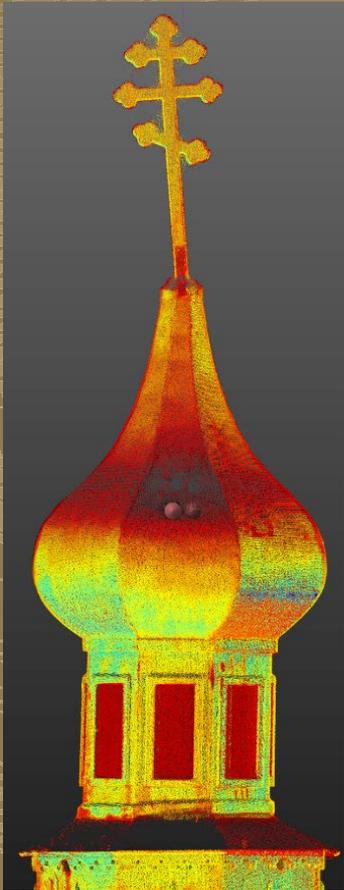


# Documentation Using High Definition Laser Scanning

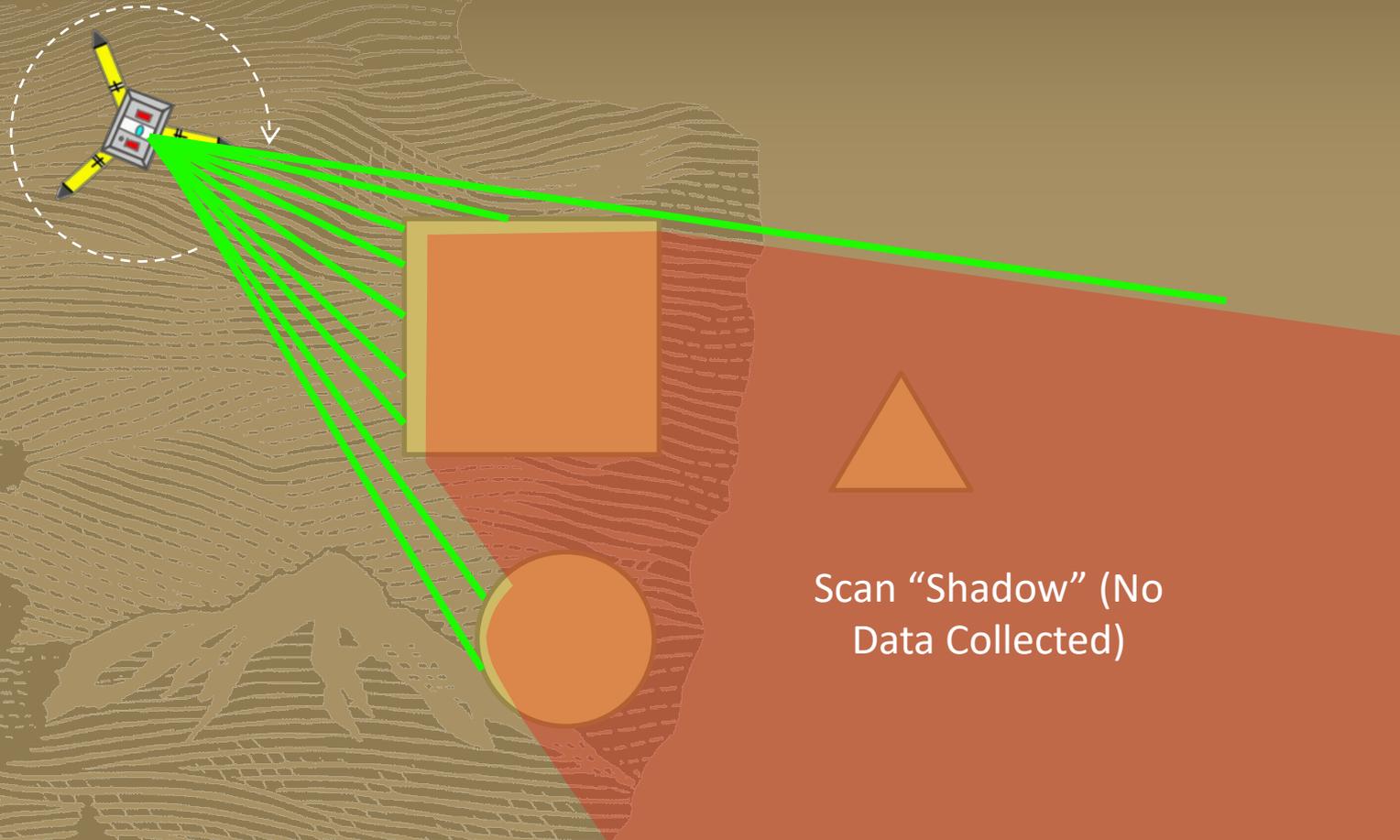


EXPERIENCE YOUR AMERICA

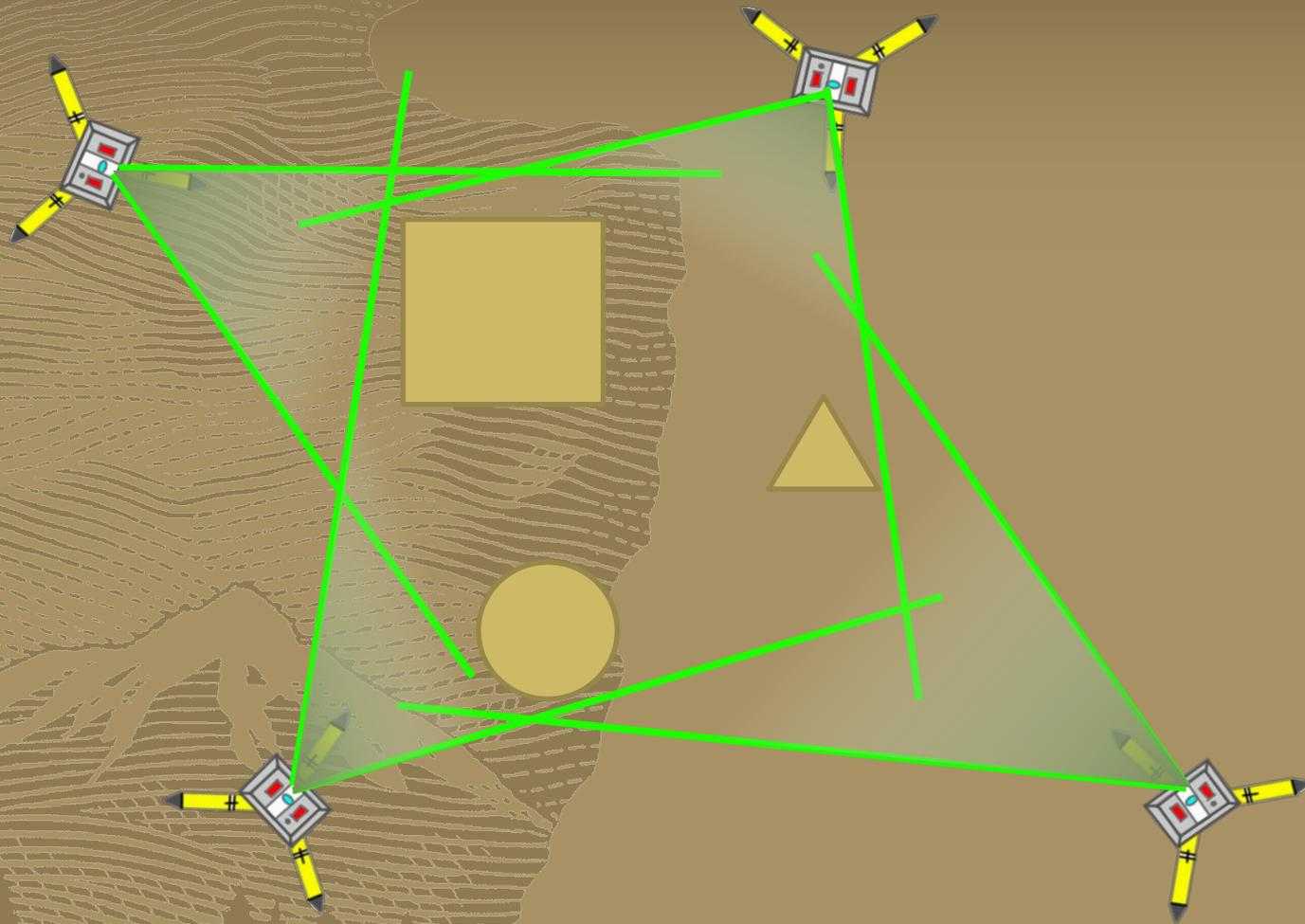
## Overview

- What is High Definition Laser Scanning?
- Types of “scanners” available
- Use by the Heritage Documentation Programs (HDP)
- AKRO in house capabilities and expertise
- Scanning efforts and pilot projects from 2017
- Added benefits of using laser scanning to assist in documentation
- Scan data demo
- Questions

# What is High Definition Laser Scanning?



# What is High Definition Laser Scanning?



EXPERIENCE YOUR AMERICA

# Other Kinds of Scanners?

- 3D Cameras
  - Not true scanners, rather use photogrammetry to generate good visuals with very basic 3d geometry
  - Used for interiors and small scale spaces.
- Short range scanners (1-25m)
  - Infrared (handheld) and Phase Based
- Short/Medium range Scanners (1-120m)
  - Phase based and Time of Flight
- Medium/Long range Scanners (100-340+m)
  - Time of Flight scanners
- Aerial LIDAR and Structure from Motion (SfM)



# New Regional Office Equipment

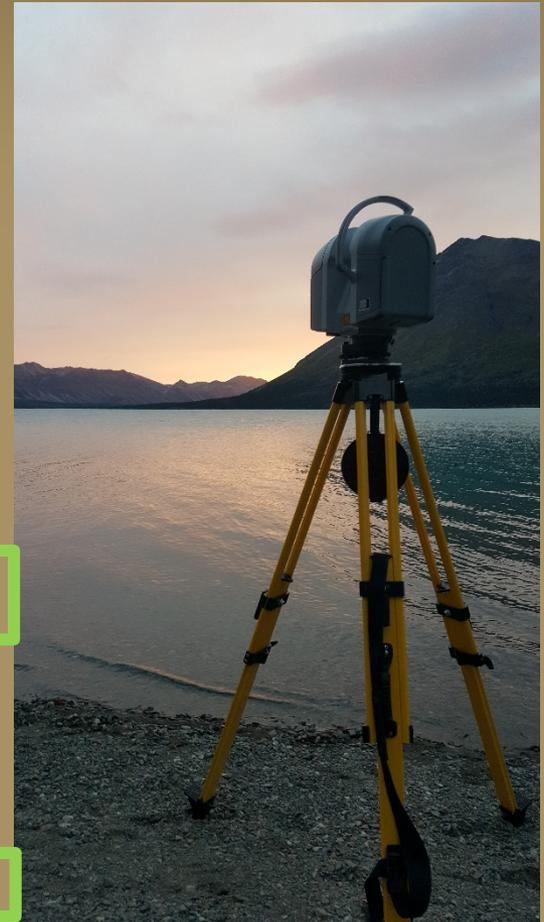
- Two types of scanners
  - Trimble SX10 Long Range Total Station + Scanner + Imaging System
    - Total Station Capabilities for survey workflows (multitasker)
    - Multiple imaging cameras (Overview, Primary, Telescope, Plummet)
    - Medium Speed, Medium Resolution scans (26k points per second)
    - 600 m range
  - Trimble TX8 Medium/Long Range Scanner
    - High Speed, high resolution scanner (1 million points per second)
    - 1-340 m range



# TX8 settings in depth

- Trimble TX8
  - 1 million points per second time of flight scanner
  - Up to 340 meter range
  - Internal camera maps photos to cloud
  - Registration using targets or cloud to cloud algorithms

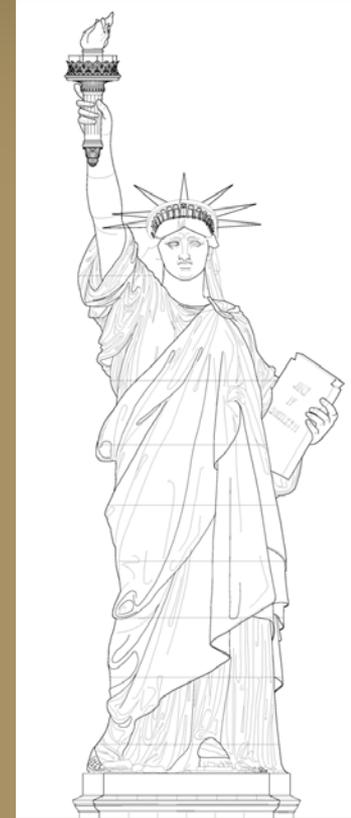
Scan Parameters	Preview	Level 1	Level 2	Level 3	Extended <sup>1</sup>
Max range	120 m	120 m	120 m	120 m	340 m
Scan duration (minutes) <sup>3</sup>	01:00	02:00	03:00	10:00	20:00
Point spacing at 10 m	15.1 mm	——	——	——	——
Point spacing at 30 m	——	22.6 mm	11.3 mm	5.7 mm	——
Point spacing at 300 m	——	——	——	——	75.4 mm
Mirror rotating speed	60 rps	60 rps	60 rps	30 rps	16 rps
Number of points	8.7 Mpts	34 Mpts	138 Mpts	555 Mpts	312 Mpts



# NPS Heritage Documentation Programs – HABS/HAER/HALS



# NPS Heritage Documentation Programs – HABS/HAER/HALS





# Alaska Regional Office

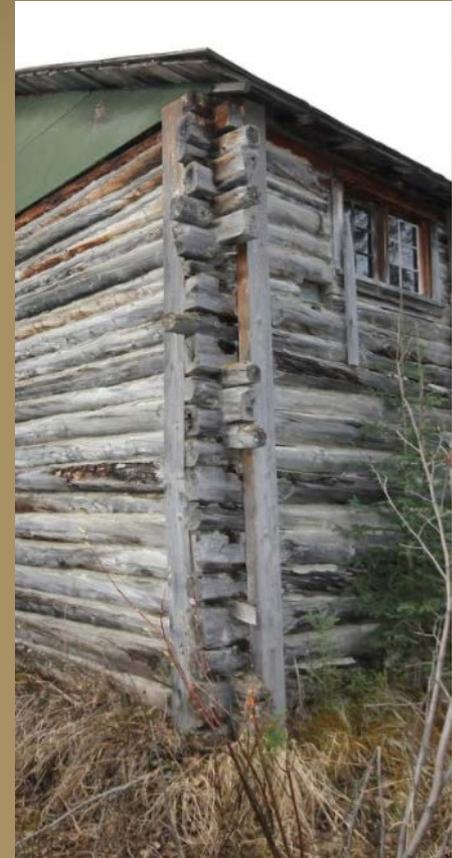
- What are our current capabilities?
  - New tools
  - Sharing expertise between professions to get the most out of the equipment and staff (Historical Architects, GIS professionals, Lands etc)
- What expertise are we looking to foster or develop?
  - Regional Level
  - Park Level
  - Continue working with HDP to develop standards and best practices

# Alaska Regional Office

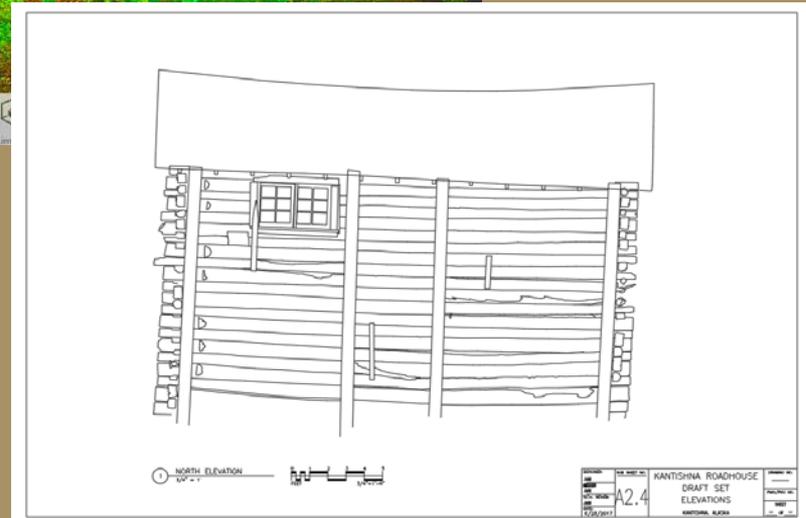
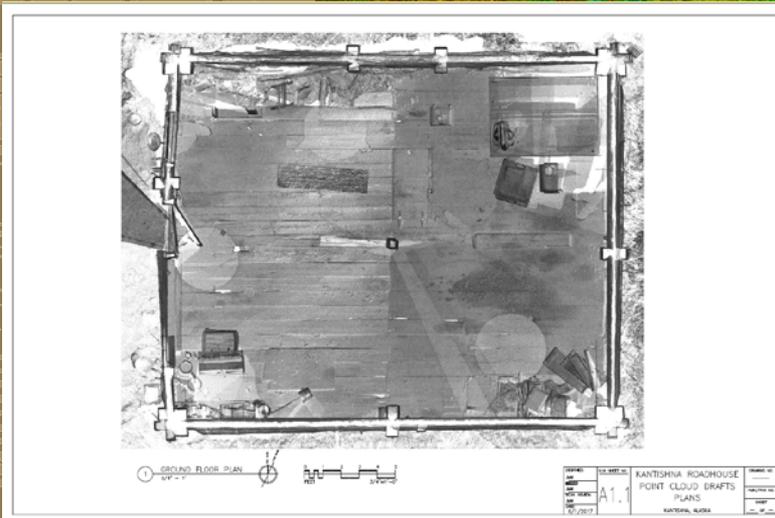
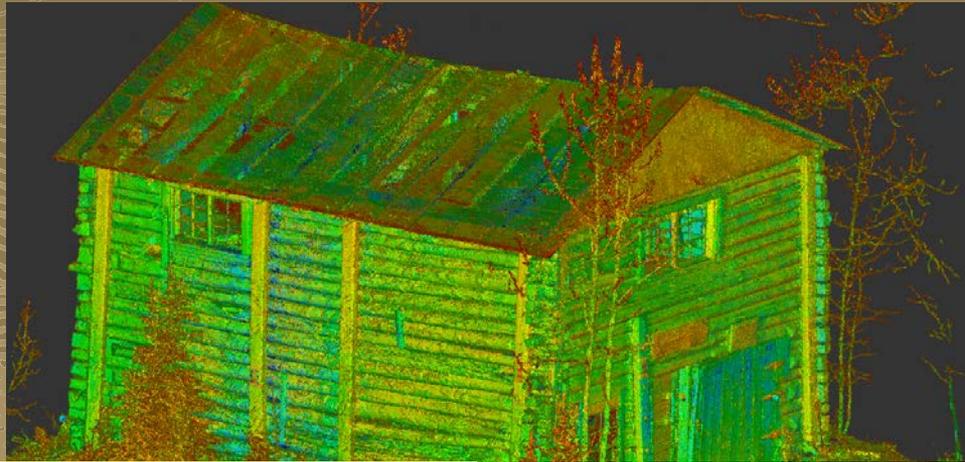
- What have we done so far with these tools?
  - 2017 site visits testing equipment and feasibility
  - Testing ability to mobilize quickly, logistics
  - Quantifying time in field and time in office
  - “Reallocation” of time (Field down, Office up)



# Kantishna Roadhouse – DENA

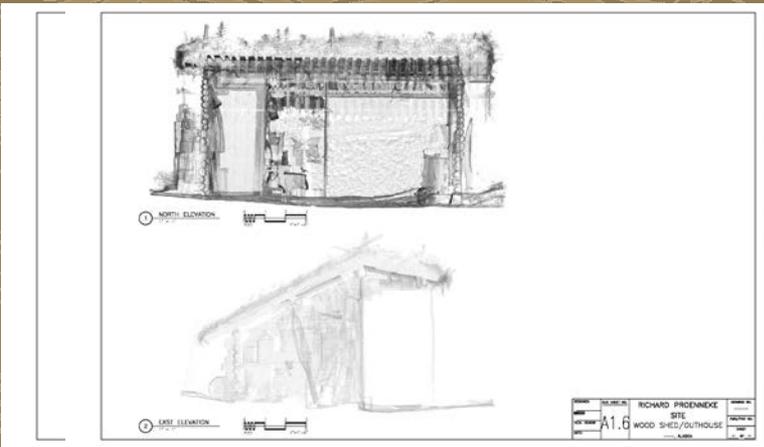
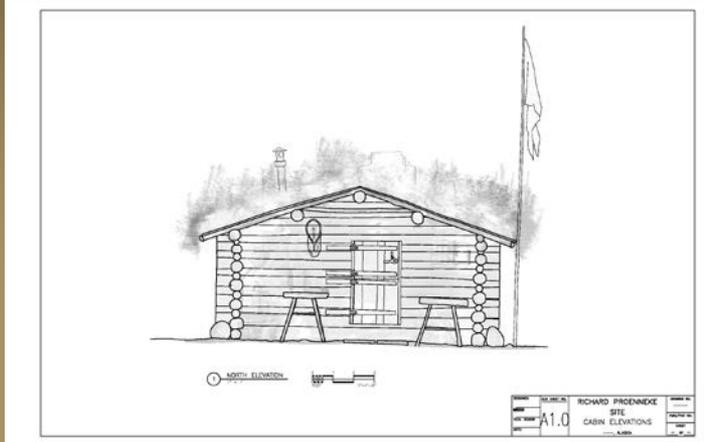
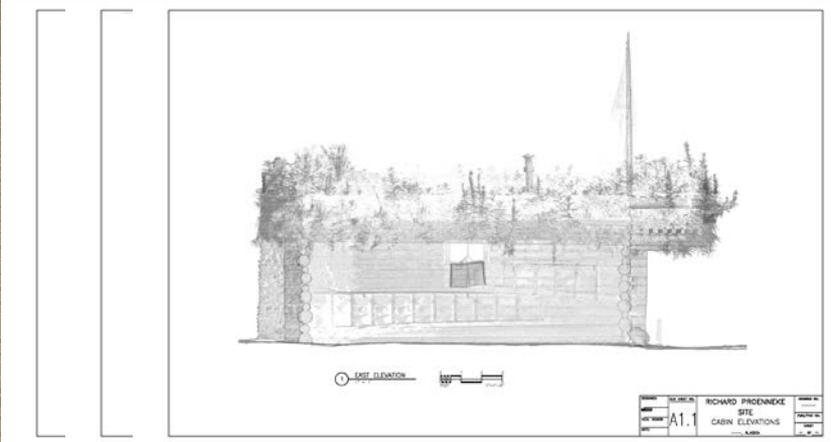


# Kantishna Roadhouse – DENA

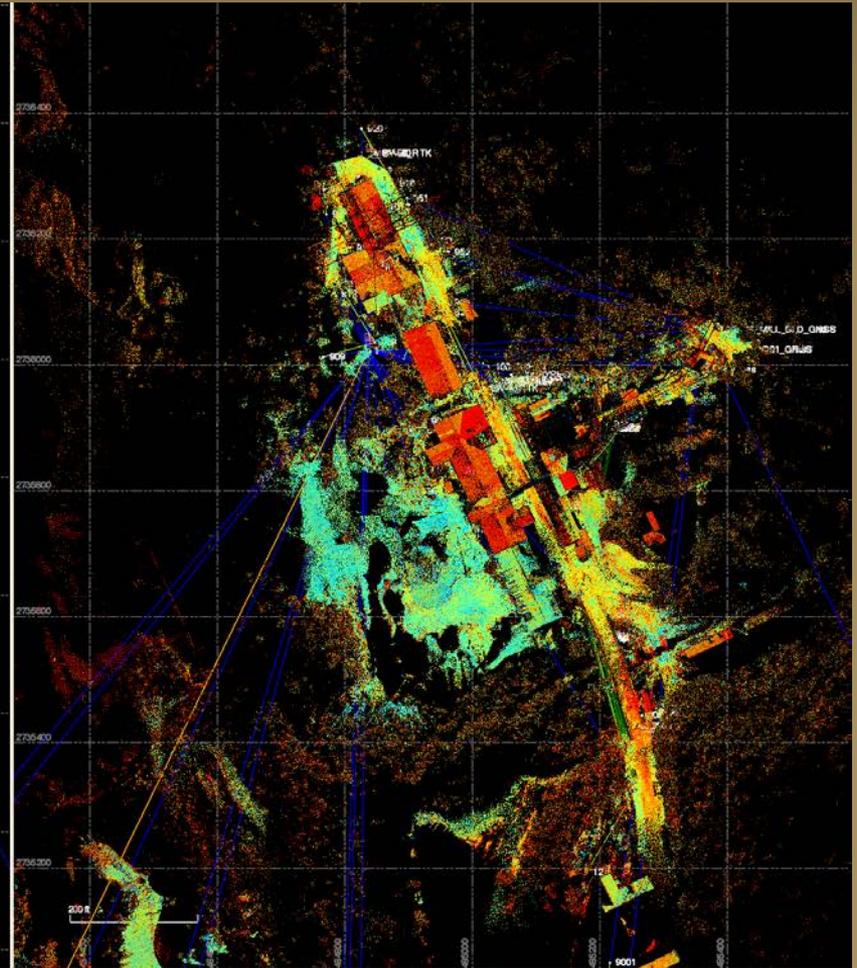


# Dick Proenneke's Cabin and surrounding site - LACL

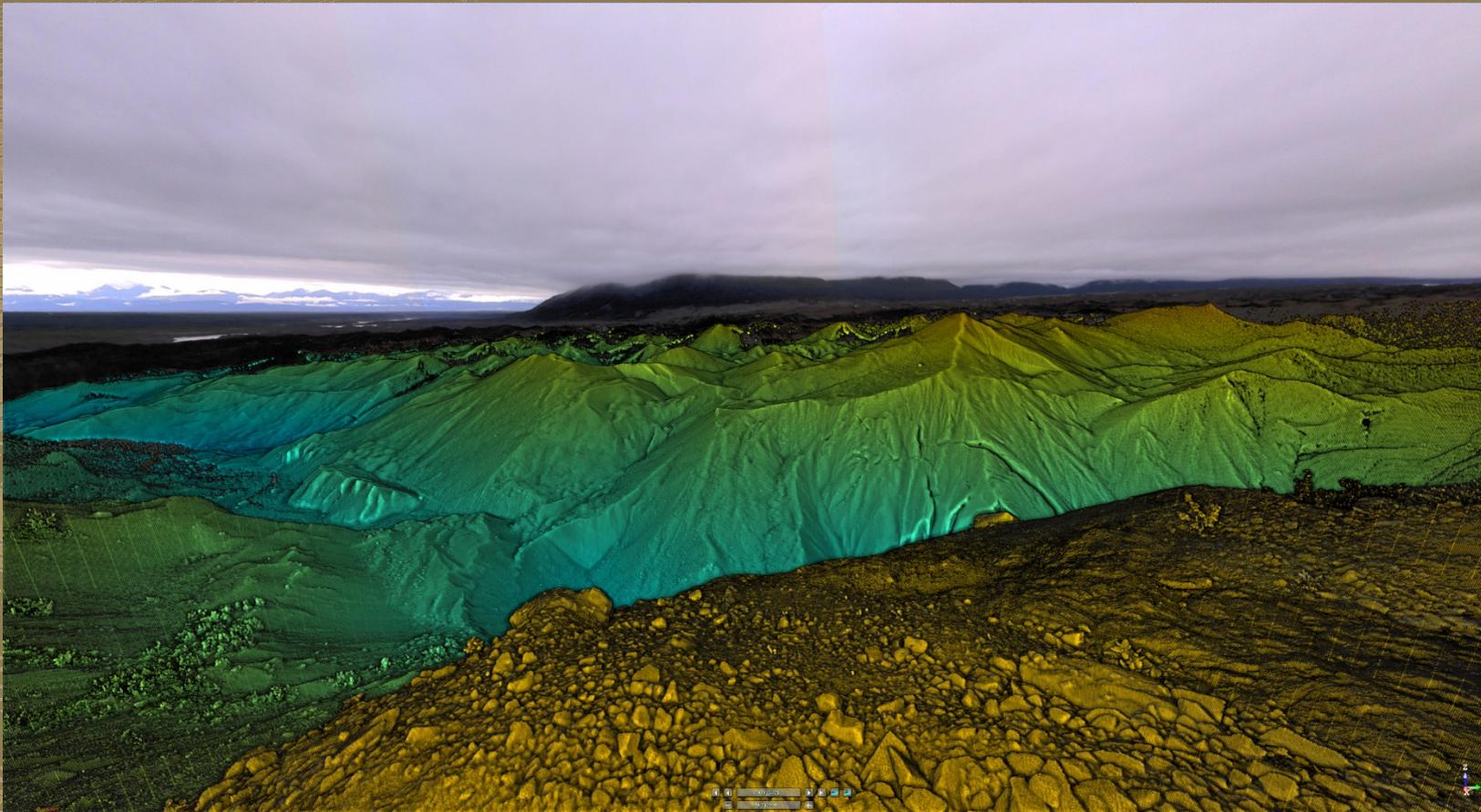




# Kennecott Mill building and surrounding site - WRST



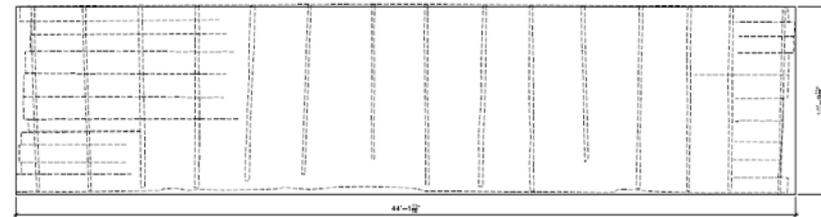
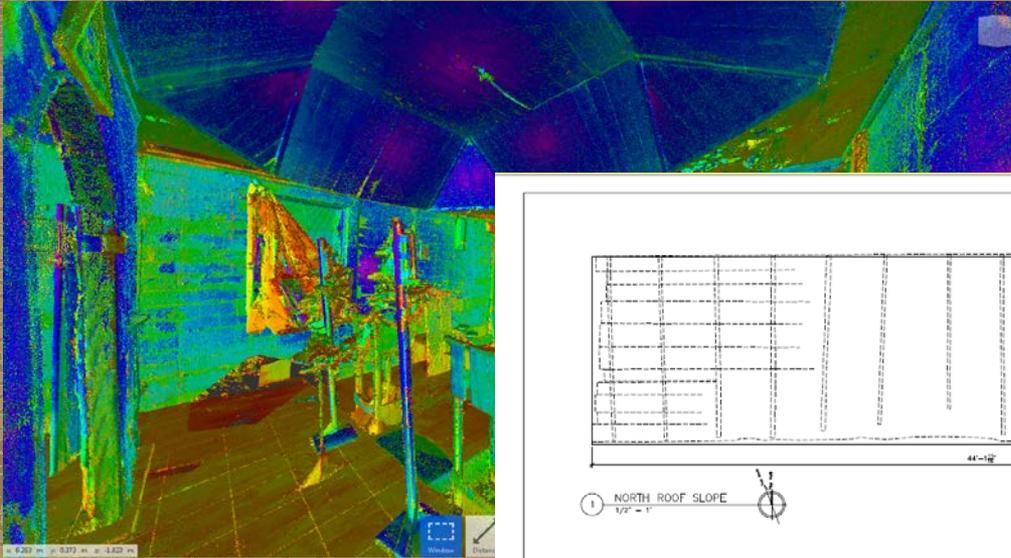
# Kennecott Mill building and surrounding site - WRST



# Saints Sergius and Herman of Valaam Church- Nanwalek

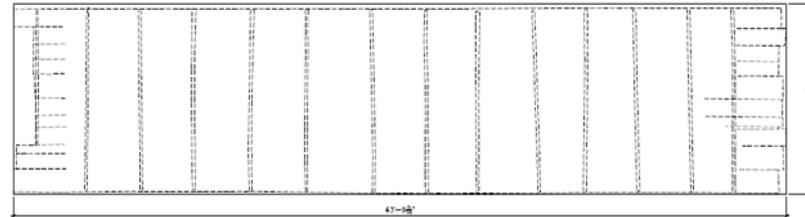


# Saints Sergius and Herman of Valaam Church- Nanwalek



Area to Cover = 477,355 sq. ft.

1 NORTH ROOF SLOPE  
1/2" = 1'

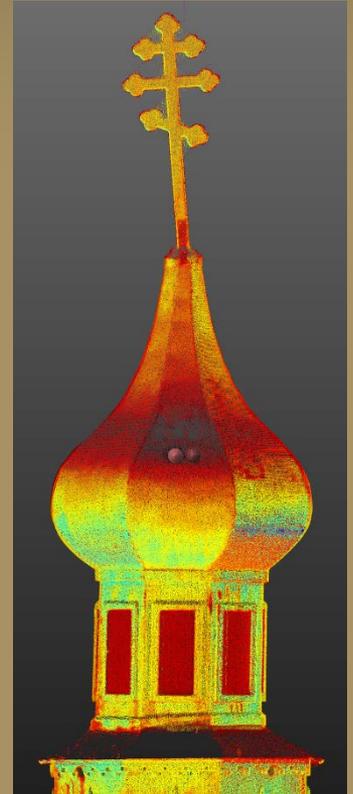
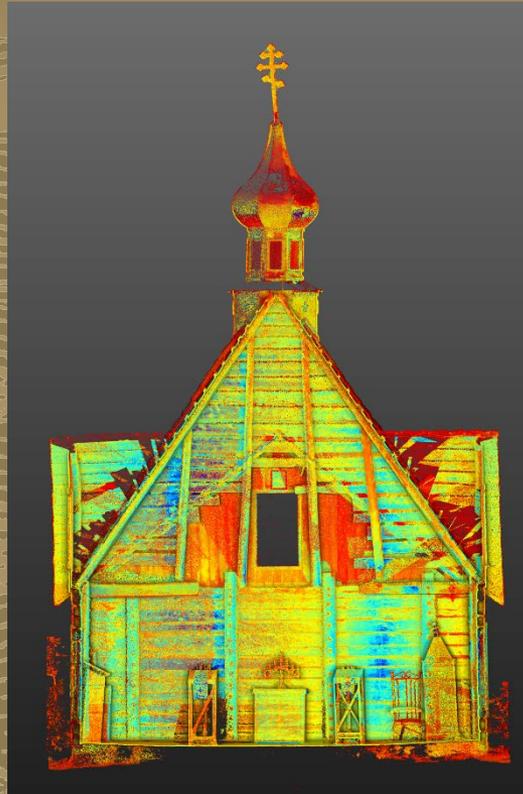
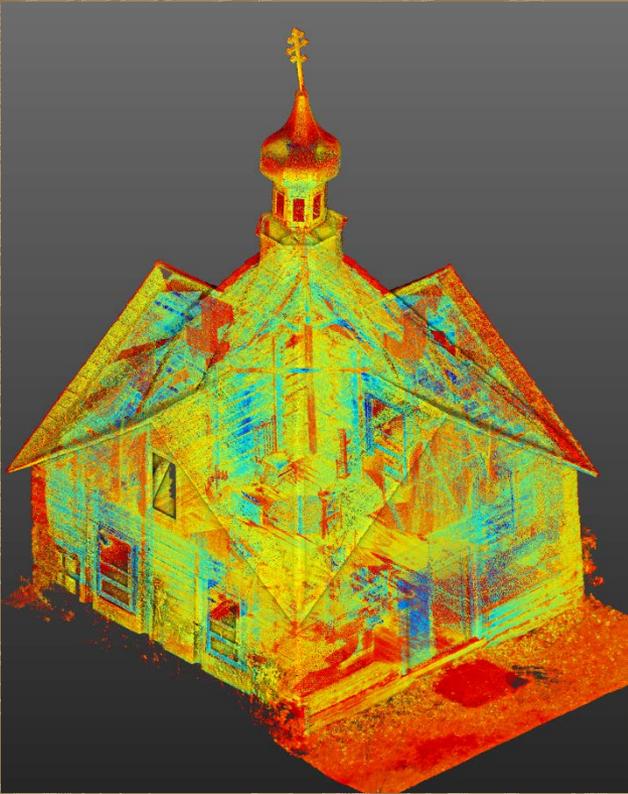


Area to Cover = 478,607 sq. ft.

1 SOUTH ROOF SLOPE  
1/2" = 1'

DESIGNED	DATE	PROJECT NO.	SAINTS SERGIUS AND HERMAN OF VALAAM CHURCH	DRAWING NO.
NOTED			ROOF ESTIMATES	
DATE			NANAIKIV, ALASKA	
BY				

# Holy Assumption Church and Chapel - Kenai



# Rough Time comparisons

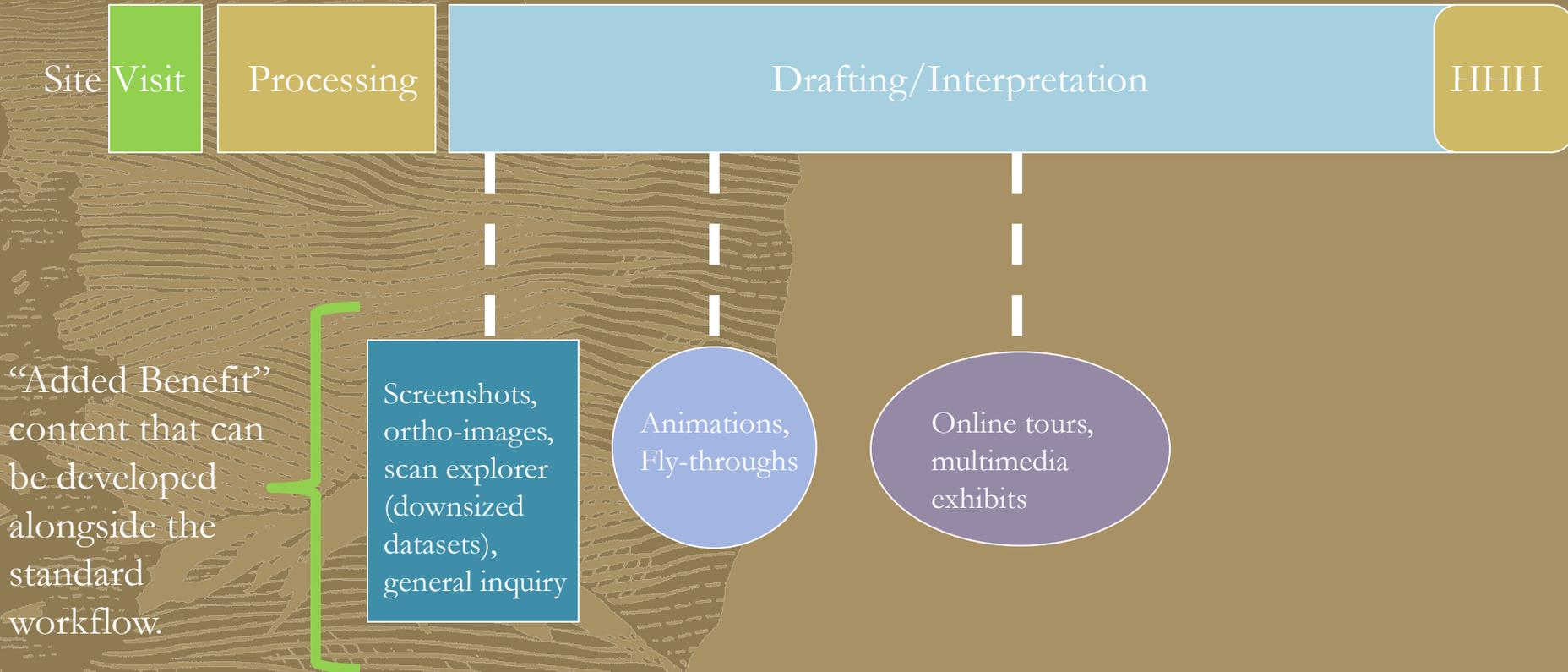


Traditional summer project with 2-3 person team, more time in the field, two site visits

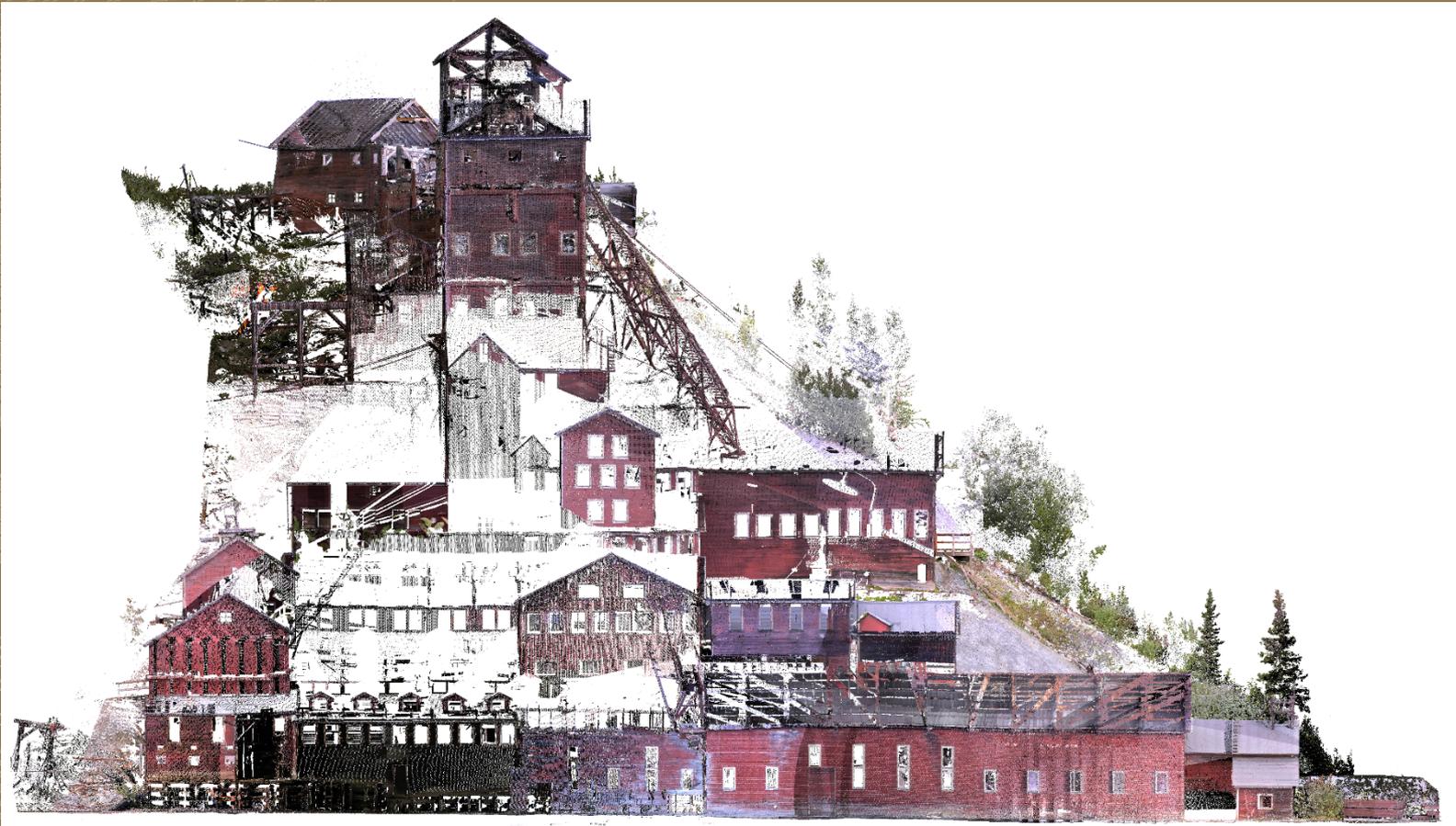


Scanning project, can be fewer members in the field, less time in field, but note processing time in office

# What can be produced from the data?



## Samples of added benefit content



## Samples of added benefit content



## Real Data Samples

- Trimble RealWorks
- Trimble Business Center