Teton Pass
Big Fill Repair
Jackson Hole, WY

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AERO AGGREGATES

HIGHLY FRICTIONAL · NON-LEACHING · ROT-RESISTANT · NON-FLAMMABLE · DURABLE · SAFE

made in the USA from recycled container glass



UL-FGA®



Ultra-Lightweight
(240 kg/m³ [15.0 pcf])

Frost Resistant

Capillary Break

Good Insulator

Free-Draining

High Friction Angle (54°)

Load-Bearing

Seismic Designs



made from **100% RECYCLED** container glass



Alternative Backfills for Highway Applications: State of the Practice

PUBLICATION NO. FHWA-HRT-23-110

JANUARY 2024



Chapter 4: FGA

Approvals

- Approved and used by 26 State DOTs
- Approved FHWA and Federal Lands
- Port Authorities – NJ/NY, Philadelphia, San Francisco
- FAA – Taxiways, Runways and Aprons

Quality Control Program

- In-house QC program
  - 4 tests per day
  - Every 200 CY is tested
- Third-party testing
- Field Testing





Quality Control Program – Test Report



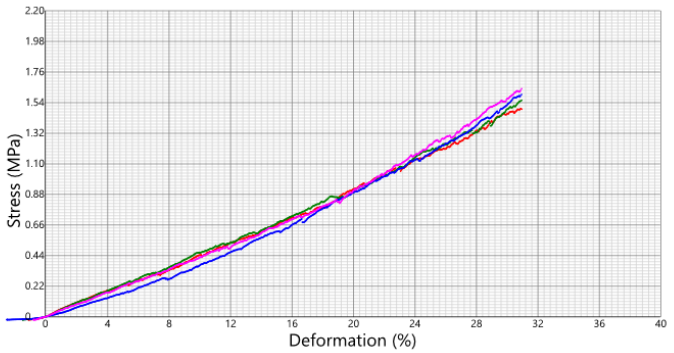
- Density - Dry, bulk density < 15 pcf
- Compression - Stress @ 20% Deformation > 15,000 psf

AERO AGGREGATES

AeroAggregates, LLC
1500 Chester Pike, Eddystone, PA 19022
Phone: 610-447-8900
www.aeroaggregates.com

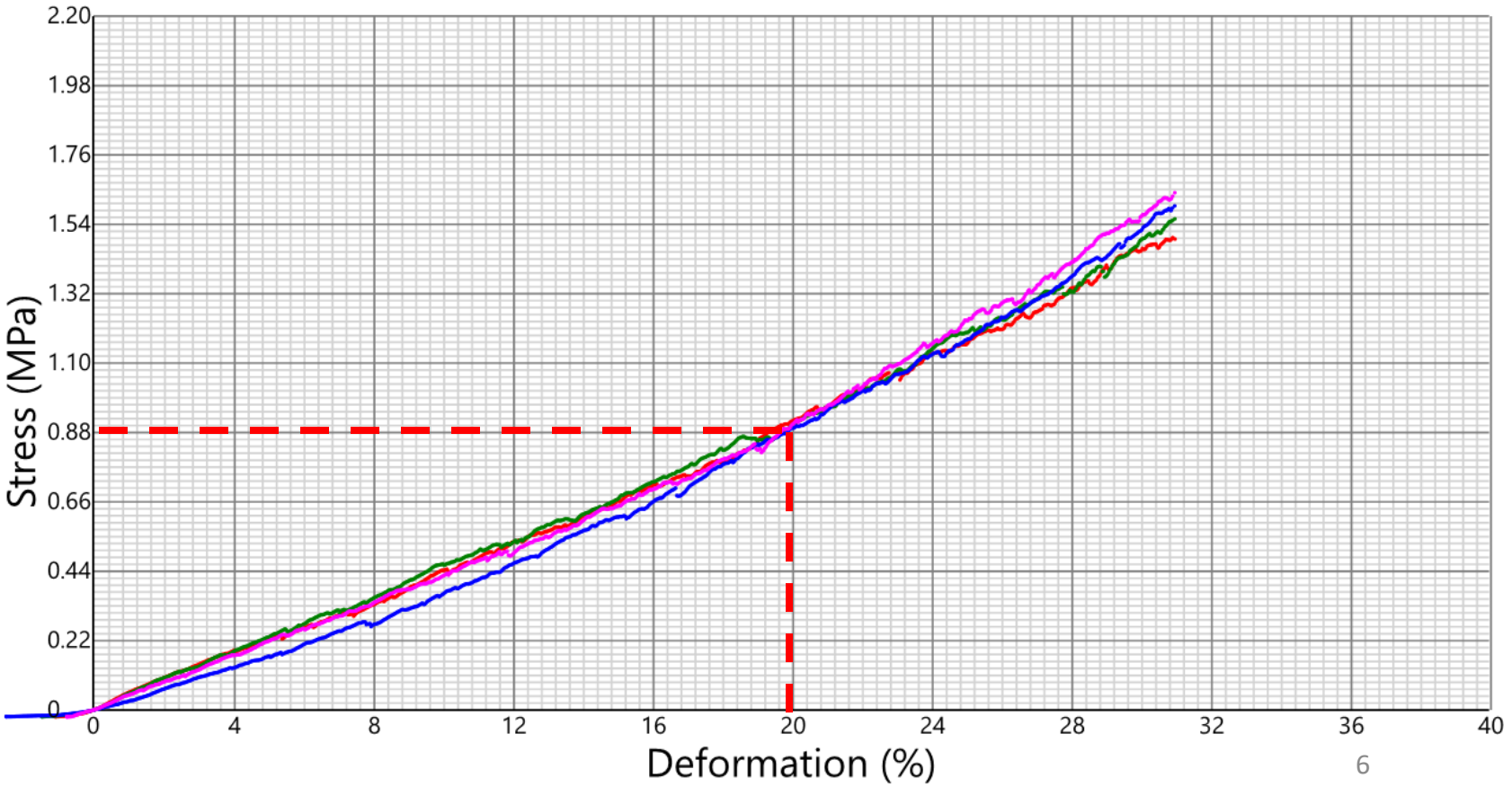
Product Name:	G15	Lot Number:	20170620
QC Tech:	MM	Shift ID:	0
Method Name:	MQC	Kiln ID:	01
Plate Diameter (mm):	298.5 mm		

Specimen ID	Date/Time of Manufacture	Date/Time Tested	Bulk Density kg/m3	Stress @ 10% MPa	Stress @ 15% MPa	Stress @ 20% MPa	Stress @ 25% MPa
1	20170620 10:00	6/22/2017 4:12 PM	214.31	0.4430	0.8621	0.9161	1.1688
2	20170620 10:00	6/22/2017 4:18 PM	214.31	0.4630	0.8671	0.9000	1.1975
3	20170620 17:40	6/22/2017 4:38 PM	213.52	0.3667	0.6124	0.8941	1.1736
4	20170620 17:40	6/22/2017 4:43 PM	213.52	0.4251	0.8483	0.9032	1.2353
Average			213.92			0.9033	



Notes:

MQC Manager: _____

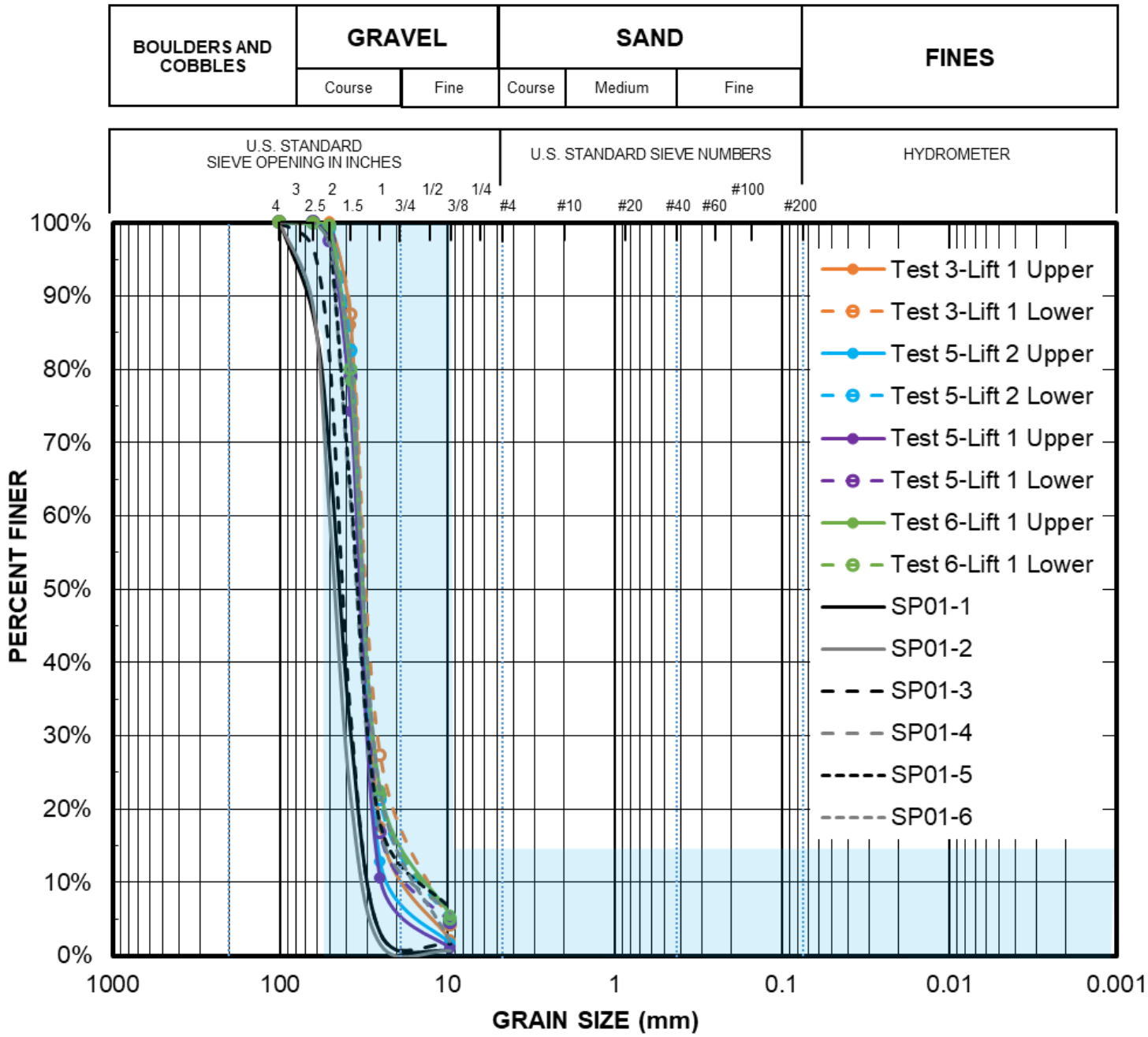


PennDOT Compaction Verification

Has post-installation, post-compaction gradations been performed to compare against source gradations?

TABLE A

Sieve Size	Total Percent Passing
4”	100
2 ½”	85-100
3/8”	0-15

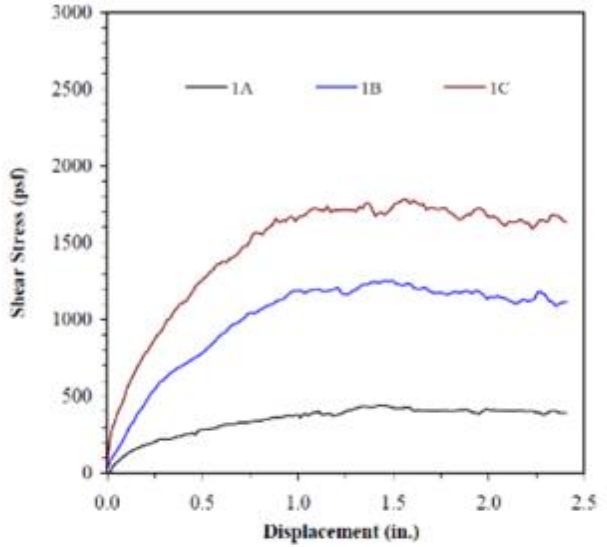


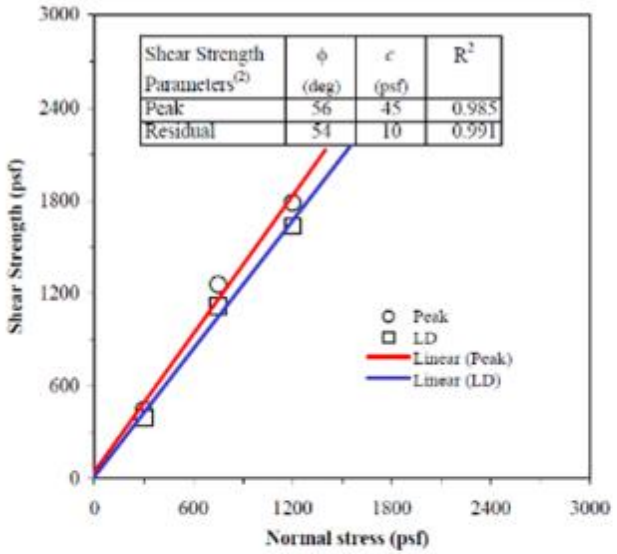
FGA Friction Angle

DREXEL UNIVERSITY - CIVIL, ARCHITECTURAL AND ENVIRONMENTAL ENGINEERING

DIRECT SHEAR TESTING (ASTM D 3080 MODIFIED)

Test Series No. 1: Lightweight aggregate (LWA-FG) lightly compacted under dry conditions





Test No.	Shear Box Size (in. x in.)	Normal Stress (psf)	Shear Rate (in./min)	Soaking (psf)	Soaking (hour)	Consolidation Step 1 (psf)	Step 1 (hour)	Step 2 (psf)	Step 2 (hour)	Step 3 (psf)	Step 3 (hour)	Soil Compaction γ_m (pcf)	ω_i (%)	ω_f (%)	Shear Strength τ_p (psf)	τ_R (psf)	Failure Mode
1A	12 x 12	300	0.04	-	-	-	-	-	-	-	-	15.3			444	392	(1)
1B	12 x 12	750	0.04	-	-	-	-	-	-	-	-				1255	1116	(1)
1C	12 x 12	1200	0.04	-	-	-	-	-	-	-	-				1784	1634	(1)

NOTES:

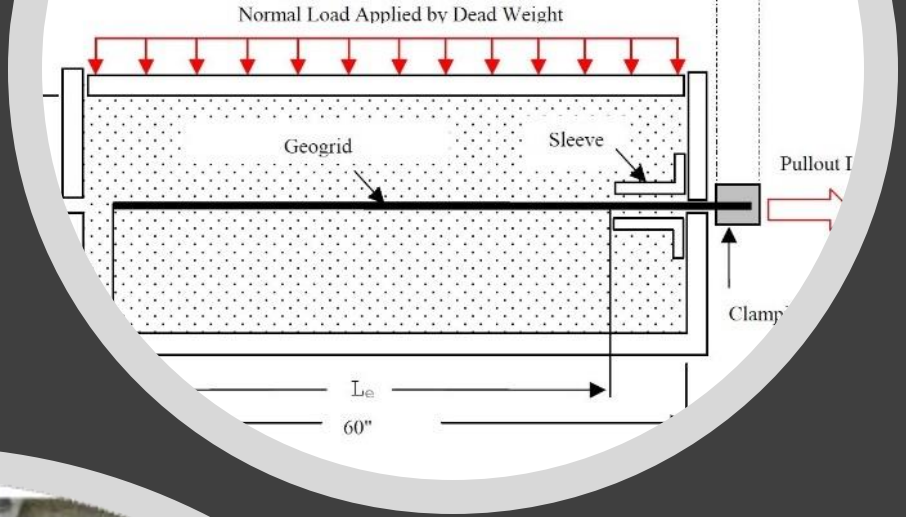
(1) Shear failure was forced to occur internally through the soil specimen at the predetermined plane between the upper and lower shear box during each test.

(2) The reported total-stress parameters of friction angle and cohesion were determined from a best-fit line drawn through the test data. Caution should be exercised in using these strength parameters for applications involving normal stresses outside the range of the stresses covered by the test series. The residual shear strength was calculated using the shear force measured at the end of the test.

SGI TESTING SERVICES, LLC

DATE REPORTED:	4/28/2016
FIGURE NO.	C-1
PROJECT NO.	SGI16023
DOCUMENT NO.	
FILE NO.	







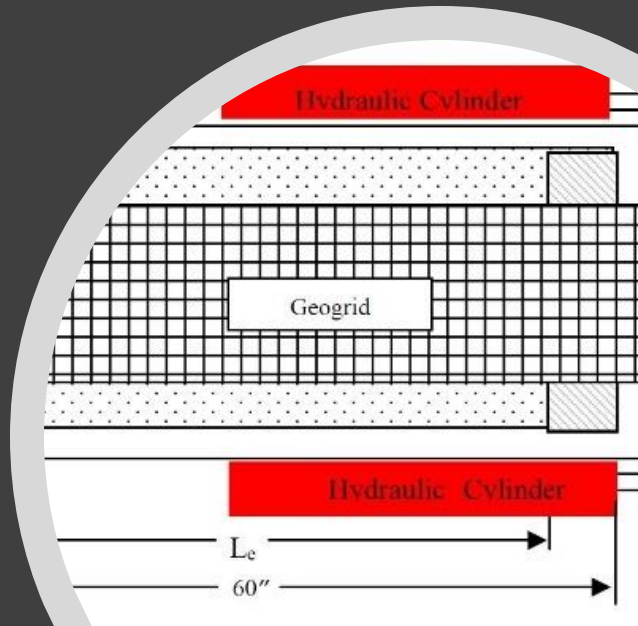


Steel & Poly Straps

PET & HDPE Geogrids

Pullout Testing of Geogrids and Straps for MSE





Images courtesy of SGI Lab, Atlanta, GA



NJ DOT I-80



NH DOT Route 4 Durham, NH



VA DOT I-95



DC DOT Frederick Douglass Bridge



NYNJ Port Authority GW Bridge



NJDOT Route 7 Wittpenn Bridge

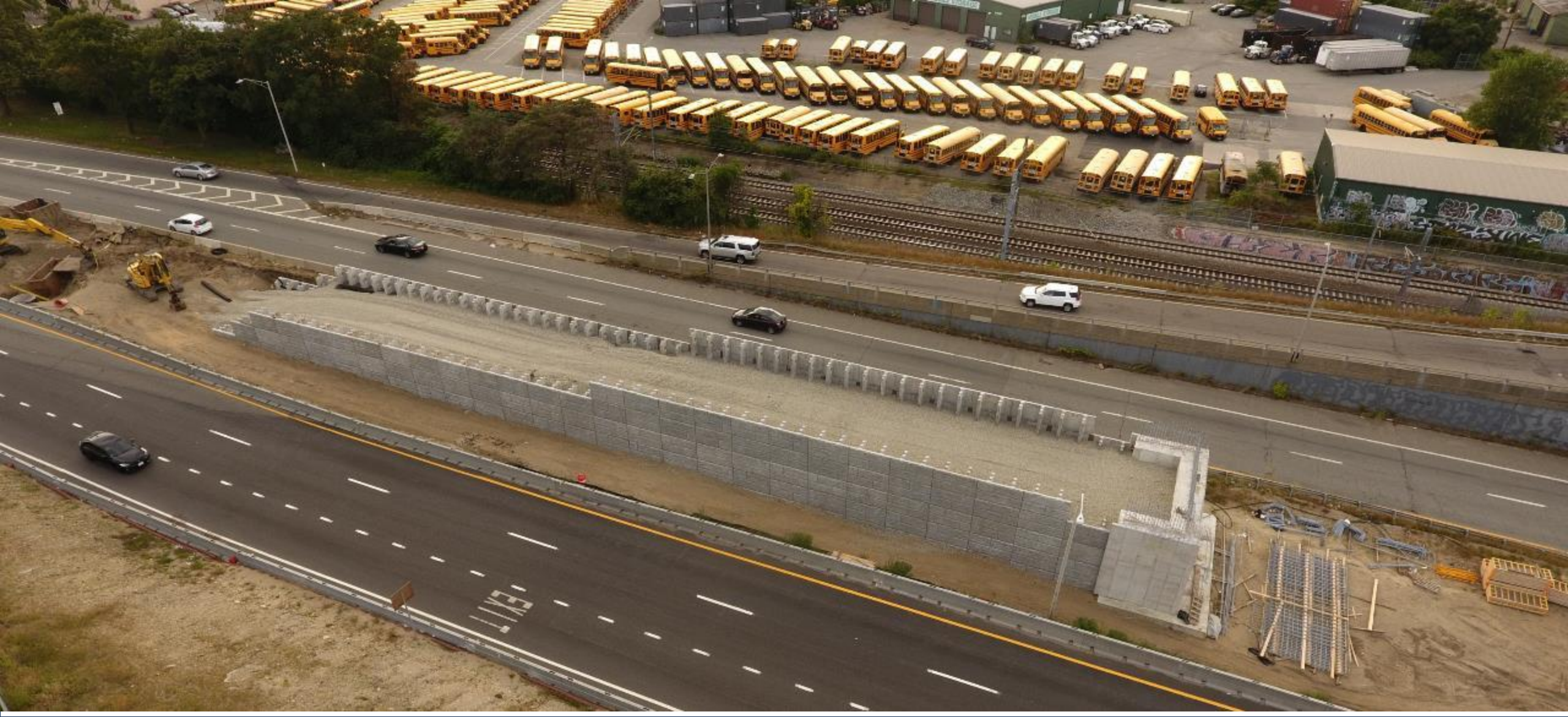


RIDOT 6/10 Providence



Logan Airport

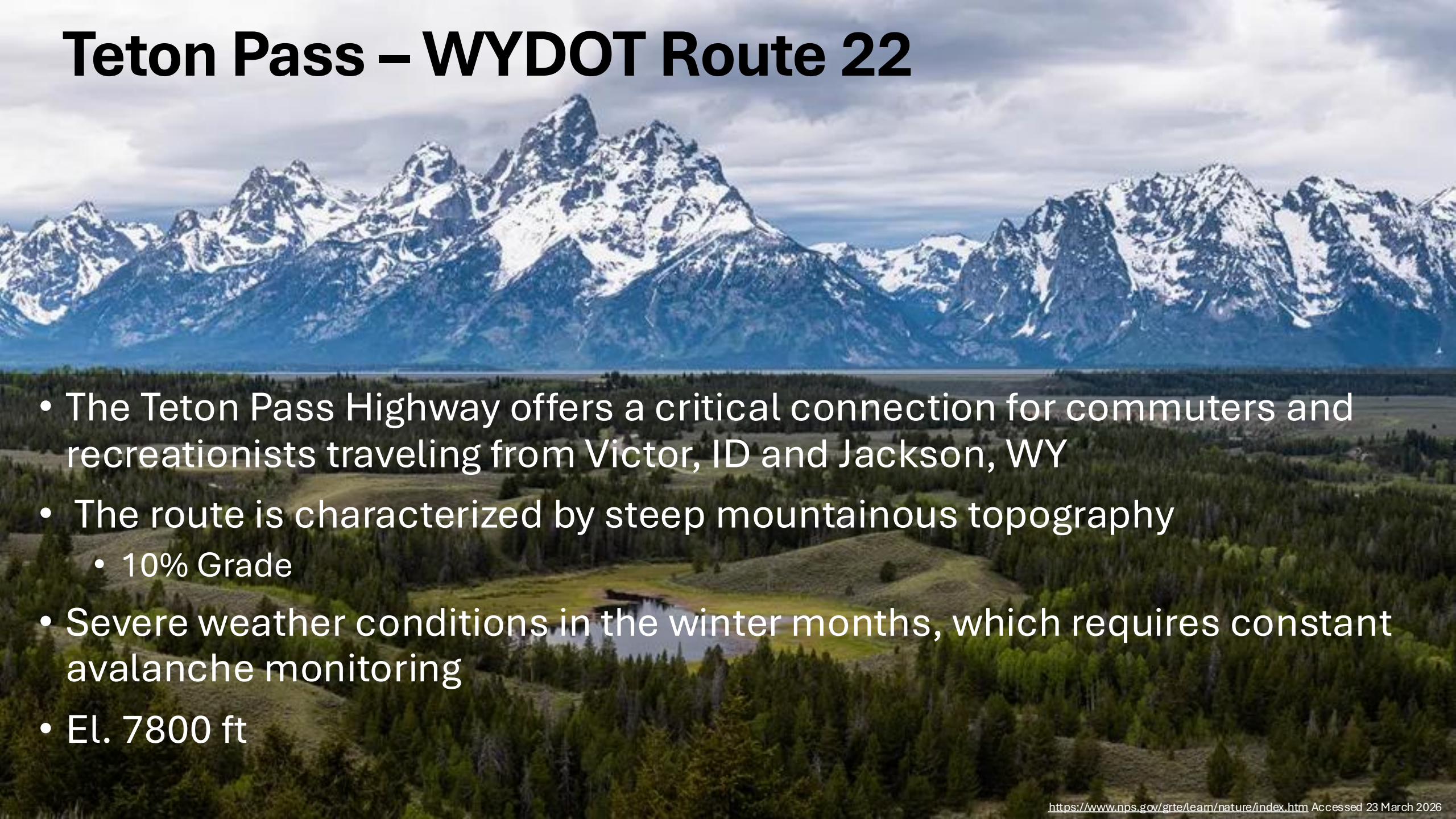
Boston, MA



Route 6/10 Interchange Reconstruction

Providence, RI

Teton Pass – WYDOT Route 22



- The Teton Pass Highway offers a critical connection for commuters and recreationists traveling from Victor, ID and Jackson, WY
- The route is characterized by steep mountainous topography
  - 10% Grade
- Severe weather conditions in the winter months, which requires constant avalanche monitoring
- El. 7800 ft

https://www.nps.gov/grte/learn/nature/index.htm Accessed 23 March 2026


CANADA
UNITED STATES
MEXICO
PACIFIC OCEAN
ATLANTIC OCEAN
Gulf of Mexico
WASHINGTON
OREGON
CALIFORNIA
NEVADA
IDAHO
MONTANA
WYOMING
UTAH
ARIZONA
COLORADO
NEW MEXICO
NORTH DAKOTA
SOUTH DAKOTA
NEBRASKA
KANSAS
OKLAHOMA
TEXAS
MINNESOTA
IOWA
MISSOURI
ARKANSAS
LOUISIANA
WISCONSIN
ILLINOIS
MICHIGAN
INDIANA
OHIO
KENTUCKY
TENNESSEE
MISSISSIPPI
ALABAMA
GEORGIA
FLORIDA
SOUTH CAROLINA
NORTH CAROLINA
VIRGINIA
WEST VIRGINIA
PENNSYLVANIA
NEW YORK
MAINE
VERMONT
NEW HAMPSHIRE
MASSACHUSETTS
RHODE ISLAND
CONNECTICUT
NEW JERSEY
DELAWARE
MARYLAND
Seattle
Olympia
Portland
Salem
Boise
Helena
Bismarck
Pierre
Minneapolis
St. Paul
Madison
Milwaukee
Chicago
Lansing
Detroit
Cleveland
Des Moines
Lincoln
Cheyenne
Denver
Salt Lake City
Carson City
Sacramento
San Francisco
Las Vegas
Los Angeles
San Diego
Phoenix
Albuquerque
Santa Fe
Topeka
Springfield
Jefferson City
St. Louis
Indianapolis
Columbus
Frankfort
Lexington
Nashville
Memphis
Little Rock
Oklahoma City
Dallas
Austin
San Antonio
Houston
Jackson
Montgomery
Atlanta
Baton Rouge
New Orleans
Tallahassee
Jacksonville
Orlando
Miami
Charleston
Richmond
Washington, D.C.
Annapolis
Dover
Harrisburg
Trenton
New York City
Hartford
Providence
Albany
Boston
Concord
Montpelier
Augusta
Columbia
Raleigh
Tropic of Cancer
CUBA
HAWAII
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RUSSIA
BERING SEA
0 100 mi
0 160 km
0 400 mi
0 600 km
0 200 400 mi

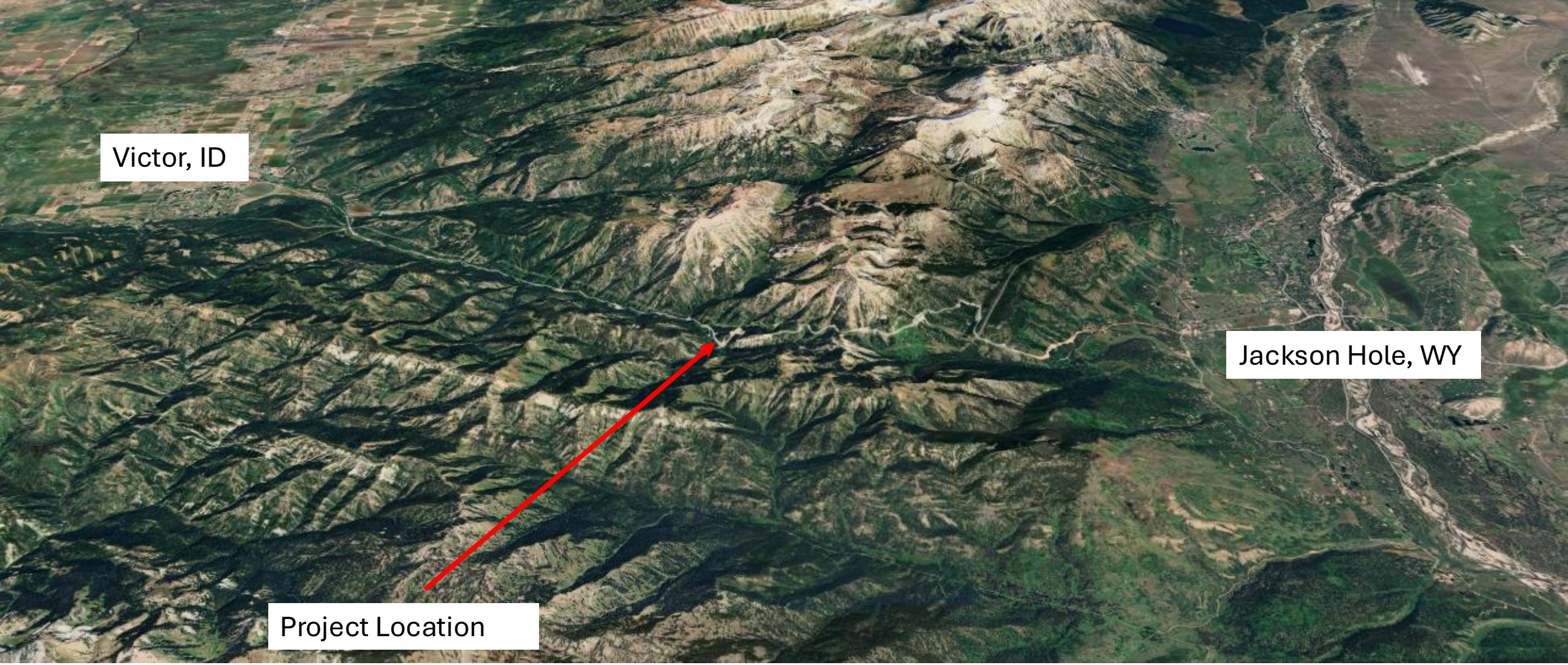


Photo Courtesy of WYDOT

The Teton Pass Highway offers a critical connection for commuters and recreationists traveling from Victor, Idaho and Jackson, Wyoming

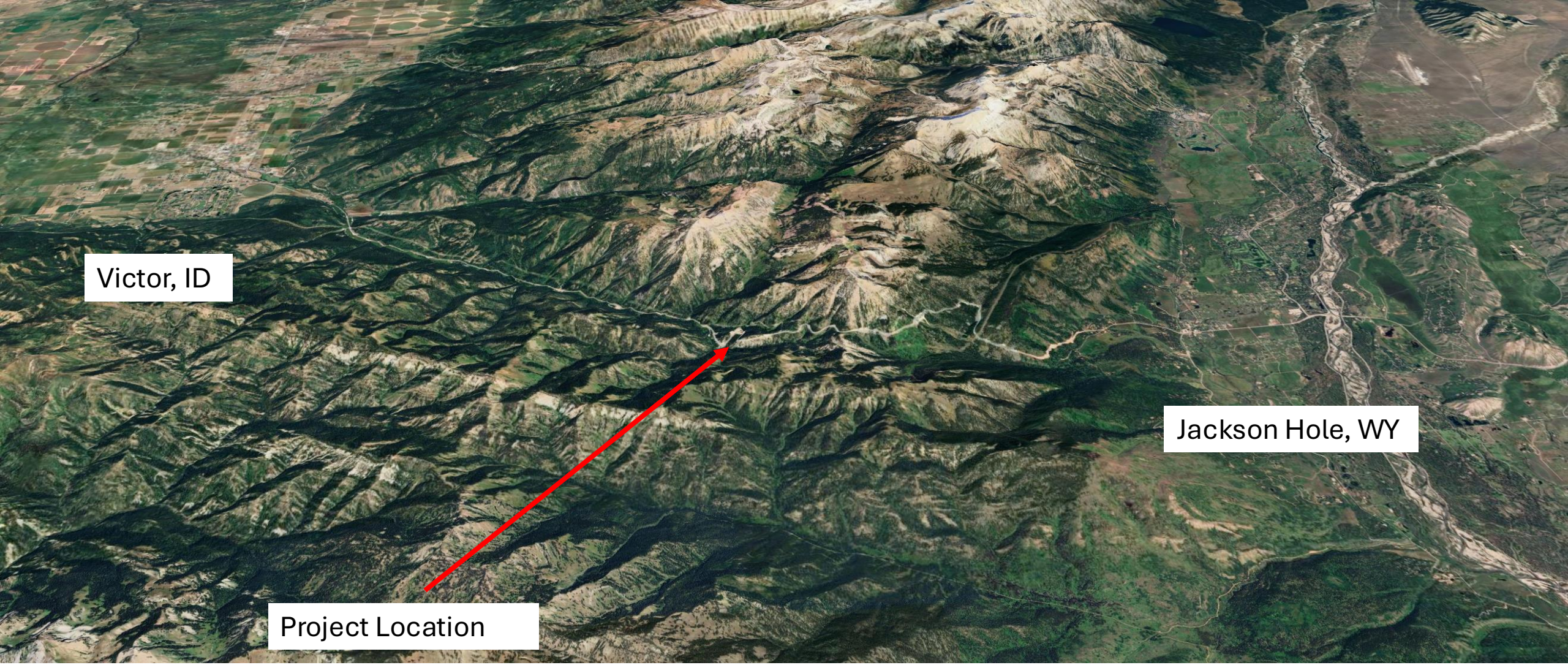


Photo Courtesy of WYDOT

Teton Pass “The Big Fill”

The permanent roadway was built in 1969

“The Big Fill” due to the amount of imported fill required

- https://youtu.be/2HF44RBFOqU



Photo Courtesy of WYDOT



Photo Courtesy of WYDOT

Catastrophic Failure of “Big Fill”

- June 8, 2024
- The Big Fill Slide took out a section of the Teton Pass at M.P. 12.8
- The slide occurred at elevation 7,656


Photo Courtesy of WYDOT


Photo Courtesy of WYDOT



Photo Courtesy of WYDOT


Photo Courtesy of WYDOT



Photo Courtesy of WYDOT

Permanent Repair Design details

- Soil nails to stabilize existing slope
- Micropiles used at the foundation
- Use of geosynthetic-reinforced 1.5H:1V slope
- Required lightweight fill due to soft soils below the embankment
- FGA provided drainage in addition to lightweight.

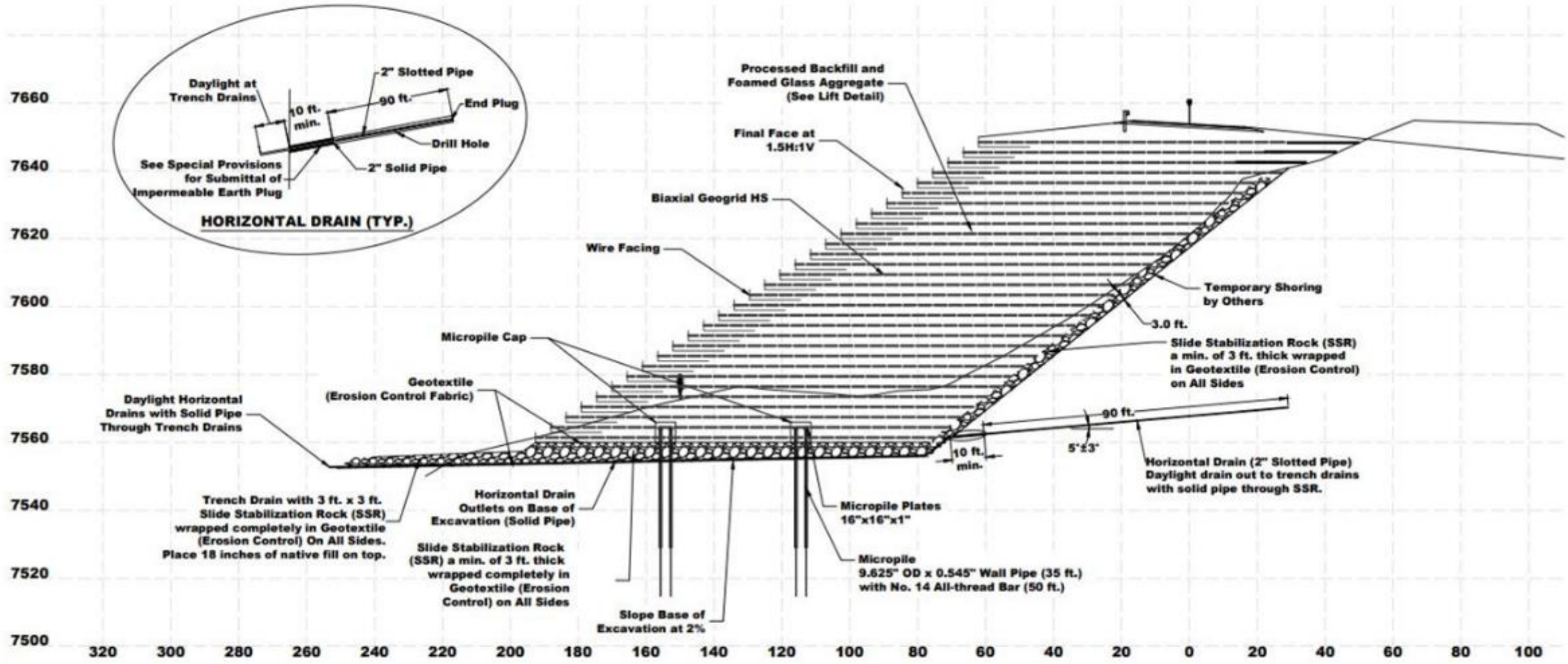




Photo Courtesy of WYDOT



Photo Courtesy of WYDOT



0 15 30

PLAN SCALE IN FEET

TYPICAL SECTION
LIGHTWEIGHT FILL


CANADA
UNITED STATES
MEXICO
PACIFIC OCEAN
ATLANTIC OCEAN
Gulf of Mexico
WASHINGTON
OREGON
CALIFORNIA
NEVADA
IDAHO
MONTANA
WYOMING
UTAH
ARIZONA
COLORADO
NEW MEXICO
NORTH DAKOTA
SOUTH DAKOTA
NEBRASKA
KANSAS
OKLAHOMA
TEXAS
MINNESOTA
IOWA
MISSOURI
ARKANSAS
LOUISIANA
WISCONSIN
ILLINOIS
MICHIGAN
INDIANA
OHIO
KENTUCKY
TENNESSEE
MISSISSIPPI
ALABAMA
GEORGIA
FLORIDA
SOUTH CAROLINA
NORTH CAROLINA
VIRGINIA
WEST VIRGINIA
PENNSYLVANIA
NEW YORK
MAINE
VERMONT
NEW HAMPSHIRE
MASSACHUSETTS
RHODE ISLAND
CONNECTICUT
NEW JERSEY
DELAWARE
MARYLAND
Seattle
Olympia
Portland
Salem
Boise
Helena
Bismarck
Pierre
Minneapolis
St. Paul
Madison
Milwaukee
Chicago
Lansing
Detroit
Cleveland
Des Moines
Lincoln
Cheyenne
Denver
Salt Lake City
Carson City
Sacramento
San Francisco
Las Vegas
Los Angeles
San Diego
Phoenix
Albuquerque
Santa Fe
Springfield
Indianapolis
Columbus
Topeka
Jefferson City
St. Louis
Frankfort
Lexington
Charleston
Richmond
Washington, D.C.
Annapolis
Harrisburg
Trenton
New York City
Hartford
Providence
Albany
Boston
Concord
Montpelier
Augusta
Nashville
Raleigh
Memphis
Columbia
Atlanta
Little Rock
Jackson
Montgomery
Dallas
Austin
Houston
San Antonio
Baton Rouge
New Orleans
Tallahassee
Jacksonville
Orlando
Miami
Oklahoma City
Tropic of Cancer
CUBA
HAWAII
Honolulu
ALASKA
Anchorage
Juneau
RUSSIA
CANADA
BERING SEA
0 100 mi
0 160 km
0 400 mi
0 600 km
0 200 400 mi



Photo Courtesy of WYDOT



Photo Courtesy of WYDOT



Photo Courtesy of WYDOT



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Photo Courtesy of WYDOT



Photo Courtesy of WYDOT

Teton Bypass Repair

- Total slope height 30m (~100 ft)
- Construction started Fall 2024
- MSE slope to be completed by end of May 2025
- Roadway re-opens June 2025
- ~$41 million total project cost


Photo Courtesy of WYDOT



Photo Courtesy of WYDOT


Photo Courtesy of WYDOT


Photo Courtesy of WYDOT

Pete Schexnayder, PM - Ames Construction

- “The foamed glass aggregate was the product of choice for the WYDOT ‘Big Fill Slide’ project on the Teton Pass”
- “The product not only allowed continuous placement.”
- “Was also less susceptible to weather conditions.”
- “Decreased the weight of mass exerting forces on the existing material below the embankment.”
- “And was ecologically friendly for the surrounding national forest.”

Project team included:

- Wyoming DOT
- RJ Engineering and Consulting
- AMES Construction
- Keller

- Over **50 million** -12oz. bottles diverted from landfill



Project Acknowledgements:

- Owner: WYDOT
- Engineer: RJ Engineering
- Contractor: Evans Construction (Detour Route)
- Ames Construction (Primary), Keller (Sub)



Photo Courtesy of WYDOT

THANK YOU!
Questions?

Rebuilding Resilience: Slope Stabilization with Foamed Glass Aggregate at Teton Pass, WY

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