The volume of material that broke away from the source area was estimated to be between 1300 and 1500 cubic yards which fell approximately 1300 feet along an average 35 degree slope before impacting the highway.
Source Location

January 21, 2003

November 25, 2004
Rock mass broke into several smaller pieces ... sort of
# Energy of Falling Rocks

## 15 ft Diameter

- **Energy:** 215,000 to 25,000 ft-ton  
  (40,000 to 54,000 kJ)
- **Velocity:** 60 to 90 ft/sec  
  40 to 60 mph
- **Bounce:** 5 to 20 ft

## 6 ft Diameter

- **Energy:** 500 to 950 ft-ton  
  (1,300 to 2,700 kJ)
- **Velocity:** 50 to 70 ft/sec  
  35 to 50 mph
- **Bounce:** 6 to 25 ft
I-70 alternative

As of Thursday evening, Interstate 70 was closed in both directions between Exit 116 in Glenwood Springs and Exit 140 in Gypsum. Highway officials hoped to have at least two lanes open by 6:00 a.m. this morning. The following detour is recommended:

**Detour route**

**Interstate 70 closure area**

**Rock slide area**

**Map area**

Colorado
Areas of Major Damage

- Major retaining wall damage
- Major road damage
- Slide perimeter

Rock slide area

GLENWOOD SPRINGS

10 miles
Reports of Road Damage
Repairing the retaining walls

Two sections of the retaining wall beneath the westbound lanes must be replaced. One is 30 feet long and 22 feet tall, the other is 20 feet long and 23 feet tall. The retaining wall is made up of double-T-shaped panels that support the highway and serve as a retaining wall.

Repairing the bridge

1. Remove metal pan beneath bridge
2. Determine extent of damage
3. Remove asphalt around work area
4. Cut concrete to depth of 2.5 inches, avoiding rebar
5. Jackhammer and remove remaining concrete
6. Straighten, repair or replace rebar
7. Replace or repair pan (not shown)
8. Pour concrete to original level (not shown)
9. Apply asphalt (not shown)
Concrete Deck Repair
Retaining Wall Repair

TYPICAL SECTION

MOMENT SLAB SECTION

Sheet Revision

MSE Wall Typical Cross Section

Glenwood Canyon
Wall Repair

December 3, 2004

Yeh and Associates, Inc.
Consulting Geotechnical Engineers

2500 E. Evans Ave.
Denver, CO 80222
Phone: (303)781-9520
Fax: (303)781-9583

Resource Center
Truncated MSE Wall Repair
Retaining Wall Repair
Paving ..... in January
Finally Finished
Rockfall & Repair Timeline

Rockfall occurred November 25
CDOT selected contractor November 30
60-day contract for repairs, $681,775
Incentives/disincentives for early finish
Repairs began December 1
Repairs completed January 26
Contractor received $30,000 in incentives
Total cost of repair: $1.2M
QUESTIONS?

GeoHazards Conference
Charleston, West Virginia
August 3, 2005

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FHWA-RC