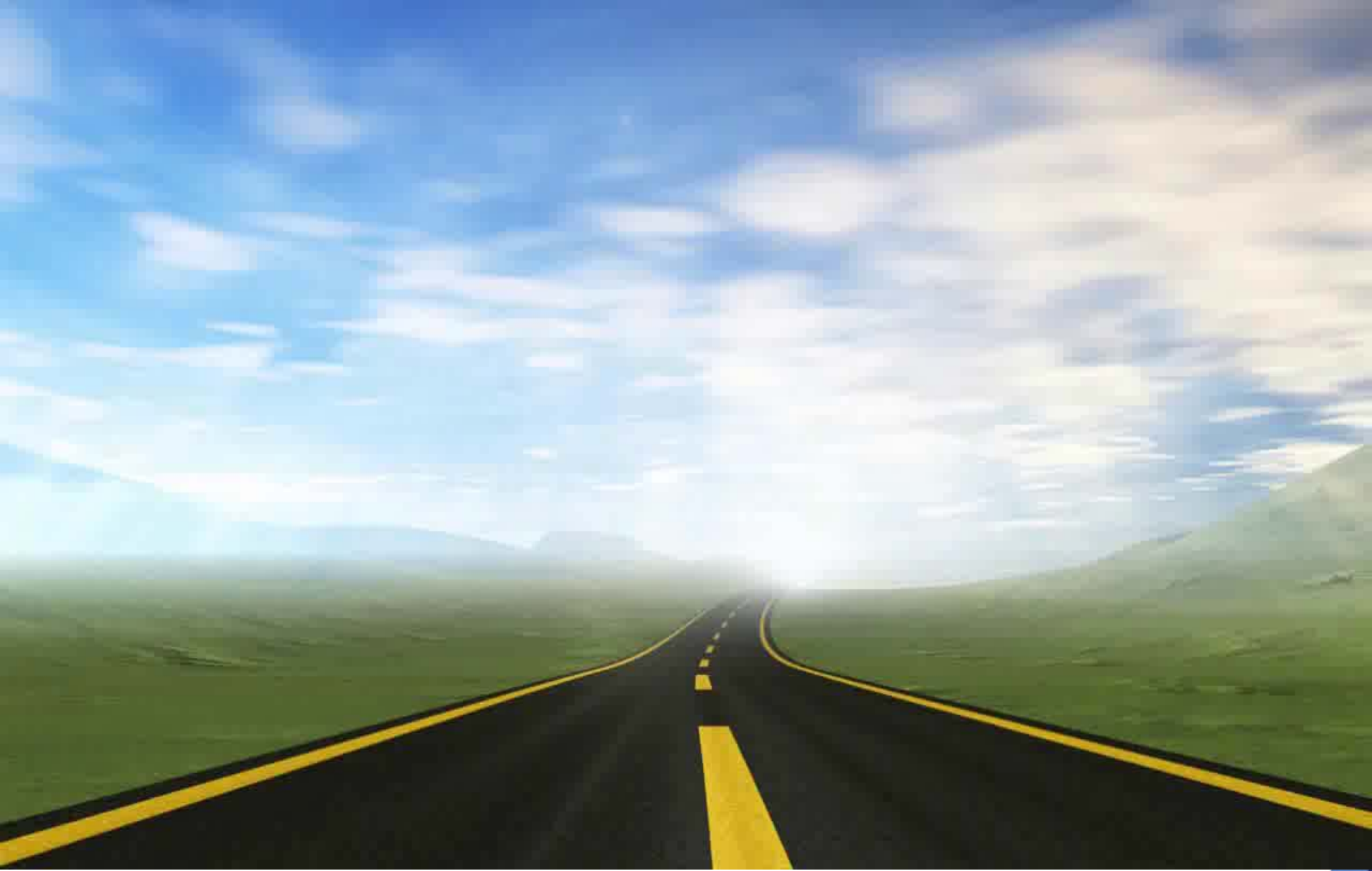


# 2019 Western States Forum

June 18<sup>th</sup> – 20<sup>th</sup>

## Building and Leveraging Fiber Optics in Rural Areas





# History

- Olympics
- American Fork City
  - Rail Road ROW
  - CentraCom - Lt. Governor Spencer Cox
  - UDOT I-15
  - Kerns Building
  - University of Utah Dark Fiber Research Ring
- FTV Wave to St. George
- Microwave - DTS - UCAN



# - Union Pacific RR Right-of-Way

# American Fork City



1915



# 2002 Winter Olympics

- First Fiber Optics
  - Connecting Cameras
  - Connecting Traffic Lights
  - Connecting VMS
- First Trade
  - \$800,000 for 5 blocks of a single 2 inch conduit.





- Lt. Governor Spencer Cox - Breaking the Monopoly



# University of Utah Dark Fiber Research Ring and Data Center

# DTS

- DTS Telecommunions Laws
- 72-7-108 allows for service to State Agencies.

- Utah Communications Authority
- Radios Push to Talk
- First Net



- What Is the DOT Connection

# State Laws and Rules

- Utah Code 72-7-108
- What happened to Utah Code 72-7-109
- Rule R907-64
- Rule R907-65

# Federal Laws

- United States Code – USC - TITLE 23—HIGHWAYS - CHAPTER 5- RESEARCH, TECHNOLOGY, AND EDUCATION - §514. Goals and purposes - (b) Purposes 4) to promote the innovative use of private resources in support of intelligent transportation system development;
- The 1998 FHWA policy change allowing states to accommodate longitudinal access of utilities within interstate rights-of- way;
- The 1996 Telecommunications Act authorizing states to enter into agreements with telecom companies;
- Federal Webinar Ken Leuderalbert PE
- BLM Issues
- [Rural Interstate Corridor Communications Study Report to States](#)  
**2009**

# Dig Once

- Broadband Opportunity Council Agencies' Progress Report January 2017
- UDOT – No Policy
- Dig Once Policy Considerations Implementing Dig Once policies at the local, rather than at the statewide or national level, would be more effective given the complexities of implementing a policy that spans jurisdictions. Federal, state and local infrastructures, for instance, are subject to different laws regulating build-out plans for deploying broadband. In addition, most work for managing and maintaining utility facilities on roadways are the responsibility of counties and cities, including requests for utility permits to install and conduct work on existing facilities. An approach that encourages cooperation, but does not prevent excavation when needed is most supported by federal, state and local agencies when implemented as part of the cooperative planning process.
- [https://www.fhwa.dot.gov/policy/otps/policy\\_brief\\_dig\\_once.pdf](https://www.fhwa.dot.gov/policy/otps/policy_brief_dig_once.pdf)

# Extent of the UDOT Network

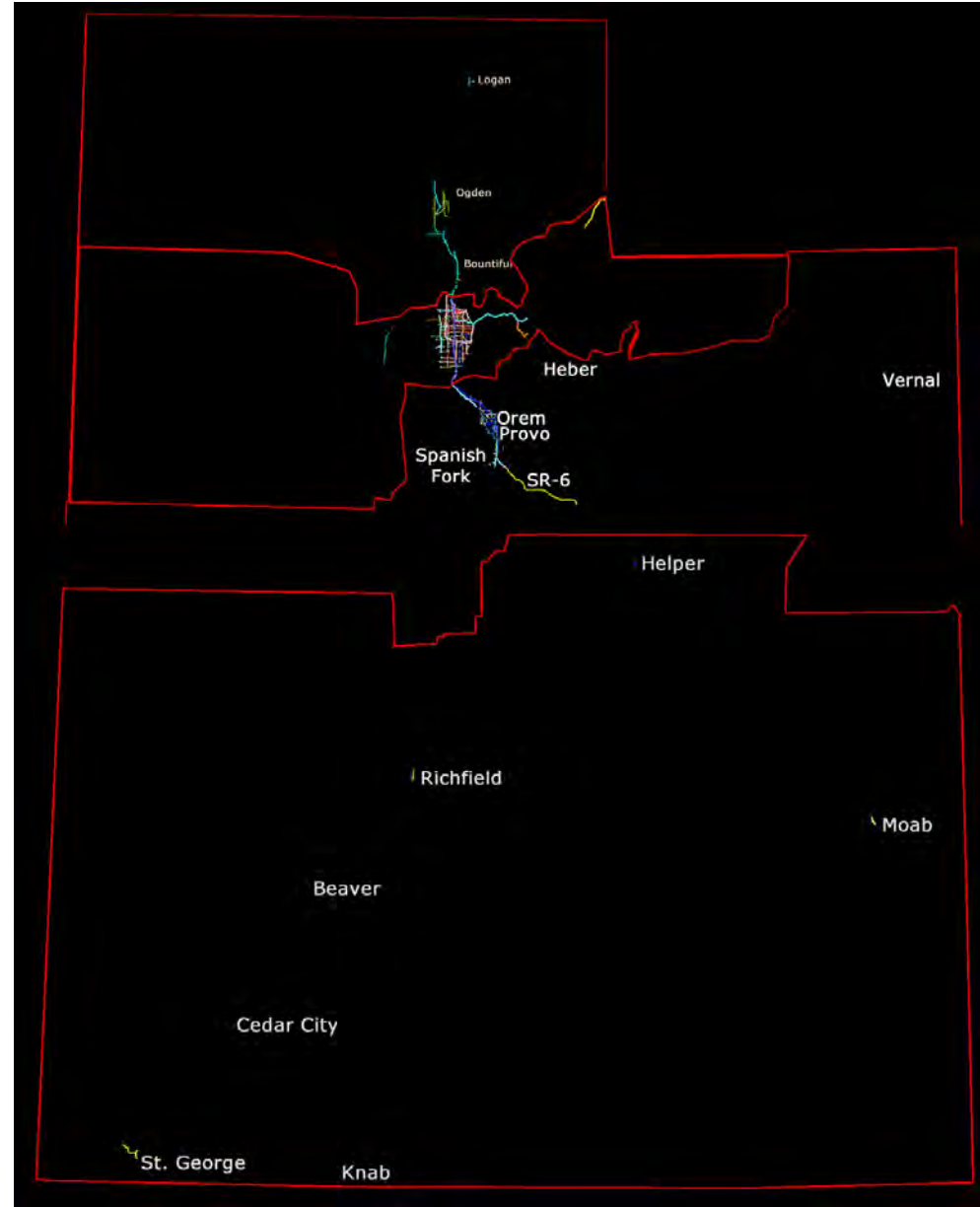
- UDOT has about 2,517 miles of fiber optics. This total includes UDOT fiber 960 miles with PPP (Public, Private, Partnership) fiber 1,558 miles. The St. George connection is with a pipeline for 300 miles not a road. South Central Fiber Circuits 312 miles connect Cedar City, Bryce Canyon, Kanab, Parowan and Beaver. The percentages I calculated are for road miles and do not include the rural fiber circuit trades of 612 miles.
- Utah Interstate Miles 978
- Interstate Fiber Miles 443 fiber miles 45%
- I-15 400 miles with 281 fiber miles 70%
- I-215 29 miles with 29 fiber miles 100%
- I-80 197 miles with 87 fiber miles 44%
- I-84 120 miles with 23 fiber miles 19%
- I-70 232 miles with 23 fiber miles 10%
- Level 1 Road Miles 2,980
- Level 1 Fiber Miles 1,442 49%
- Level 2 Road Miles 1,960
- Level 2 Fiber Miles 20 1%
- Total Interstate, Level 1 and Level 2 Road Miles 5,875
- Total Interstate, Level 1 and Level 2 Fiber Miles 1,905 32%





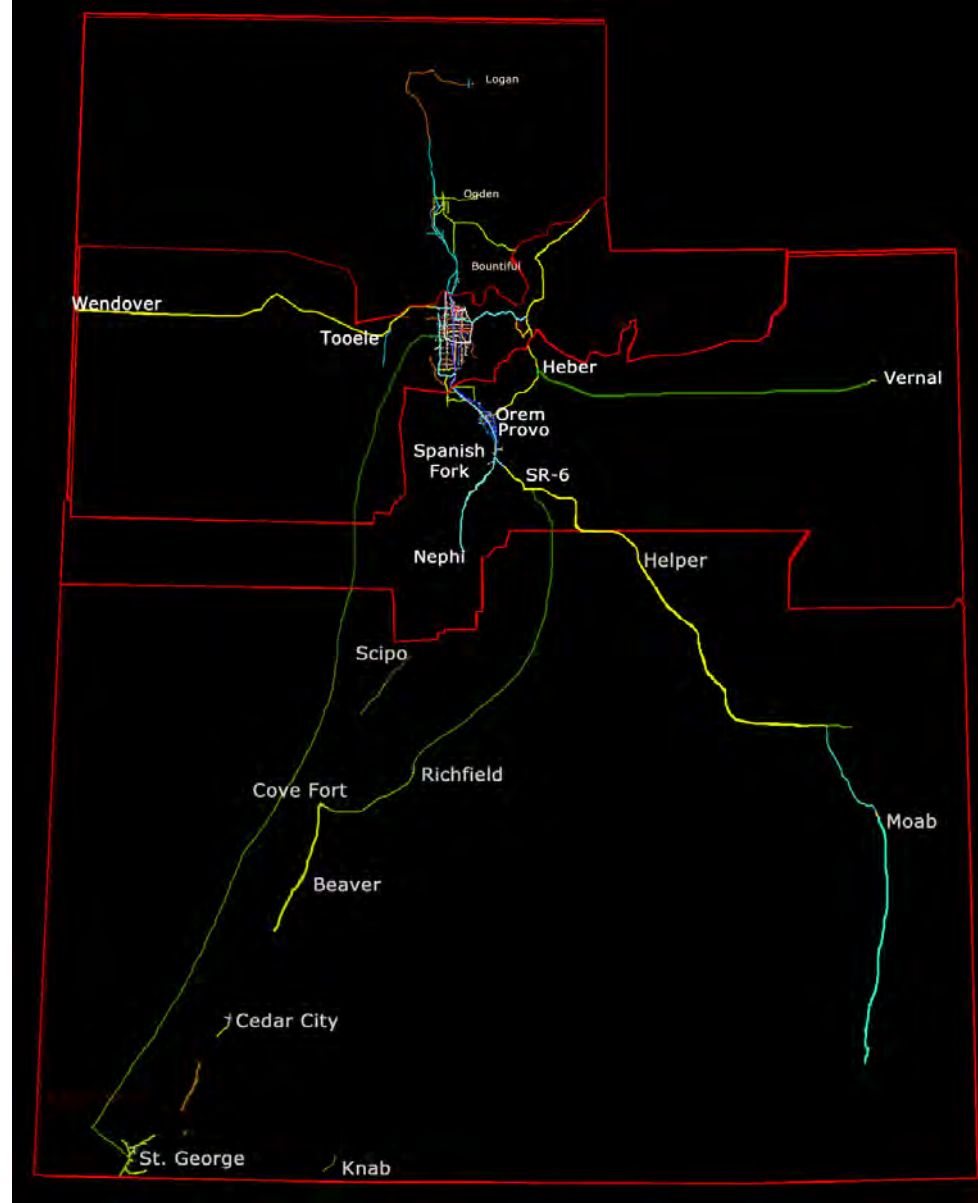
UDOT  
Fiber/Conduit 631  
Miles Aprox.

Traded  
Fiber/Conduit  
Circuits  
100 Miles Aprox.

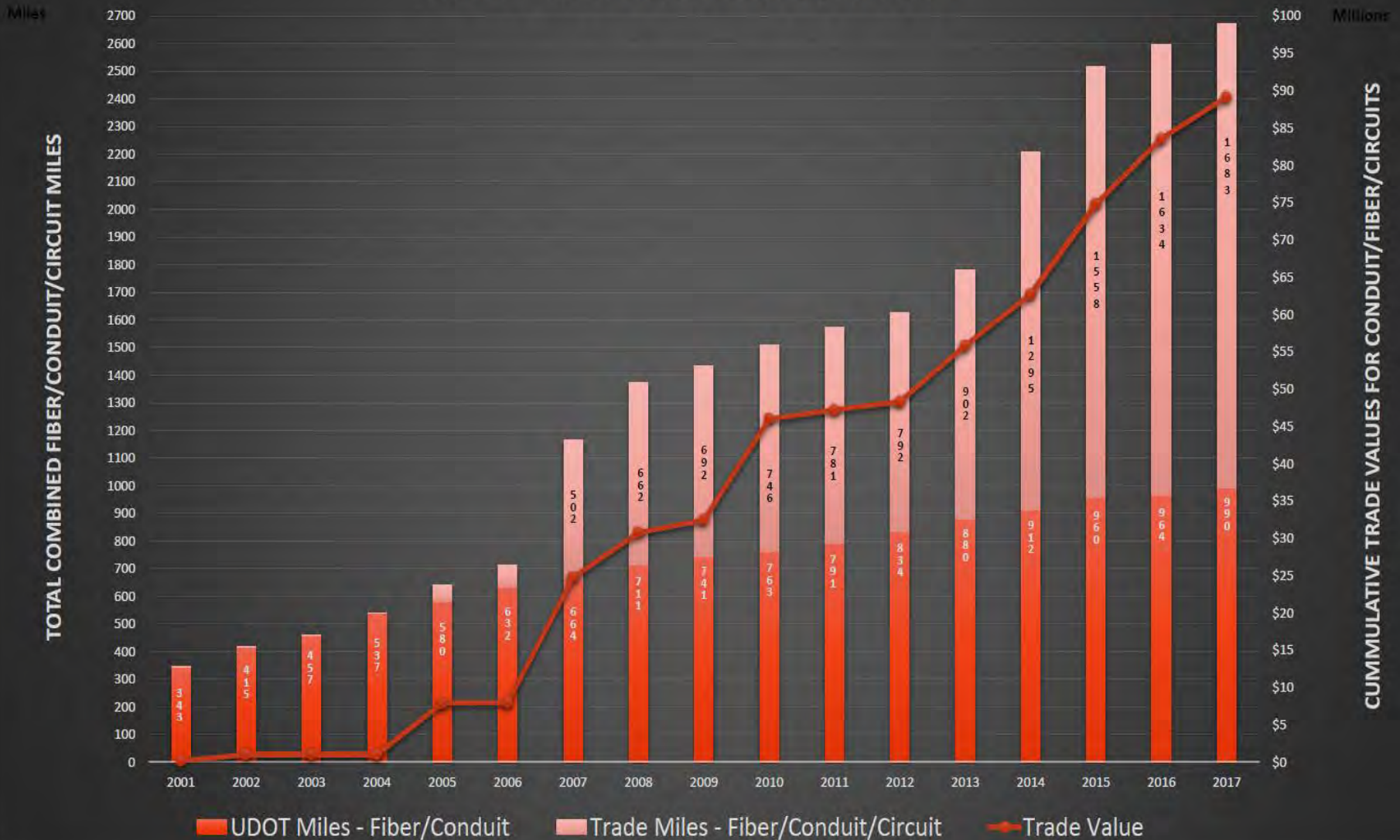


UDOT  
Fiber/Conduit 1000  
Miles Aprox.

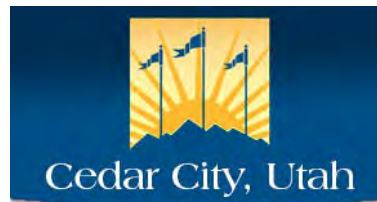
Traded  
Fiber/Conduit  
Circuits  
2000 Miles Aprox.



# UDOT's Fiber Optic Network 17 Years



# Cities - Counties - Special Services



# Trade Partners



# Telecoms



# Trade Partners



# State Agencies



Utah Governor's Office *of*  
Economic Development  
BUSINESS • TOURISM • FILM



# Trade Partners



# Trade Agreements

## Public vs Private

- Difference between Public Partner and Private Partner
  - Interlocal Cooperative Vs Lease Agreement
    - City, County, State, Public Safety,
    - Who is UDOT allowed to serve?
      - UT code 72-7-108 language on state buildings.
      - Crown Castle Library at Alta
      - Trade Agreements 30 years
      - Telecom Restrictions

# Trade Web Site

- Balance Sheet in Trade Agreement
- Demo of Trade Web Site
- Link
- Software Used
  - Pros – Cons - Why



# Installation and Cost

- State Contracts
  - Procurement Contracts
  - Staffing Professional Services Contracts
    - Engineering Firms
      - Horrocks
      - Narwhal
      - PineTop
- Stand alone vs project inclusion

# Rural Project Lessons

- Moab
  - Still camera shots
  - If possible show a live feed.
  - URL code
  - Environmental Document
- Cottonwood Canyon pics and tell the story.
  - Schools Library public safety Lessons with Forest Service
  - Ignorance is sometimes a good thing. Only get to use that once.
  - ROW handshakes that needed to be cleared.
  - Canyons are rural.

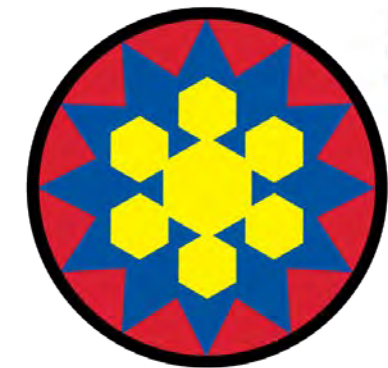












**Brighton**  
UTAH



**Solitude**  
MOUNTAIN RESORT



**Save Our Canyons**



# Stakeholders





# Why Build the Cottonwoods?

- No monitoring road Conditions
- Poor communications
  - Operations groups
  - Emergency response - Avalanche
  - Ski resorts and lodges
  - Everyday users

# Crown Castle International

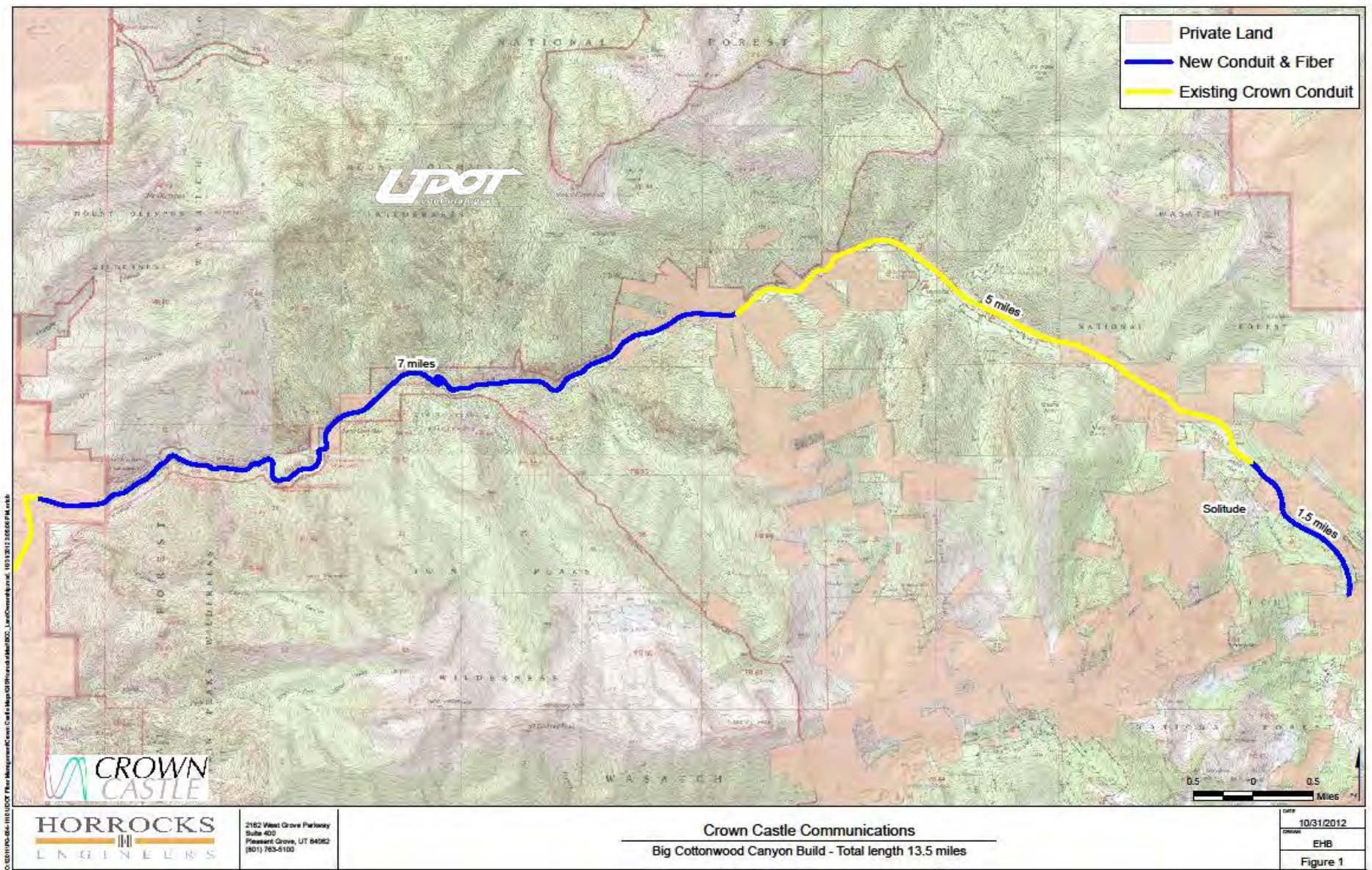
- Wireless infrastructure company
- Supports all carriers
- Proposed DAS in each canyon

# Crown Castle Received

- Build Fiber-Optic Backbone in ROW
- Wireless Towers in ROW
- Use of UDOT fiber conduit
- Hub building on UDOT ROW

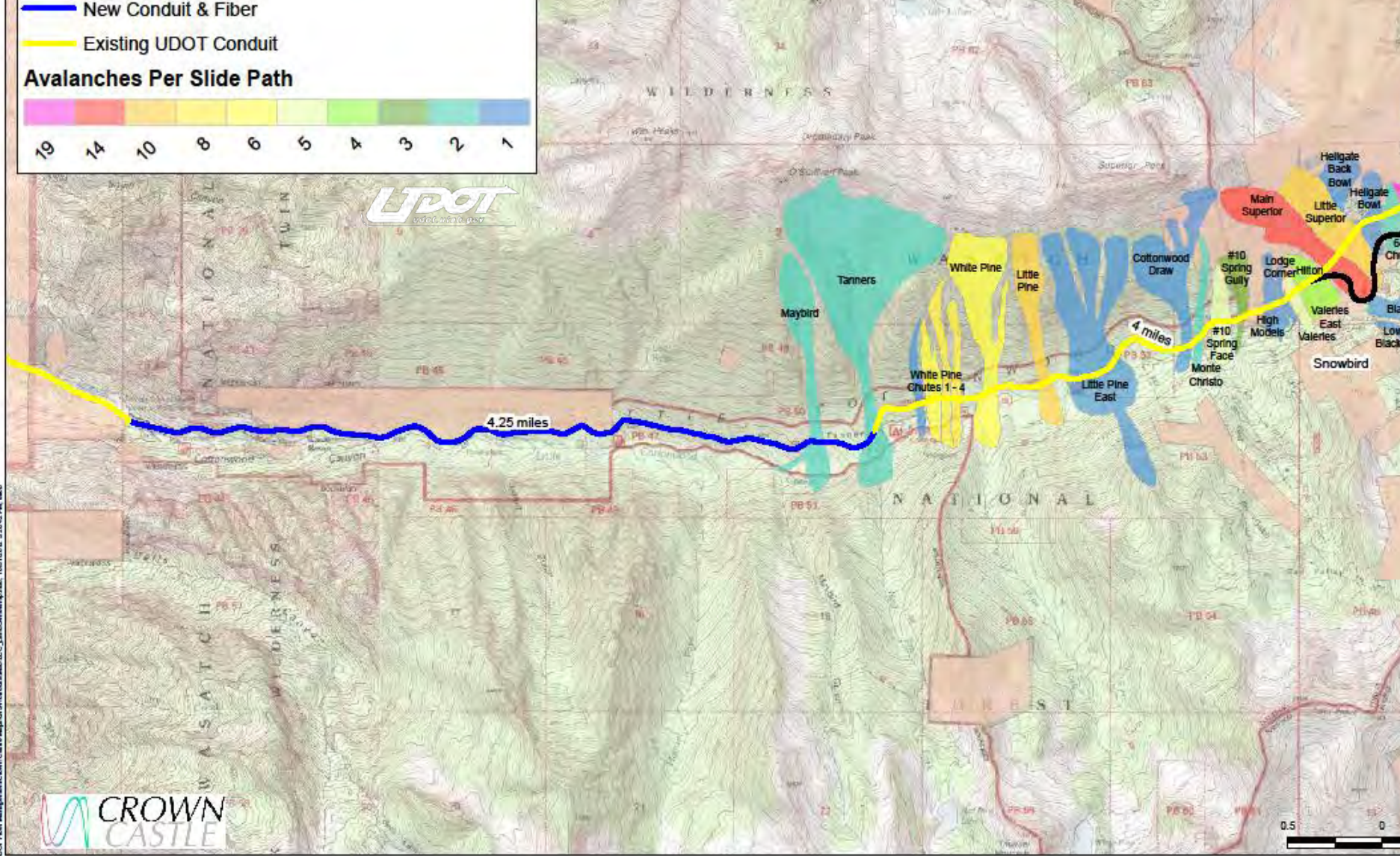
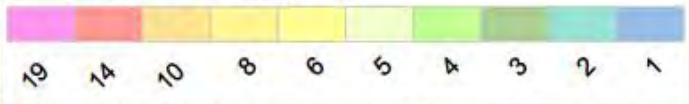
# UDOT Received

- 24 strands on fiber cable
- Spare conduit
- Access to all poles for equipment
- RWIS Installation
- Power for devices
- Hub space for equipment



**—** New Conduit & Fiber  
**—** Existing UDOT Conduit

**Avalanches Per Slide Path**



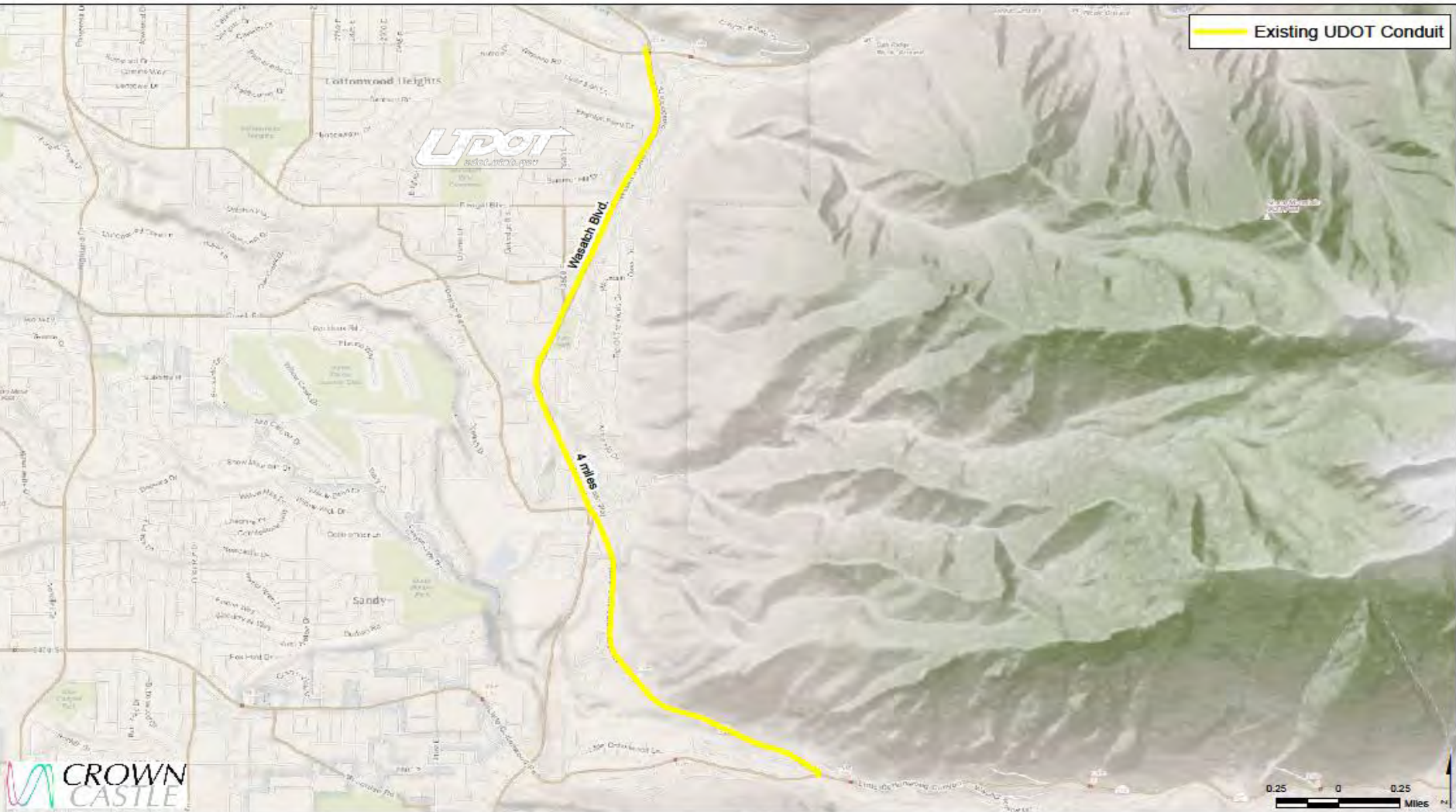
C:\EIT\19-06-111\UDOT\_Thru\_Management\Conduit\_Map\Map2019\Roadside\Map2019\UDOT\_Thru\_Management.mxd, 10/10/2019 3:04:42 PM, 443



2162 West Grove Parkway  
 Suite 400  
 Pleasant Grove, UT 84062  
 (801) 763-5100

**Crown Castle Communications**  
 Little Cottonwood Canyon Build - Total length 8.25 miles





**CROWN CASTLE**  
**HORROCKS ENGINEERS**

2182 West Grove Parkway  
 Suite 400  
 Provo, UT 84602  
 (801) 753-5100

**Crown Castle Communications**  
 Wasatch Blvd. Build - Total length 4 miles

DATE: 10/31/2012  
 DRAWN: EHB  
 Figure 2







# DAS Tower

(Distributed Antenna System)









*Click picture to play video.*















Big Cottonwood



Little Cottonwood

# Hub Buildings

# Project Summary

- Projects Estimate: \$5 Million
- 35 poles
- 24.5 Miles fiber optics
- 7200 Volt Electrical Systems
- 12 new cameras - 8 Road Weather Systems - 15 chain-up signs
- Improved communications for All Users
- Avalanche Operations Center
- Future ITS expansion (dms, etc.)

# Rural Build Challenges

- BLM
  - Permit Process - Lessons Learned
- Forest Service - Parks Service
- School Lands - State Parks
- Indian Nations
- Environmental
  - Hogs Back example

# Connectivity

- Hub 5 – Main Meet Point
- Traffic Signals (Chart and Stats)
  - Analytics web site
  - UEN
  - UTOPIA
    - B-Top Grant
- Sheds
  - Internet - DTS
  - Vehicle to Infrastructure - Distributed Computing Connectivity
- ARWIS (Chart and Stats)
- Cameras (Chart and Stats)

# Current Projects

- Reservation Construction
  - Navaho - White Mesa
- Daggar County
  - Strata - Private Partner
  - UEN - Public Partner - State Fund Match - Cell Phone Funds
    - Issues with these funds
- Rural I-15 - Direct Communications
- Logan Canyon – Crown Castle and Direct Communications
- American Fork Canyon – Crown Castle

# 5g & Rural Fiber Deployment

- Utah 5g Law
  - Rural Impact
- How we are working through it.
- Fiber is first
- Great opportunity to start with trades.
  - Think outside the box



# Rural Economic Impact

- Rural Jobs - 25,000 Rural Jobs Initiative
  - Education
  - Cottage Businesses
  - Small Businesses
  - Federal and State Parks
  - Silicon Slopes - Rural Satellite Communities - Quality of Life

# What's Next?

## Is fiber going away and will it be an old technology?

- New Fiber
  - Longer distance between regeneration sites. Better for long rural applications.
  - Micro Fiber and Conduit - Pros - Cons
- Discuss the new WDM (Wave Division Multiplexing) daisy chain fiber for ATMS – Rural
- Optical Acoustical Sensing
  - Real time travel speeds volume counts
  - Avalanche rocks
  - Bridge and road conditions

# References

- Dig Once- [https://www.fhwa.dot.gov/policy/otps/policy\\_brief\\_dig\\_once.pdf](https://www.fhwa.dot.gov/policy/otps/policy_brief_dig_once.pdf)  
Broadband Opportunity Council Agencies' Progress Report January 2017
- Pictures –
  - Cottonwood Canyons Pics Brad Smith Horrocks Engineering <https://www.horrocksengineers.com/>
  - 2002 Olympic - Salt Lake City skyline during the 2002 Olympics as seen from KSL. photo by Ravell Call (Submission date: 12/13/2002) <https://www.deseretnews.com/article/865671826/Deseret-News-wants-to-share-your-memories-of-the-Salt-Lake-City-2002-Winter-Olympic-Games.html>
  - Slides 1,2,3,61 - PresenterMedia.com 4416 S. Technology Dr Sioux Falls, SD 57106
  - Slides 27-31 – Utah Tourism <https://www.visitutah.com/>
  - Slide 10 – University of Utah - (c) 2019 Brian K Blaylock <http://kbkb-wx.blogspot.com/2017/03/the-university-of-utah-downtown-data.html>
  - Slide 9 – UDOT Hackathon Spencer Cox and Students – Lynne Yocom, November 2018
  - Slide 6 - <https://collections.lib.utah.edu/ark:/87278/s6h139h3> SL & U/LA & SL crossing Main St. at 5th East, American Fork, 11 January 1915 Digital Image © 2008 Utah State Historical Society. All Rights Reserved.

# Links

- Utah Code 72-7-108 - <https://le.utah.gov/xcode/Title72/Chapter7/72-7-S108.html>
- R907-64 – <https://rules.utah.gov/publicat/code/r907/r907-064.htm>
- R907 – 65 – <https://rules.utah.gov/publicat/code/r907/r907-065.htm>
- R930 – <https://rules.utah.gov/publicat/code/r930/r930-007.htm>
- Dig Once Policy - [https://www.fhwa.dot.gov/policy/otps/policy\\_brief\\_dig\\_once.pdf](https://www.fhwa.dot.gov/policy/otps/policy_brief_dig_once.pdf)



# Fiber Highway

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