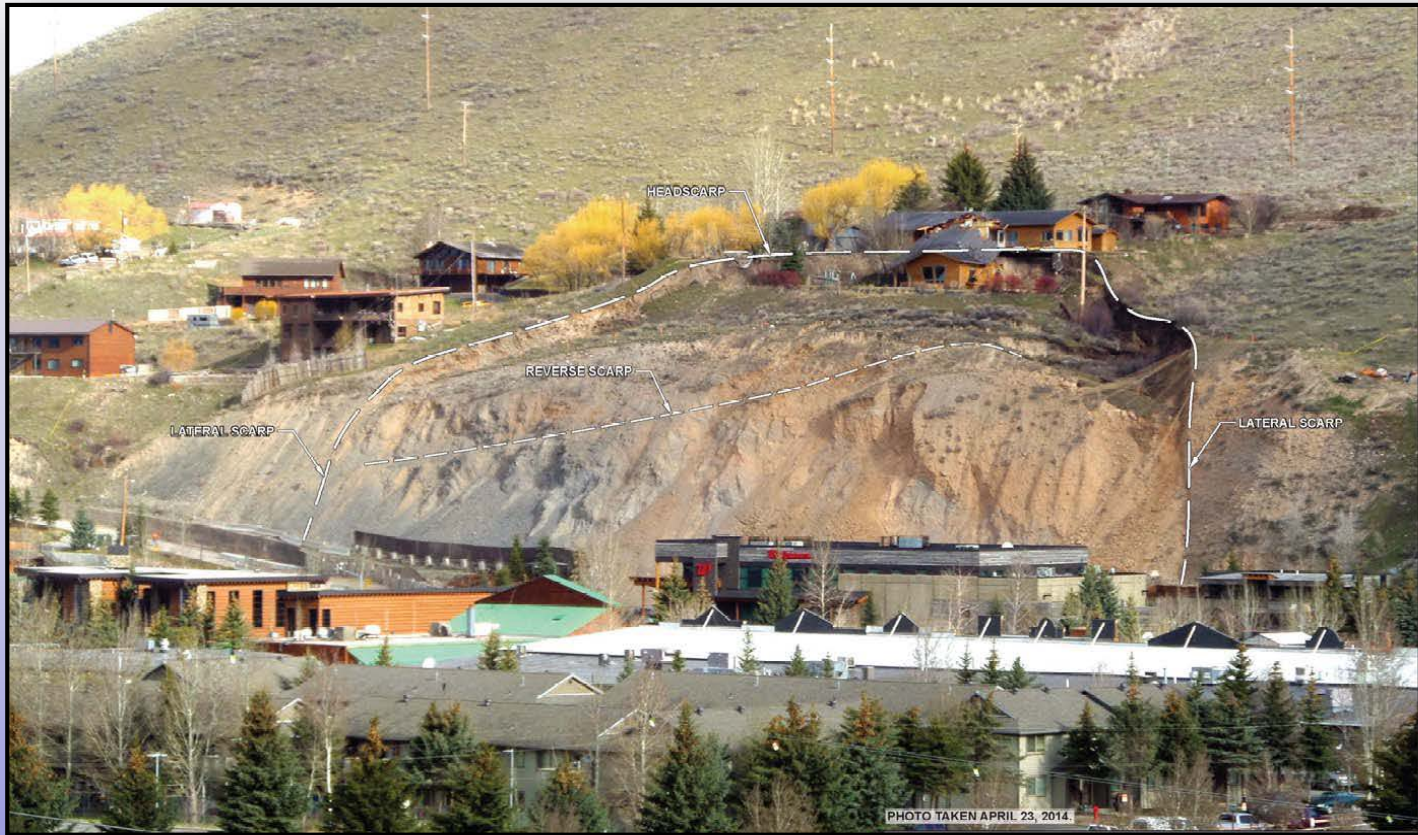


# Jackson Hole

## Landslide Presentation



# Town of Jackson Policy Objectives

- Protect Public Safety
- Protect Public Infrastructure and assets
- Understand the local geologic condition
- Develop a plan to mitigate the landslide
- Fund that portion of the slide repairs that protects public infrastructure and assets

# What happened?

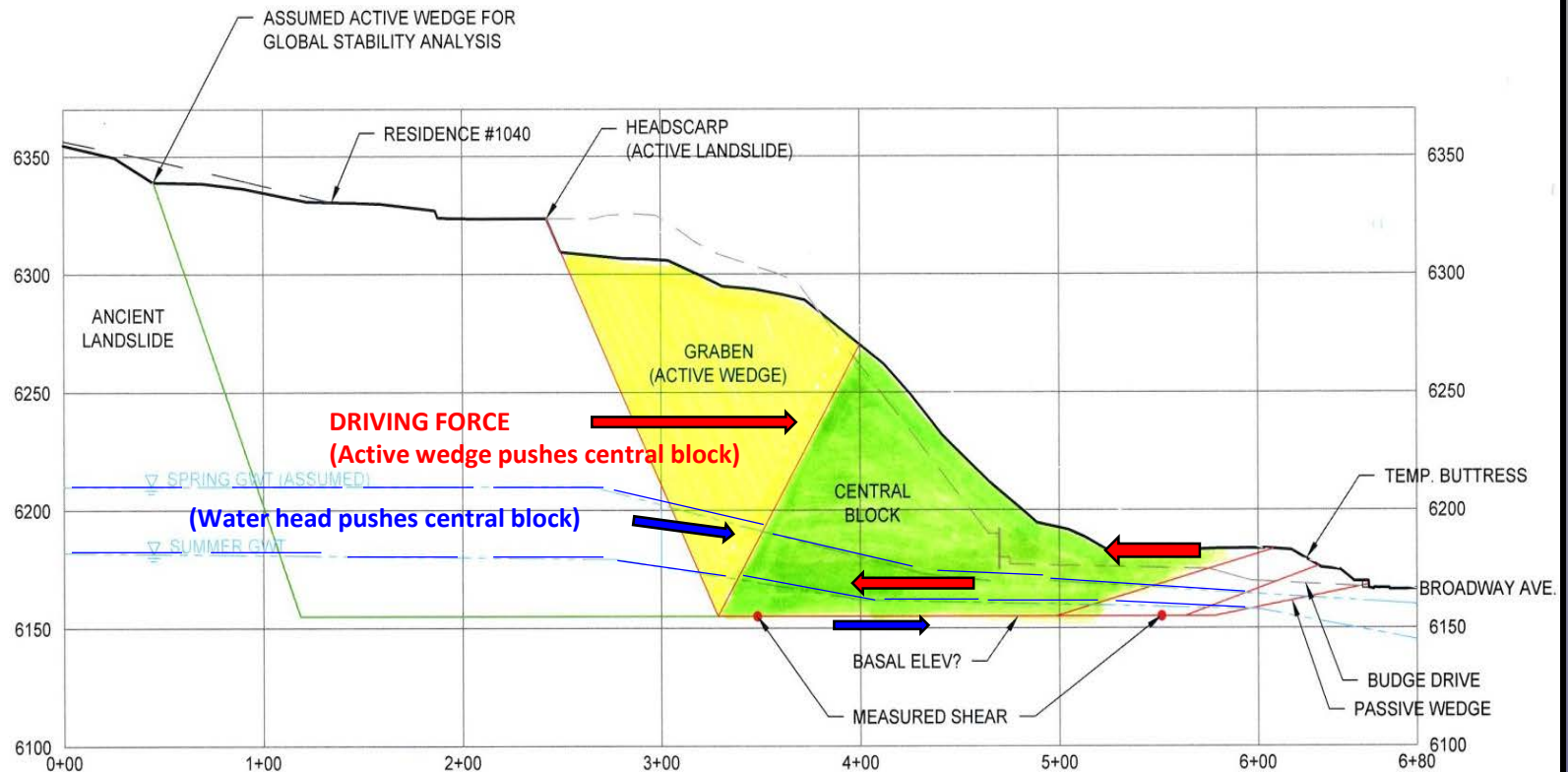
- All the development on the north side of Broadway between Scott Lane and WY 22 sits on the remnants of a colluvium mass wasting and ancient landslides that occurred approximately 150,000 years ago.
- During this event the volcanic basaltic andesite, which overlaid the sedimentary layers, slid down to what would 150,000 years later become West Broadway Avenue.
- This ancient landslide was reactivated through a series of events over the past 60 years.
- These actions reduced the Factor of Safety (FS) below 1.0. Current FS is estimated to be .96 to .99. Our goal is a FS of 1.1 - 1.2.

# Actions that reactivated Landslide

<u>Date</u>	<u>Activity</u>	<u>Volume Removed</u>	<u>%</u>
1967-68	WYDOT Quarry Operation	52,000 CY	61.5%
1963-80	Private Quarry Operations	15,000 CY	17.8%
1998	Hillside Building Construction	3,000 CY	3.6%
1999	Budge Drive Reconstruction	7,000 CY	8.3%
2011	Walgreens Development	6,500 CY	7.7%
Total Volume Removed within Landside limits		84,500 CY	

# What is it?

## Translational block landslide.



(Water causes buoyancy that reduces effective weight and friction of central block and slide toe passive wedge)

(RESISTING FORCES (friction along shear zone due to weight of central block plus friction in slide toe passive wedge))

# What is the Town of Jackson doing about it?

- In April and May 2014 we implemented emergency mitigation actions to protect public safety and infrastructure and significantly slowed landslide movement. The cost of these actions was \$1.3 million. Emergency actions included:
  - Issued emergency evacuation notice for residences and businesses
  - Constructed 3 temporary buttresses to slow slide movement. These buttresses protected the Sidewinders Parking Structure and Budge Drive access. This involved importing 7 million pounds of structural fill (2400 CY)
  - Drilled 7 test wells to obtain an understanding of the local geology
  - Reestablished temporary water and sewer service to residences on hillside. (fire flow has not yet been restored)

# What is the Town of Jackson doing about it?

- Developed 3 concepts for alternative access for residences on the hill.
- Developed a plan to stabilize the landslide. This plan included unweighting the top of the hill, construction of shear key and permanent buttresses. This plan will restore a Level of Safety Factor of 1.0 on the western portion of the slide. The Town Council approved this plan on October 27<sup>th</sup>.
- In early November, we widened and re-graded Budge Drive to provide narrow two-way traffic and relocated upper Sidewinders access for parking.
- In late November, we obtained temporary drainage easements from the Budge family, Statter family, Bencor and Walgreens to install temporary drainage plan which includes graded swales, concrete structures and culverts, which are designed, installed to collect and discharge storm water runoff.

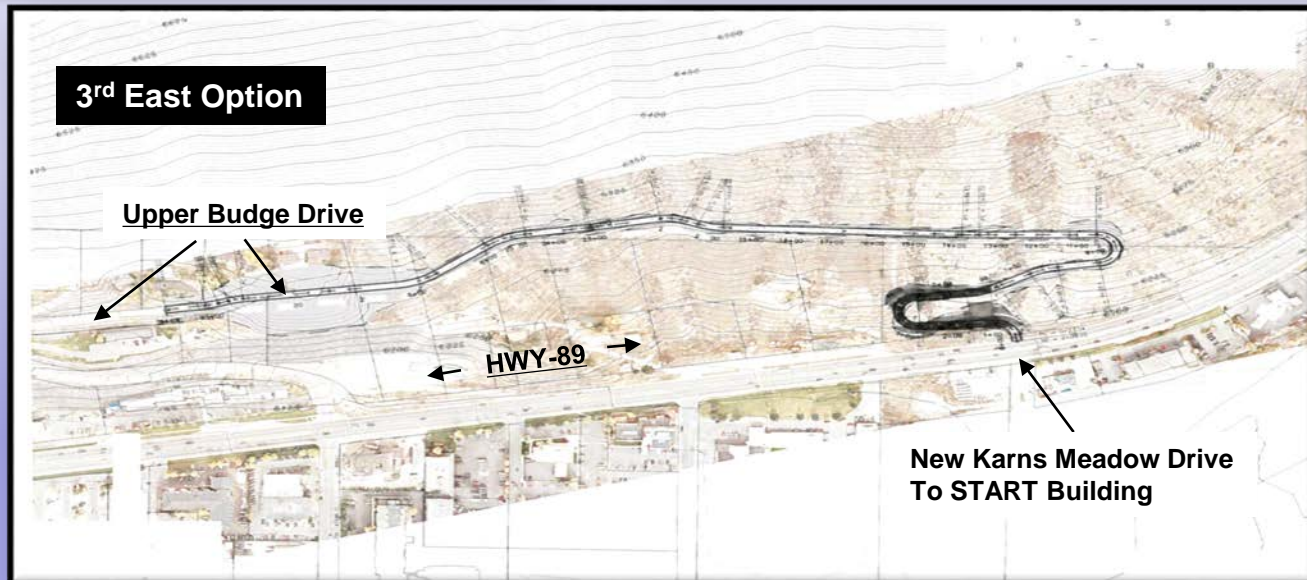
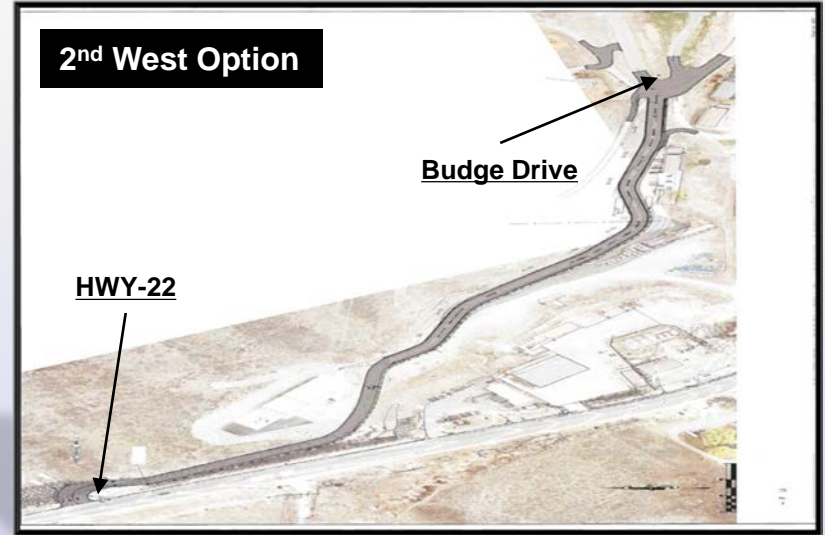
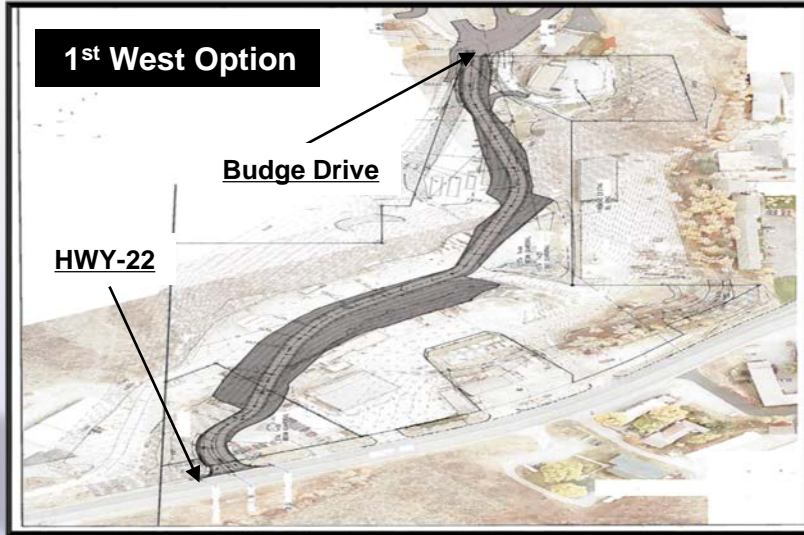


# What is the Town of Jackson doing about it?

- Selected Westwood Curtis as Construction Manager at Risk (CMAR) to construct the stabilization improvements
- Convened a settlement conference with 9 parties to preempt litigation and tort claims
- Developing a financial plan and seeking resources to stabilize slide



# Alternate Alignments



# Timeline going forward?

Budge Drive Remediation depends on a number of factors:

- Timing of the acquisition/easement for the Budge property
- Timing of easements/agreements from the Hillside partners
- Timing of the easements/agreement with Walgreens
- Timing of easements/agreements from Harry Statter property
- Availability of funding

# Funding Landslide Stabilization

- General Obligation Bond
- Increase in General Sales Tax
- Local Improvement District
- State Grants
- Spend down Reserves
- Fund it from current operating and capital revenue

# Conclusions

- Community Safety is priority
- Cooperation has generated results
- Thanks to our partners: Teton County, WYDOT