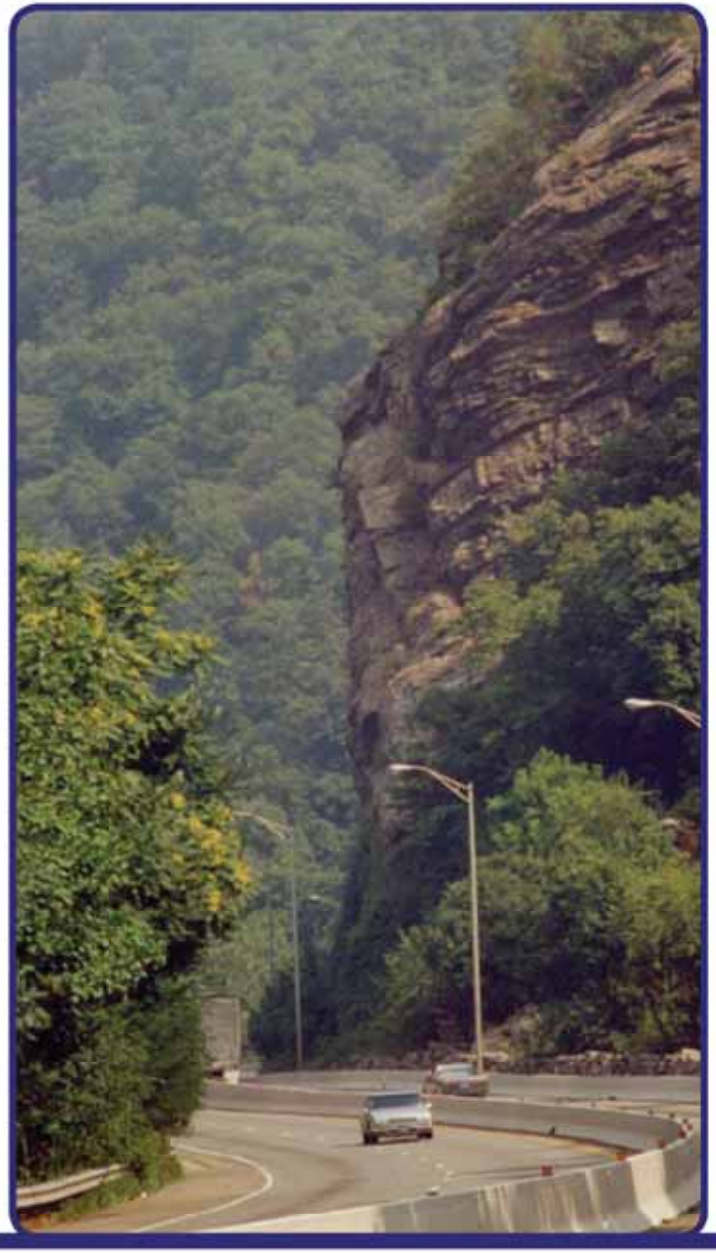
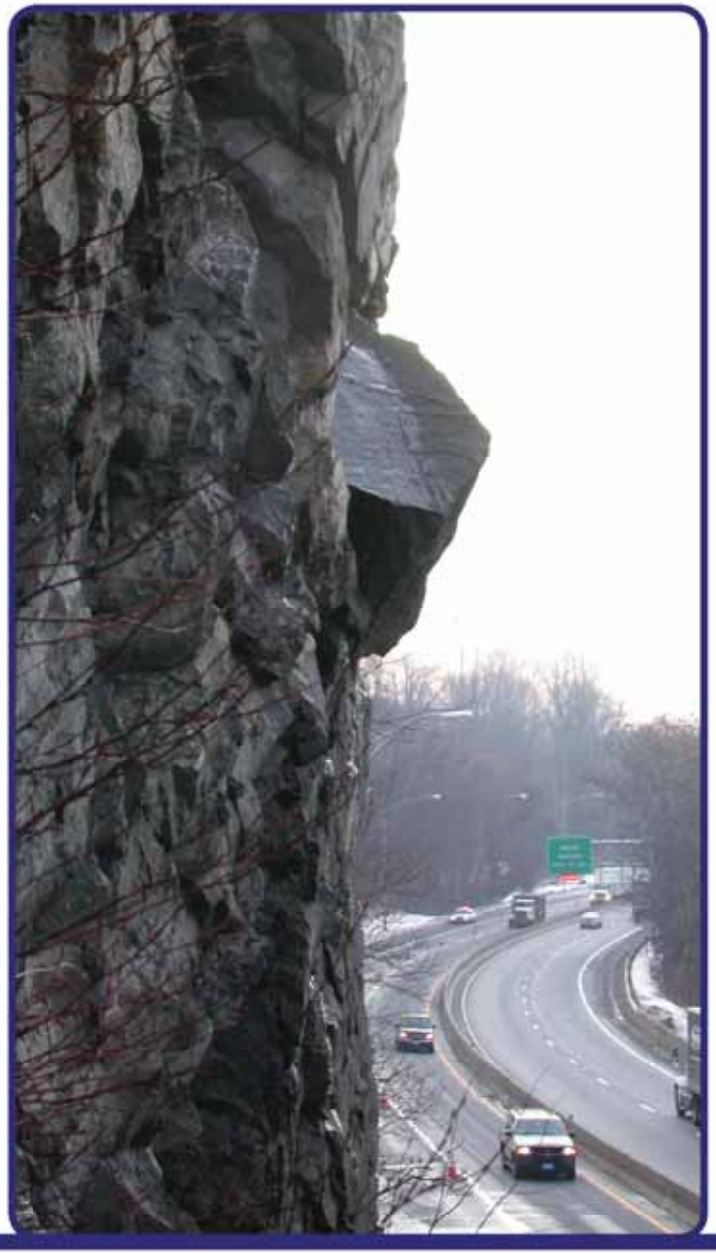
NEW JERSEY DEPARTMENT OF TRANSPORTATION

I-80 ROCKFALL MITIGATION

PROJECT PURPOSE

The purpose of the I-80 Rockfall Mitigation Project (Milepost 1.04 to 1.45) is to increase safety and improve the mobility of the traveling public by preventing rockfall incidents.





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I-80 ROCKFALL MITIGATION

ROCKFALL IS A NATIONAL CONCERN

- Average of 25-50 people are killed by landslides (rockfalls, debris flows, etc.) each year in US (Source: USGS data)
- In 1990, each state spent an average cost of $68.5M annually for landslide repairs on state highways (Source: Transportation Research Record 1393)
- The same costs today would exceed $131M per state annually

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I-80 ROCKFALL MITIGATION

ROCKFALL HAZARDS IN NEW JERSEY

Other projects in New Jersey include:

- 19 Constructed Projects
- 11 Projects in the Works

State Route 29, M.P. 28

State Route 29, M.P. 27.9

State Route 29

I-78

State Route 15

I-80, +/- M.P. 12

State Route 22

I-280, Garden State Parkway ramp

State Route 29

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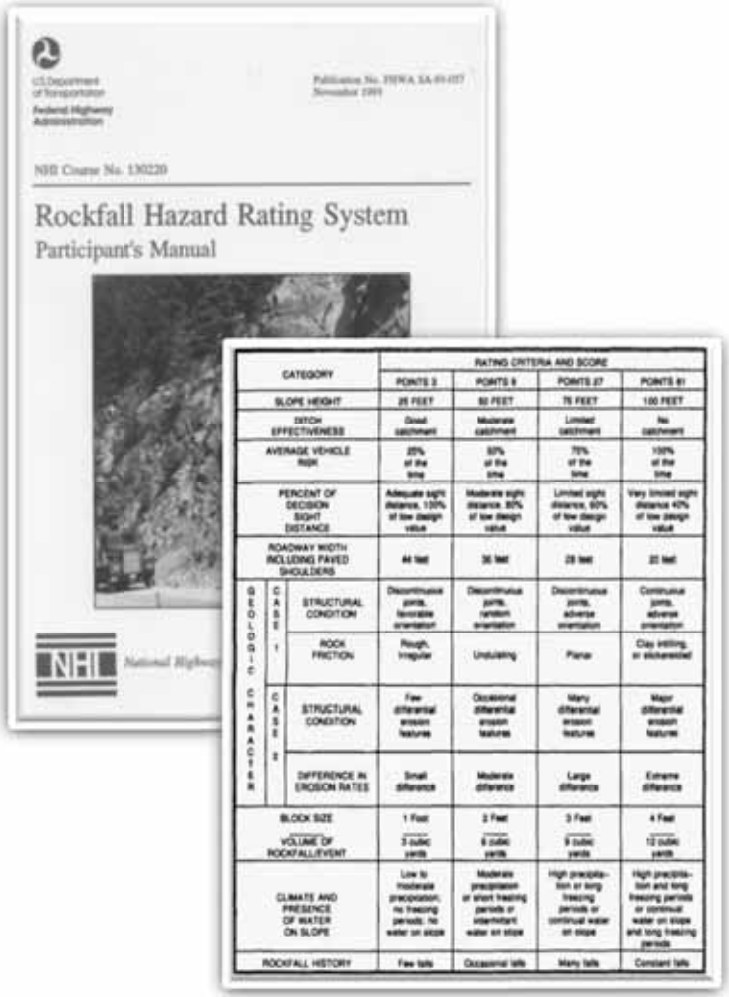
I-80 ROCKFALL MITIGATION

ROCKFALL HAZARD RATING

- Based on federal guidelines developed & adopted in US between 1988 – 1993
- FHWA Rockfall Hazard Rating System (RHRS)
- PROACTIVE approach
- Addresses rockfall potential of reaching highway
- Provides a legally defensible, standardized way to differentiate apparent risks at rockfall sites
- Customizable to each state's unique features & characteristics
- Event history is not a major factor in determining a slope's preliminary rating



U.S. Department of Transportation
Federal Highway Administration

NHI Course No. 130220

Rockfall Hazard Rating System
Participant's Manual

CATEGORY			RATING CRITERIA AND SCORE			
			POINTS 3	POINTS 9	POINTS 27	POINTS 81
SLOPE HEIGHT			25 FEET	50 FEET	75 FEET	100 FEET
DITCH EFFECTIVENESS			Good catchment	Moderate catchment	Limited catchment	No catchment
AVERAGE VEHICLE RISK			25% of the time	50% of the time	75% of the time	100% of the time
PERCENT OF DECISION SIGHT DISTANCE			Adequate sight distance, 100% of low design value	Moderate sight distance, 80% of low design value	Limited sight distance, 60% of low design value	Very limited sight distance 40% of low design value
ROADWAY WIDTH INCLUDING PAVED SHOULDERS			44 feet	36 feet	28 feet	22 feet
GEOLOGIC CHARACTER	CASE 1	STRUCTURAL CONDITION	Discontinuous joints, favorable orientation	Discontinuous joints, random orientation	Discontinuous joints, adverse orientation	Continuous joints, adverse orientation
		ROCK FRICTION	Rough, irregular	Undulating	Planar	Clay infilling, or slickensided
	CASE 2	STRUCTURAL CONDITION	Few differential erosion features	Occasional differential erosion features	Many differential erosion features	Major differential erosion features
		DIFFERENCE IN EROSION RATES	Small difference	Moderate difference	Large difference	Extreme difference
BLOCK SIZE / VOLUME OF ROCKFALL/EVENT			1 Foot / 3 cubic yards	2 Feet / 6 cubic yards	3 Feet / 9 cubic yards	4 Feet / 12 cubic yards
CLIMATE AND PRESENCE OF WATER ON SLOPE			Low to moderate precipitation; no freezing periods; no water on slope	Moderate precipitation or short freezing periods or intermittent water on slope	High precipitation or long freezing periods or continual water on slope	High precipitation and long freezing periods or continual water on slope and long freezing periods
ROCKFALL HISTORY			Few falls	Occasional falls	Many falls	Constant falls

- NJDOT maintains a Rockfall Hazard Management System
- Utilizes FHWA Rockfall Hazard Rating System
- Inventories 440+ rock slopes adjacent to NJ interstates & highways
- Preliminary and detailed ratings group slopes by addressing the likelihood of rockfall reaching the roadway surface
- Design approach hierarchy:
  - Remove
  - Stabilize
  - Protect

ROCKFALL HAZARD LOCATION IN THE STATE

Based on a system developed by the Federal Highway Administration

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ROCKFALL INCIDENTS

NEW JERSEY DEPARTMENT OF TRANSPORTATION
I-80 ROCKFALL MITIGATION

Dunnfield Creek Natural Area

Hardwick Township
Warren County

Knowlton Township
Warren County

Delaware Water Gap National Park Service

Approximate Project Area

Worthington State Forest

AREA A

AREA B

AREA C

AREA D

TRANSITION ZONE

TRANSITION ZONE

Tammany Red Dot Trail Entrance

New Jersey

Pennsylvania

Point of Gap Overlook

Delaware Water Gap Borough
Monroe County

Upper Mt. Bethel Township
Northampton County

0 40 80 160
Feet

Area A		
Date	Type of Event	Crash (Y/N)
May 2002	Rock Debris	Y (2 Crashes)
July 2004	Rock Debris	Y
August 2004	Rock Debris	Y (2 Crashes)
December 2004	Rock Debris	N
October 2005	Flooding	N
March 2007	Rock Debris	Y
March 2007	Rock Debris	Y
October 2010	Rock Debris	Y
September 2011	Flooding	N
August 2013	Tree Down	N
December 2013	Icing	N
January 2014	Flooding	N
March 2015	Icing	N
April 2015	Tree Down	N
September 2016	Tree Down	N
July 2017	Tree Down	N
January 2018	Icing	N
February 2018	Flooding	N

Area B		
Date	Type of Event	Crash (Y/N)
October 2010	Rock Debris	Y
May 2015	Rock Debris	N
September 2015	Rock Debris	Y
February 2018	Icing	N

Area C		
Date	Type of Event	Crash (Y/N)
April 2007	Rock Debris	Y (2 Crashes)
August 2017	Rock Debris	N

Area D		
Date	Type of Event	Crash (Y/N)
September 2001	Rock Debris	Y
October 2010	Rock Debris	Y
January 2016	Rock Debris	N
December 2013	Icing	N
October 2017	Tree Down	N

LEGEND
- Project Area
- NJDOT Mileposts
- ROW Lines
- State/Municipal Boundary

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