturity**

- Risk Rating + Benefit-Cost Prioritization
- Rater Training

## **PHASE-4 - Sustaining**

- Routine Site Inspections + Updates
- System Enhancements

## **GAM Survey** of all District Geotechnical Engineers completed June 2019.

- Differences: personnel, geology, assets, rating method
- Scale of statewide slope issues:
  - Actively unstable... **100's**
  - Marginally stable, less than resilient... **1,000's**
  - Possibly vulnerable... **10,000's**

## Personnel

- **Leadership support**
- **A Champion**
- **Multidisciplinary teams**, not “organizational silos”
- **Asset Rater instructions**, training, and oversight.
- **Uniform results** from different raters.



# Communication

- **Visualization tools** like GIS Mapping, dashboards.
- **Communication strategies** for ongoing results.

## ▶ Time / Dynamics

- Will likely take more **time** than anticipated (VT TAMP, 52-mo.)
- **Re-assessment** of inventory & risks at the right frequency... monthly, quarterly, annually.
- **Life-cycle planning** for geotechnical assets is not a mature practice.

# Data

- **Data is a valuable asset.** Plan data collection, maintenance, and governance before data collection efforts begin. 20% of data used 80% of the time.
- Preserves **historical** asset data.

# Analysis

- **Robust**, understandable, implementable, refine-able
- **Risk matrix/algorithm** applies to **each asset type** and into the DOT's performance process
- Generate **benefit-cost** scenarios
- Consider **resiliency**
- **Subjective assumptions** or lack of data undermines the quality of a multi-objective decision analysis (MODA)
- **Investment scenarios.** Demonstrate the long-term consequences by under-investment and failing to keep assets in a state of good repair (SOGR). Illustrate which trade-offs reduce the greatest risks
- **New commercial programs/software** vs. "home-grown" tools