



# Mining the Digital Twin

February 20, 2020

# Mandli Communications, INC.



Ray Mandli, CEO

- Established in 1983
- Based in Fitchburg, WI
- 170+ experienced team members
- Worked with 30+ DOTs
- Collected Data in all 50 states
- First pavement collection in 2002



PAVEMENT



ASSET  
INVENTORY



INTERSECTION  
MODELING



ASSET  
ENCROACHMENT



RIGHT-OF-WAY  
IMAGING



CURVE &  
GRADE

# Today . .

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➤ Early Data Collection

➤ LiDAR

➤ What's Next?

# Early Data Collection

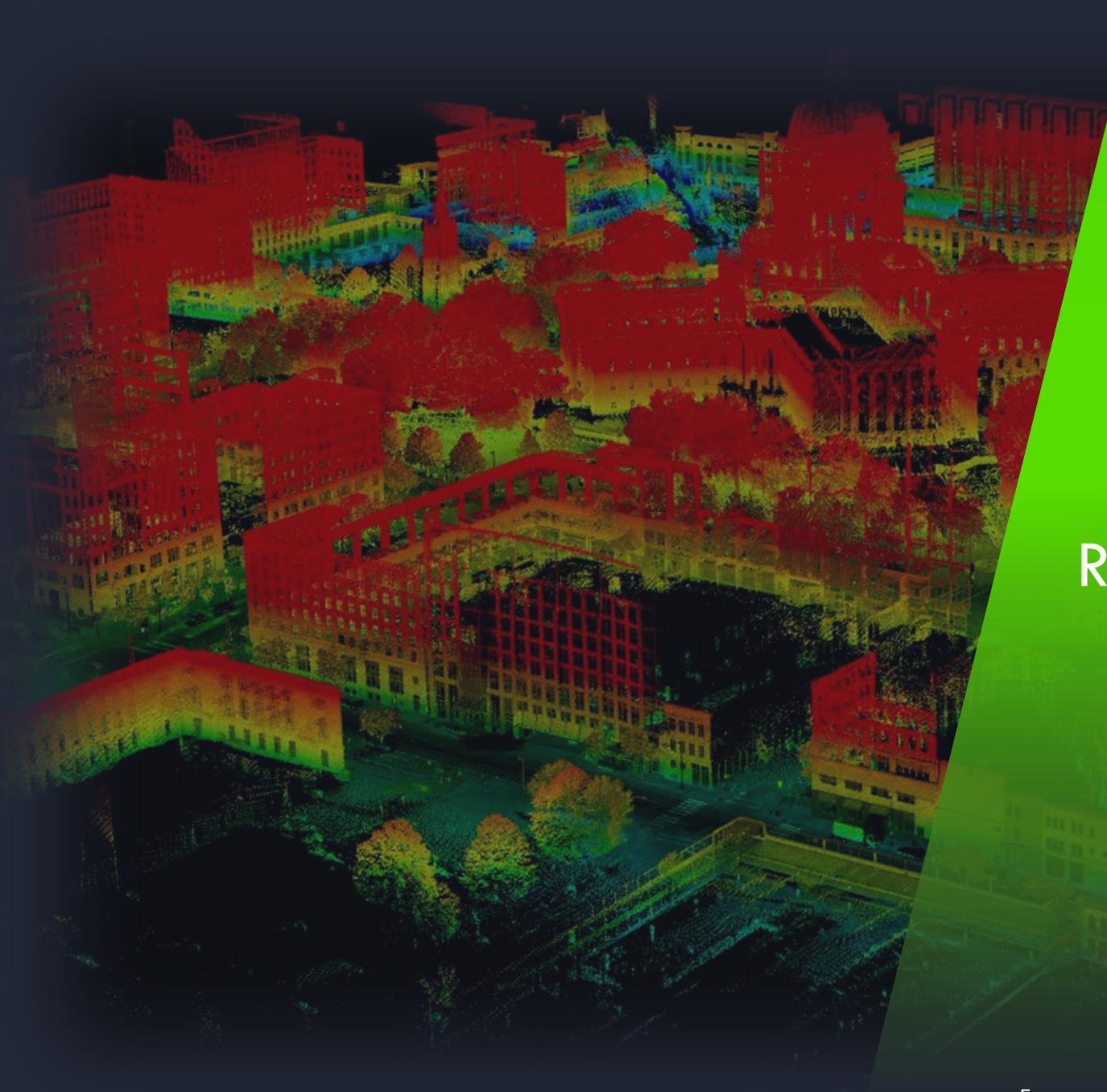
Visual Survey



Pavement



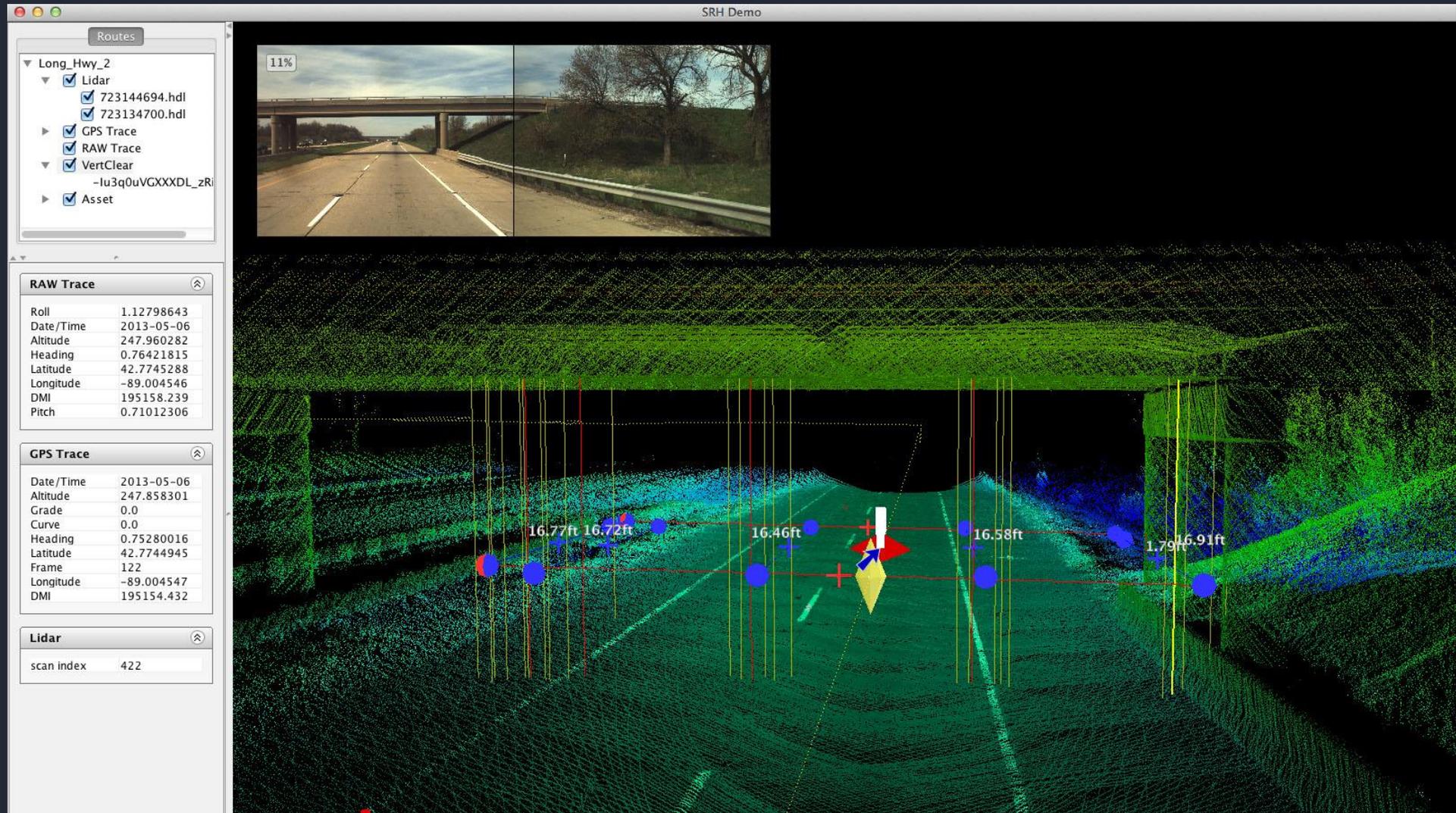
Early Photolog

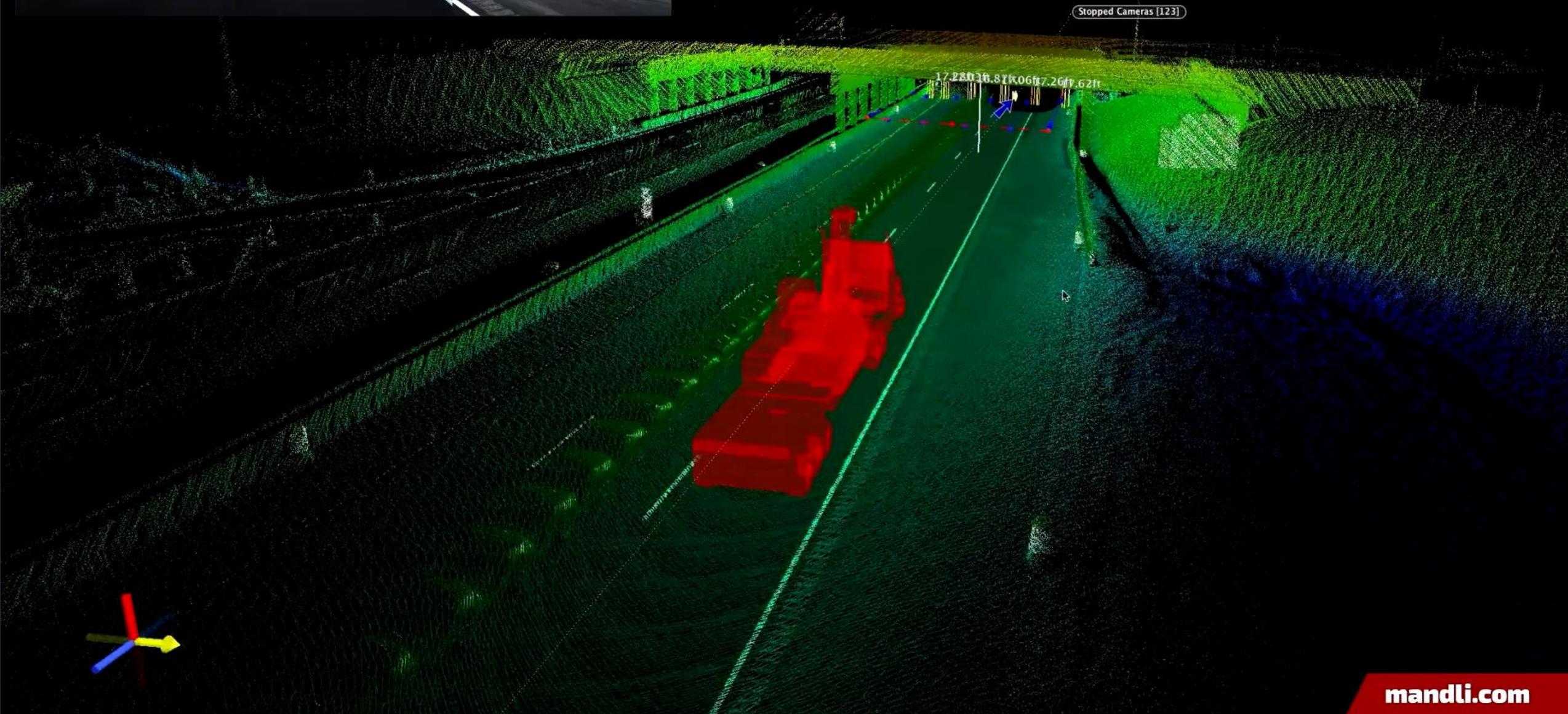


# LiDAR

Robust Data Visualization

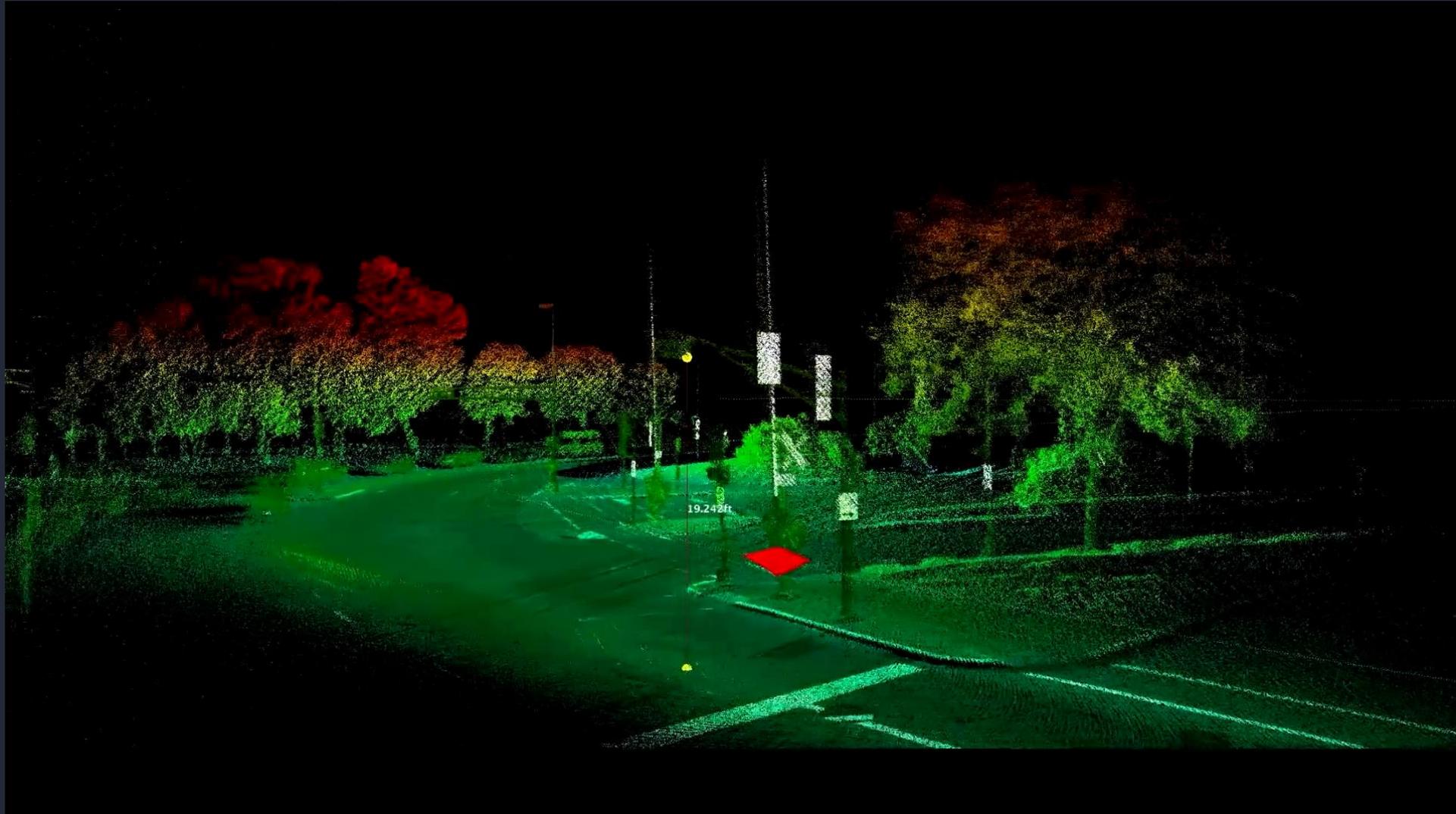
# LiDAR: Vertical Clearances



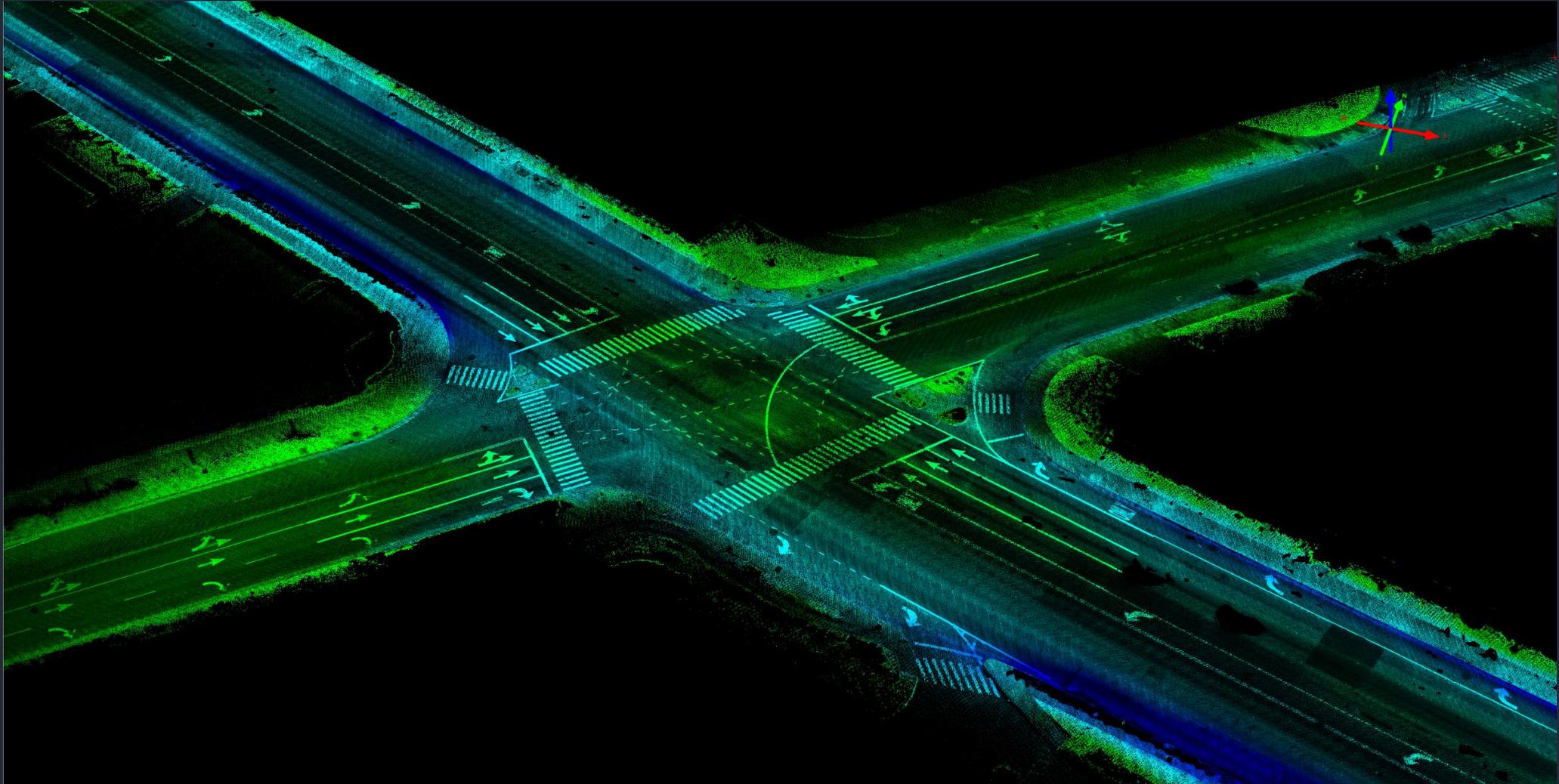


# LiDAR: Assets

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# LiDAR: LDTM, Digital Twins, As-Builts



# LiDAR: LDTM, Digital Twins, As-Builts



# LiDAR: HAD Maps



# What's Next

New Tech on the Horizon

# What's Next: 4D Camera

**Lane Keep System Machine Vision Test** | Baseline Scenarios: Light and Shadow

MANDLI COMMUNICATIONS

Panel	Score	Components
1	62.6	Passive Camera, Lane Keep System
2	91.9	3DLi Camera, Color Space Conversion, Lane Keep System
3	99.9	3DLi Camera, Vector Processing, vHAD™ Map

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# What's Next: Data Sourcing



**Latency: 6months vs 1 day**  
**Cost to DOT: \$200/mile vs. \$5/mile**



Specialty Collection Vehicle

Every Vehicle on the Road

Vector Processed Data

ADAS Imagery

Collected/Extracted Assets



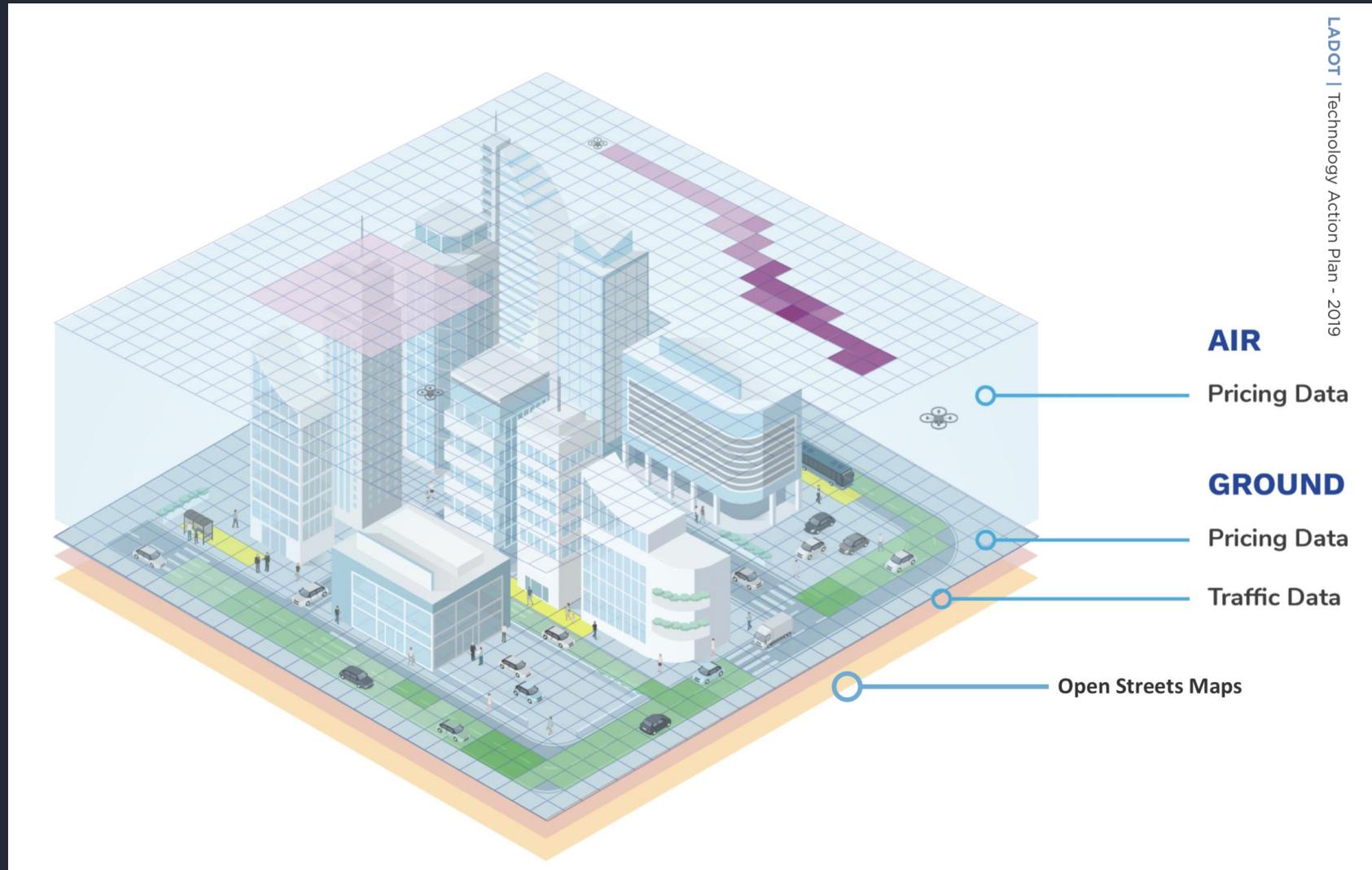
- Photolog
- Pavement Condition
- Asset Inventory
- Etc.



Dynamic Mapping Center



# What's Next: Coding the Curb



# What's Next: Coding the Curb



# What's Next: AV Organizations





GTiMA (2011)



AV Forum (2017)



WI ACES



WISCONSIN PROVING GROUNDS  
(2017)

- Automated
  - Connected
  - Electric
  - Shared
- Governor's Steering Committee  
on Autonomous and Connected Vehicle  
Testing and Deployment  
(2017)



## AV Forum

Tuesday, March 10 | 9 - 11:30 a.m.

Join your peers in the AV sector as we come together for another informative session and continue the conversation on autonomous vehicles and their future in Wisconsin and beyond.

### EVENT LOCATION:

**HNTB**  
250 E Wisconsin Ave  
Suite 2000  
Milwaukee, WI 53202

*Presentation will also be available via webinar.*

### FEATURED SPEAKERS:

Ashley Booth – HNTB  
Steve Caya – Roadview  
Steve Cyra – HNTB  
Art Harrington – Godfrey & Kahn, S.C.  
Ray Mandli – Mandli Communications  
Loreana Marciante – HNTB



Thank You