



GIS for Public Transit Safety

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Washington Metropolitan Area Transit Authority (WMATA)

Geographic Information Systems in Transportation Safety Conference

National Transportation Safety Board

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Outline

Purpose: Show how GIS can be used to support public transit safety

- Challenges
- Foundations
- Possibilities (general capabilities, not specific WMATA capacities or plans)
- Principles for implementation



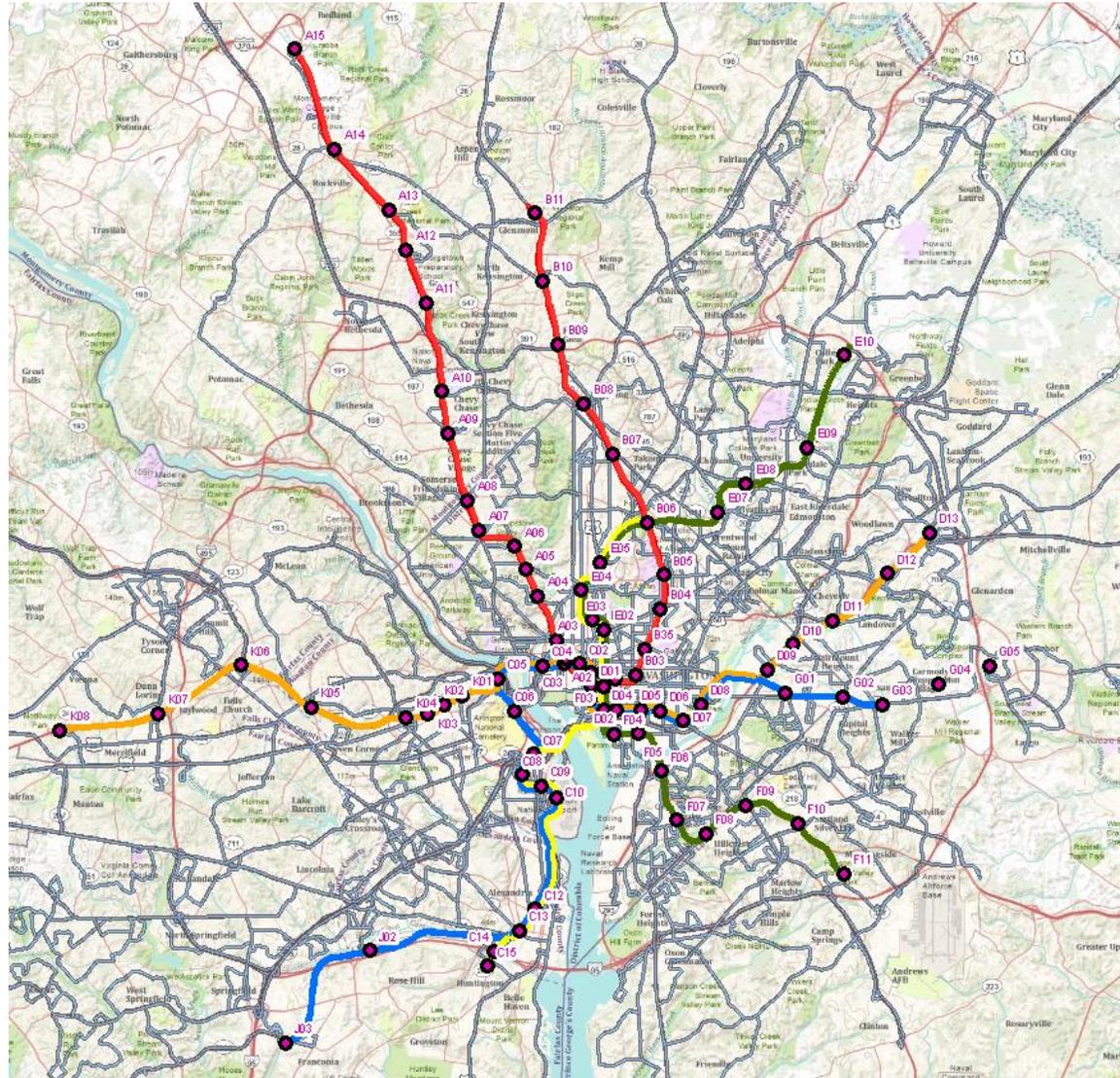
GIS Purpose and Role

GIS integrates geography and relational databases

- Geographic data capture and display
- Geographic analysis
- Geographic data base management
- Data integrity
- Data integration



Challenge: Scope and Scale of Services



- **WMATA** provides passenger transit rail, bus and paratransit services for DC and surrounding areas of MD and VA (1,500 sq mi).
- **Rail:** 103 mi track; 86 stations; 850 railcars; 217M annual ridership
- **Bus:** 11,500 stops; 350 routes; 1,480 buses; 124M annual ridership
- **Paratransit:** 600 vehicles; 2.4M annual ridership
- **Infrastructure:** Structures, track, power, signals, HVAC, drainage, IT networks, etc.
- **Support:** Safety; Police; Planning; Real Estate; Environmental Management



Transit GIS Challenges

- Location
- Precision
- Time
- Transit network
- IT span
- Data Integration



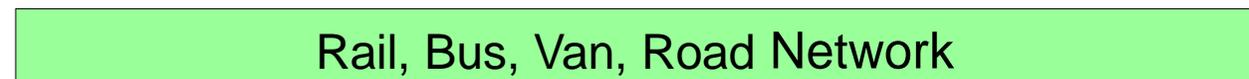
Business and Data Foundations

Strategic Portfolio of Enterprise Transit GIS

Fixed Asset Management



Transit Operations



- Stops, time points, chain markers, waypoints
- Patterns, routes, lines, transfers
- Performance (vehicles, trips, blocks)

Support Operations





IT Infrastructure Foundation

- Enterprise GIS software
- Data, data models, and data maintenance procedures
- Servers, storage, network
- Production, staging, development environments
- Desktop, web, application access
- Internal and public information
- Scale-up capacity
- Security and disaster recovery



Worker Safety

Roadway Access Guide

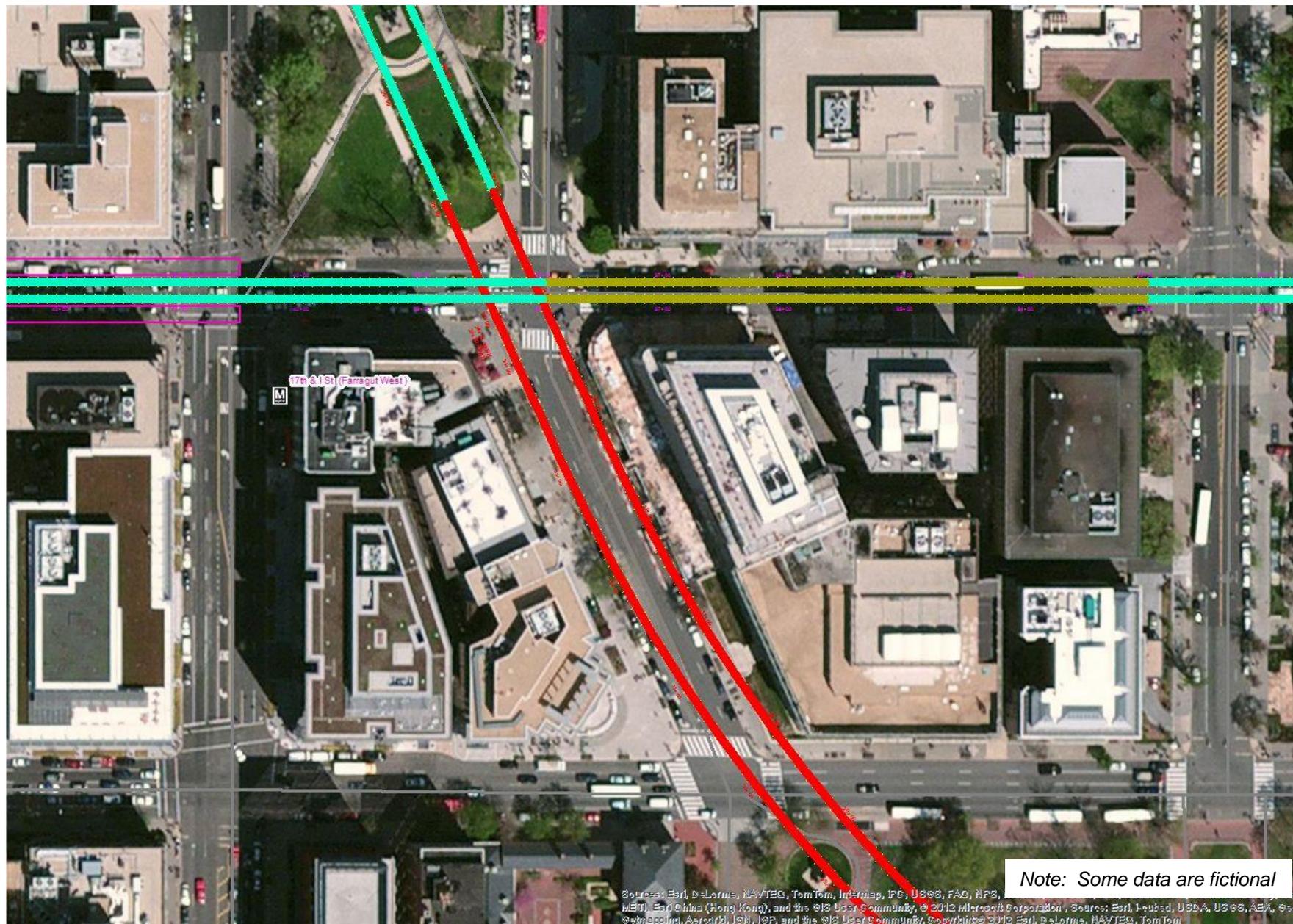
M LINE									
	TRACK 1			M LINE		TRACK 2			
RWP	NOTES	STATION END	STATION START	Ch, Mkr # start	ch, Mkr# end	STATION START	STATION END	NOTES	RWP
	CLEAR VIEW	M01	M02	34+00	59+00	M01	M02	CLEAR VIEW	
	CURVE: RESTRICTED VIEW	M01	M02	59+00	69+00	M01	M02	CURVE: RESTRICTED VIEW	
	CLEAR VIEW	M01	M02	69+00	79+00	M01	M02	CLEAR VIEW	
	CLEAR VIEW	M02	M03	79+00	104+00	M02	M03	CLEAR VIEW	
	CLEAR VIEW	M03	M04	104+00	124+00	M03	M04	CLEAR VIEW	
	HILL: RESTRICTED VIEW	M03	M04	124+00	144+00	M03	M04	HILL: RESTRICTED VIEW	
	CLEAR VIEW	M03	M04	144+00	164+00	M03	M04	CLEAR VIEW	
	CLEAR VIEW	M04	M05	164+00	184+00	M04	M05	CLEAR VIEW	
	CLEAR VIEW	M04	M05	184+00	194+00	M04	M05	HILL: RESTRICTED VIEW	
	HILL: RESTRICTED VIEW	M04	M05	194+00	204+00	M04	M05	CLEAR VIEW	
	CLEAR VIEW	M05	M06	204+00	219+00	M05	M06	CLEAR VIEW	
	HILL: RESTRICTED VIEW	M05	M06	219+00	234+00	M05	M06	HILL: RESTRICTED VIEW	

Note: Data are fictional



Worker Safety

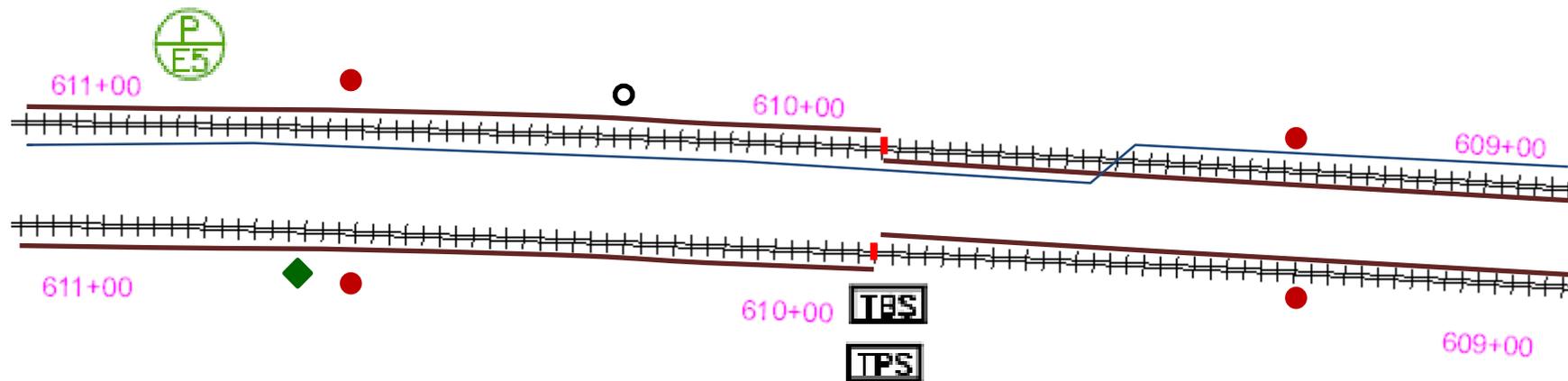
- Roadway Access Guide, mapped





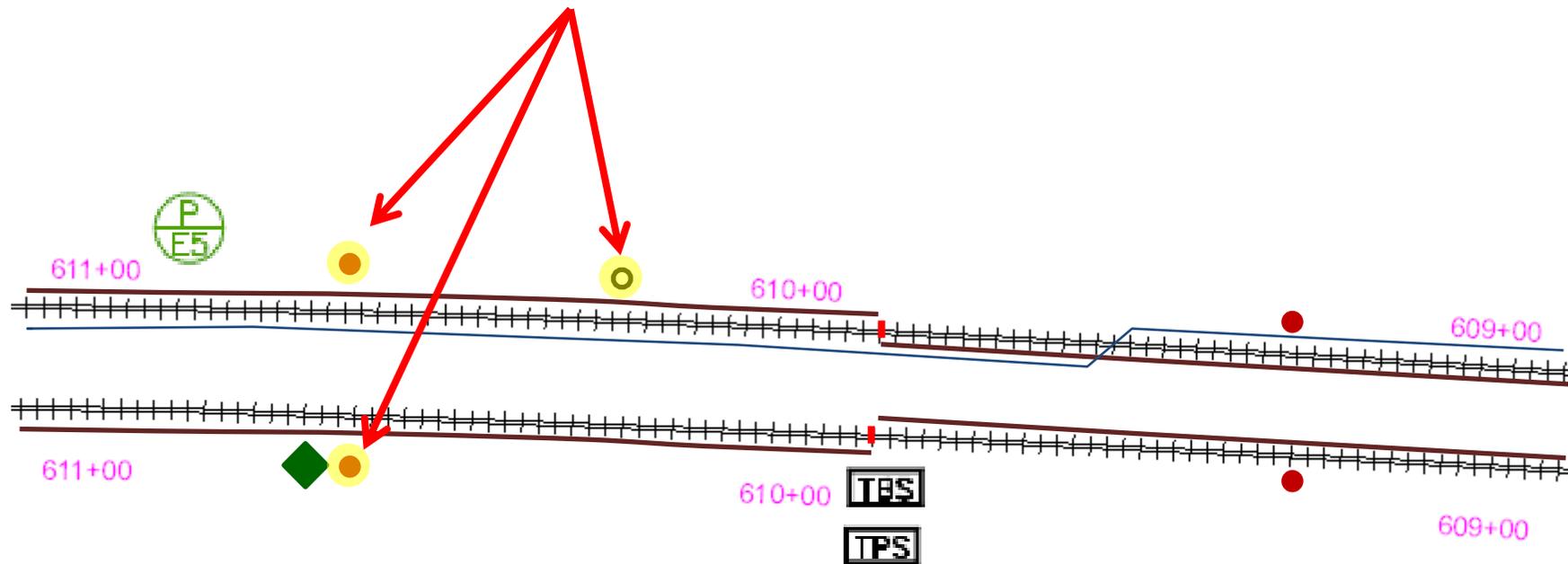
Asset Safety: Inventory and Location

- Asset inventory and maps



Note: Data are fictional

- Assets requiring inspection, maintenance, etc. (from work order management system)



Note: Data are fictional

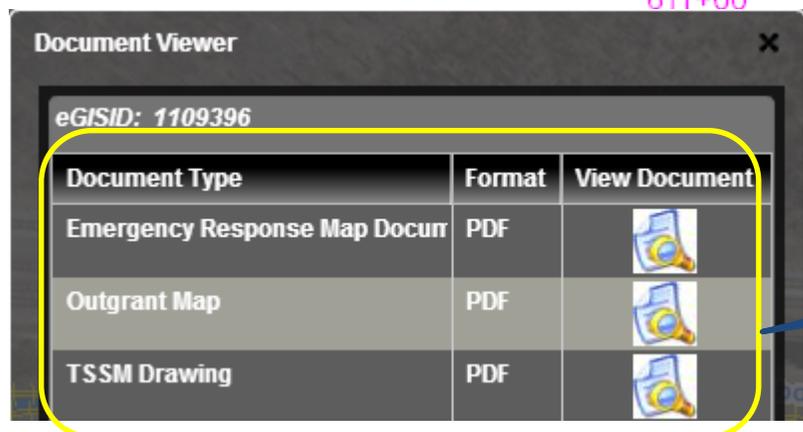
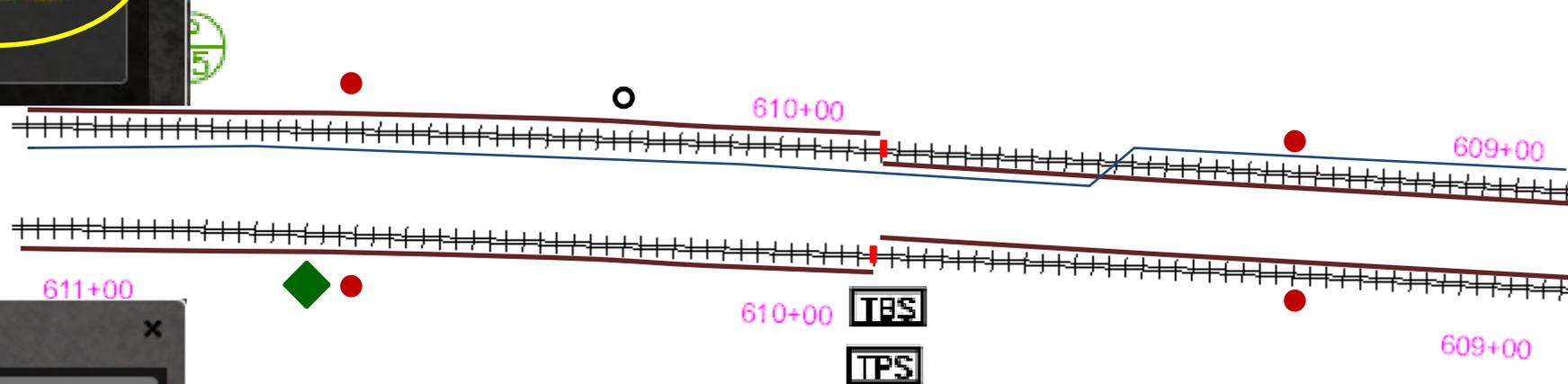


Asset Safety: Views and Documentation

- Detailed documentation and context views.



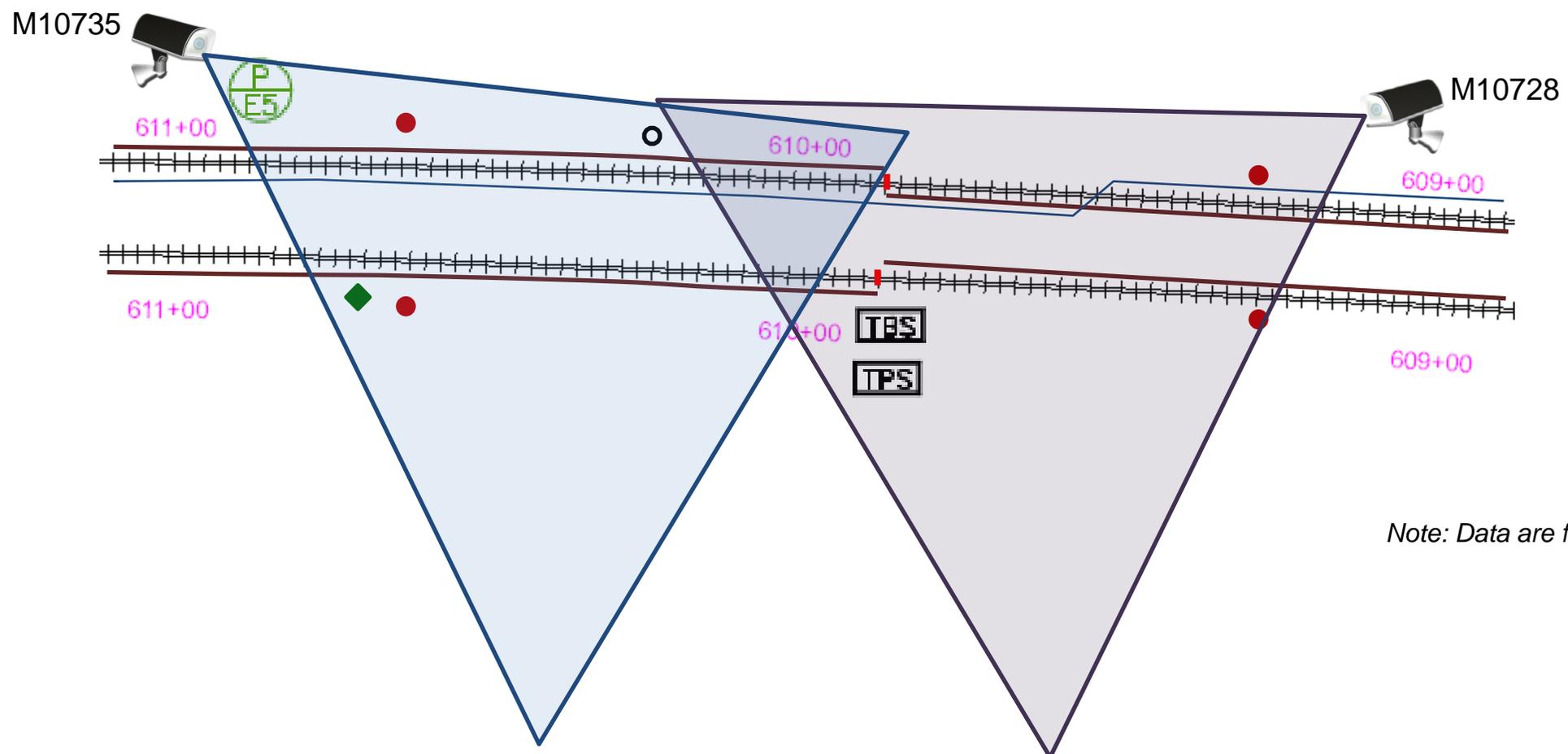
Google StreetView, Bing Imagery



Engineering and other source documents

Note: Data are fictional

- Assets within camera viewsheds

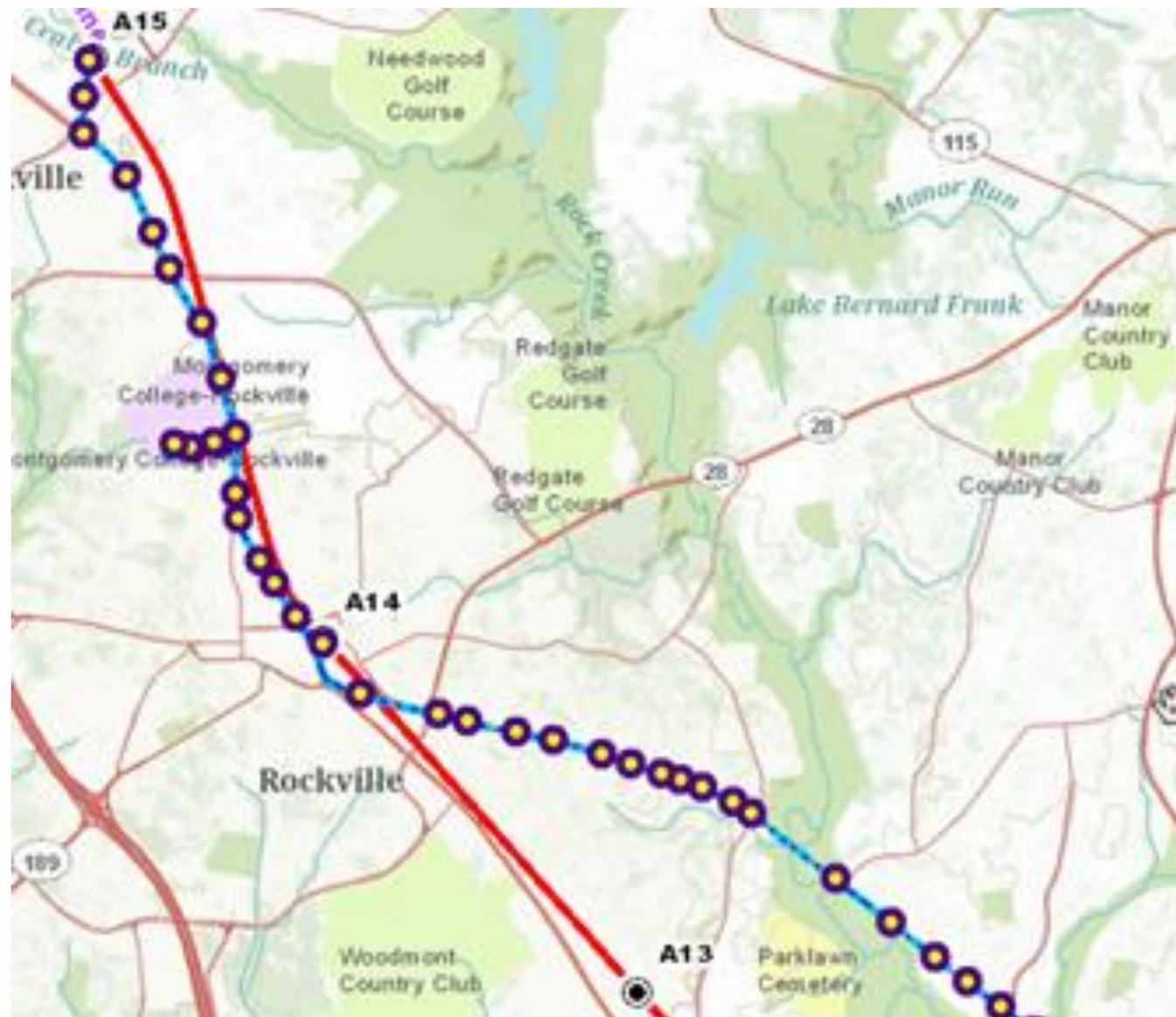


Note: Data are fictional



Situational Awareness

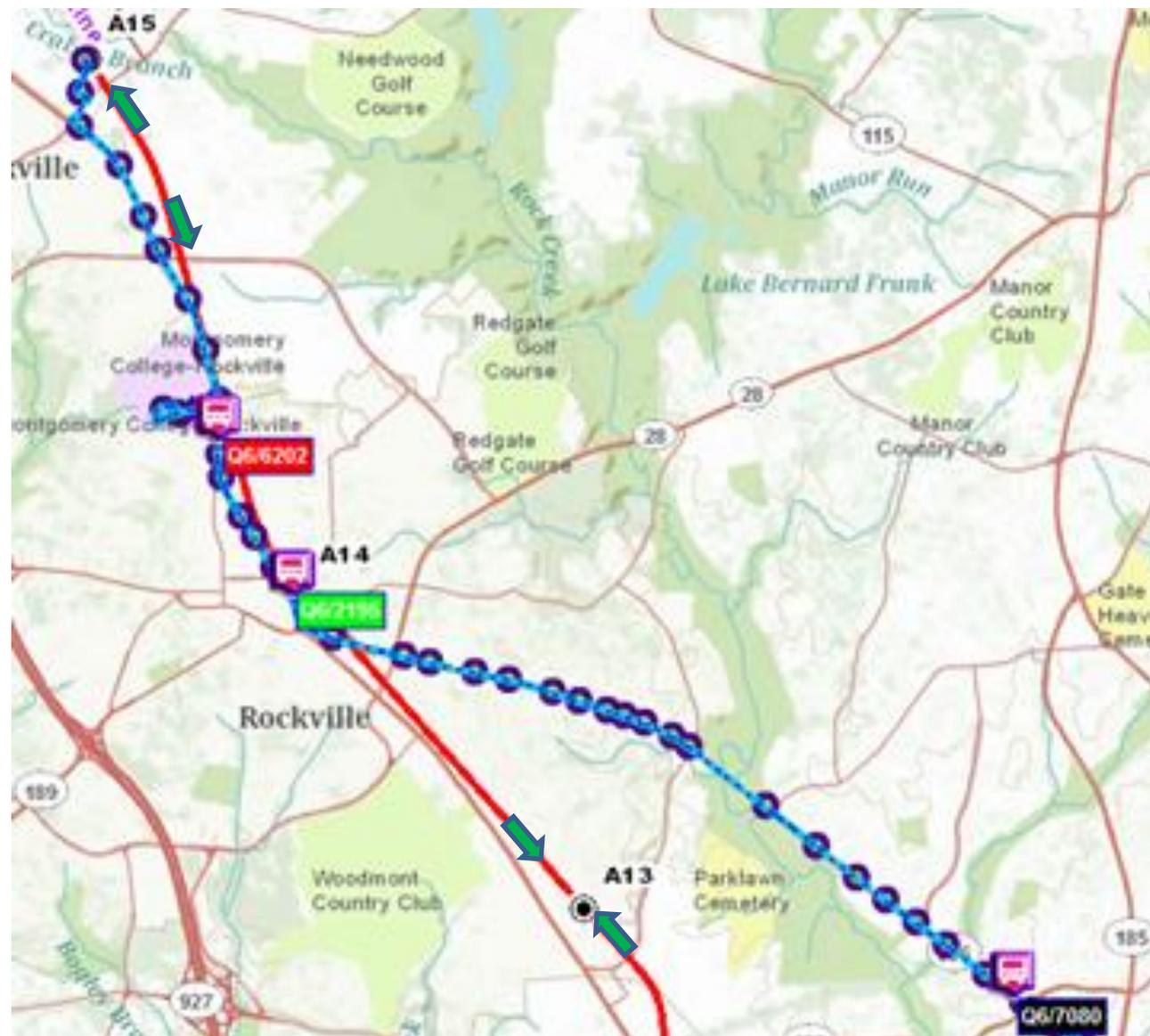
- Routes and Stops





Situational Awareness

- Bus and train locations (updated every 90 sec.)





Situational Awareness

- Alerts, incidents, delays





Situational Awareness

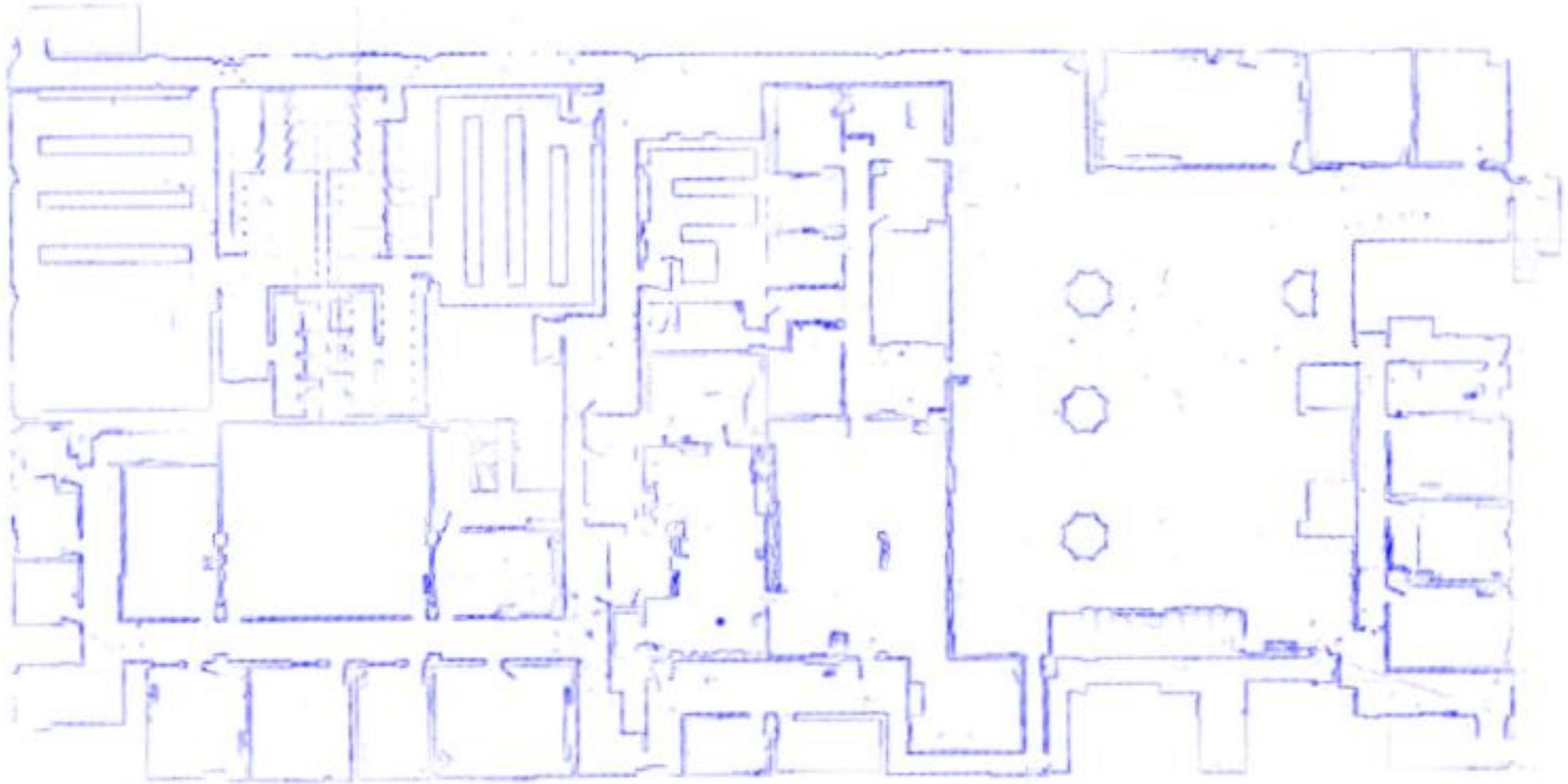
- Crime mapping





Building Mapping

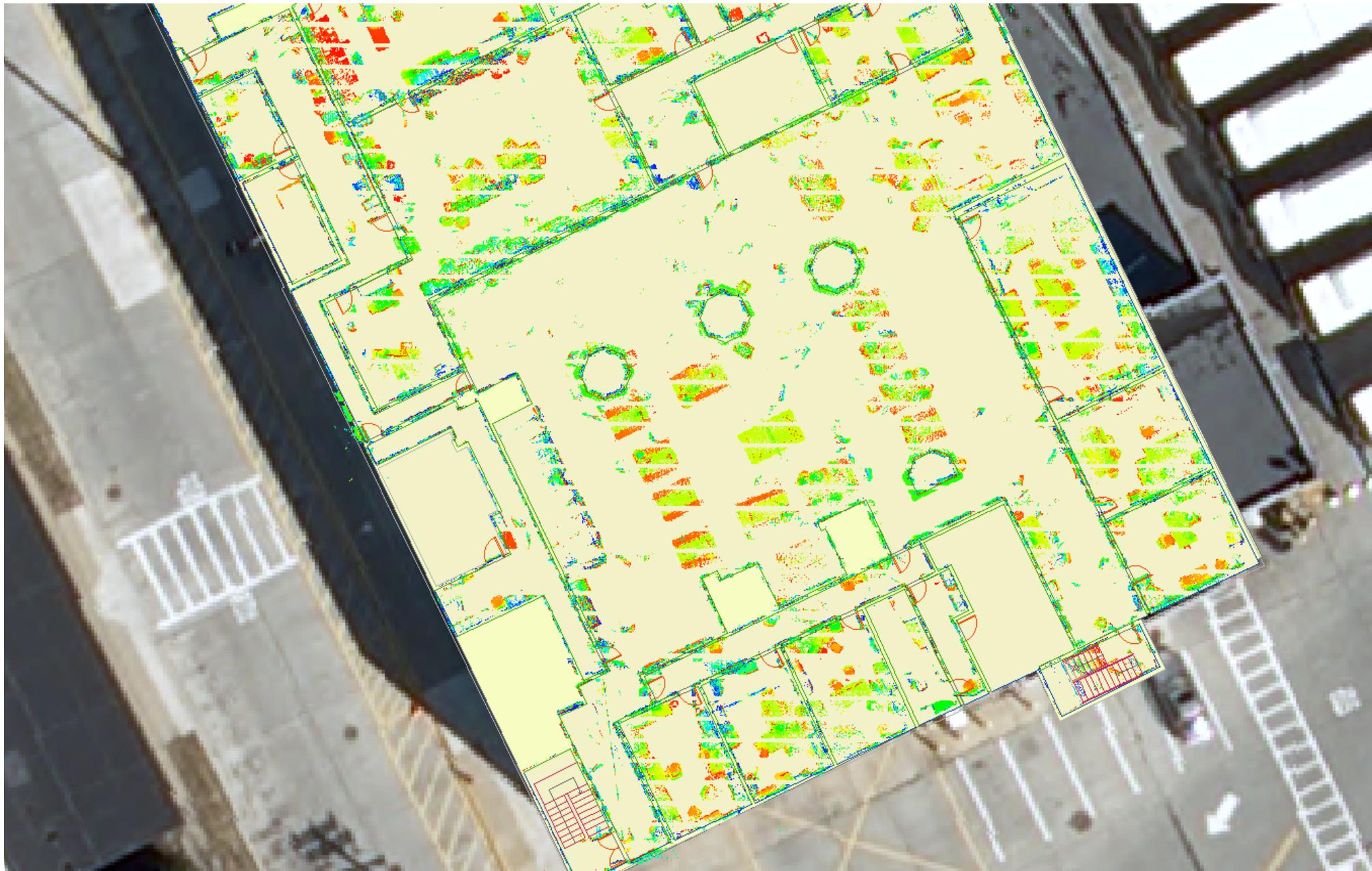
- Floor plan





Building Mapping

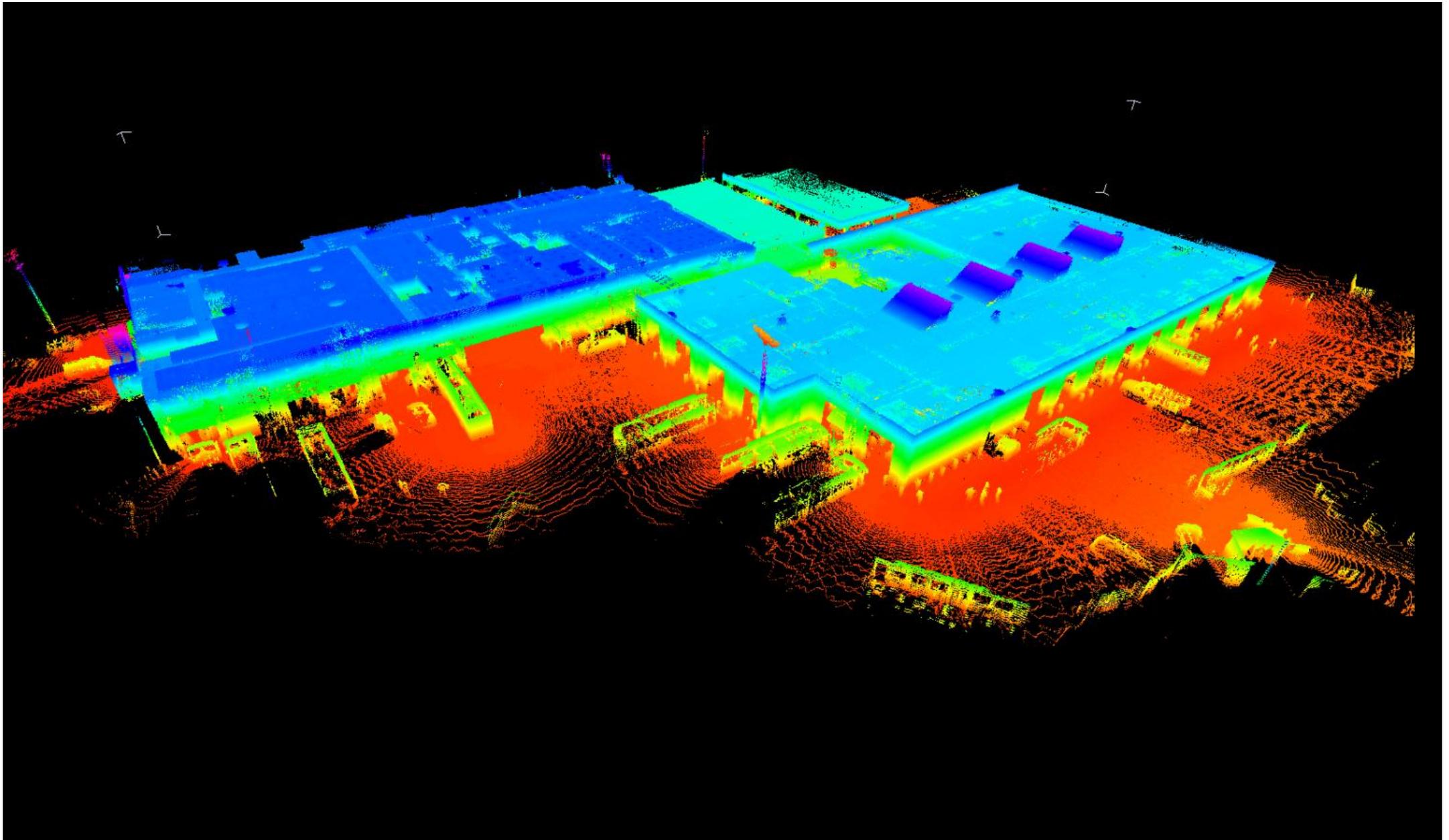
- Georeferenced, and superimposed on imagery





Building Mapping

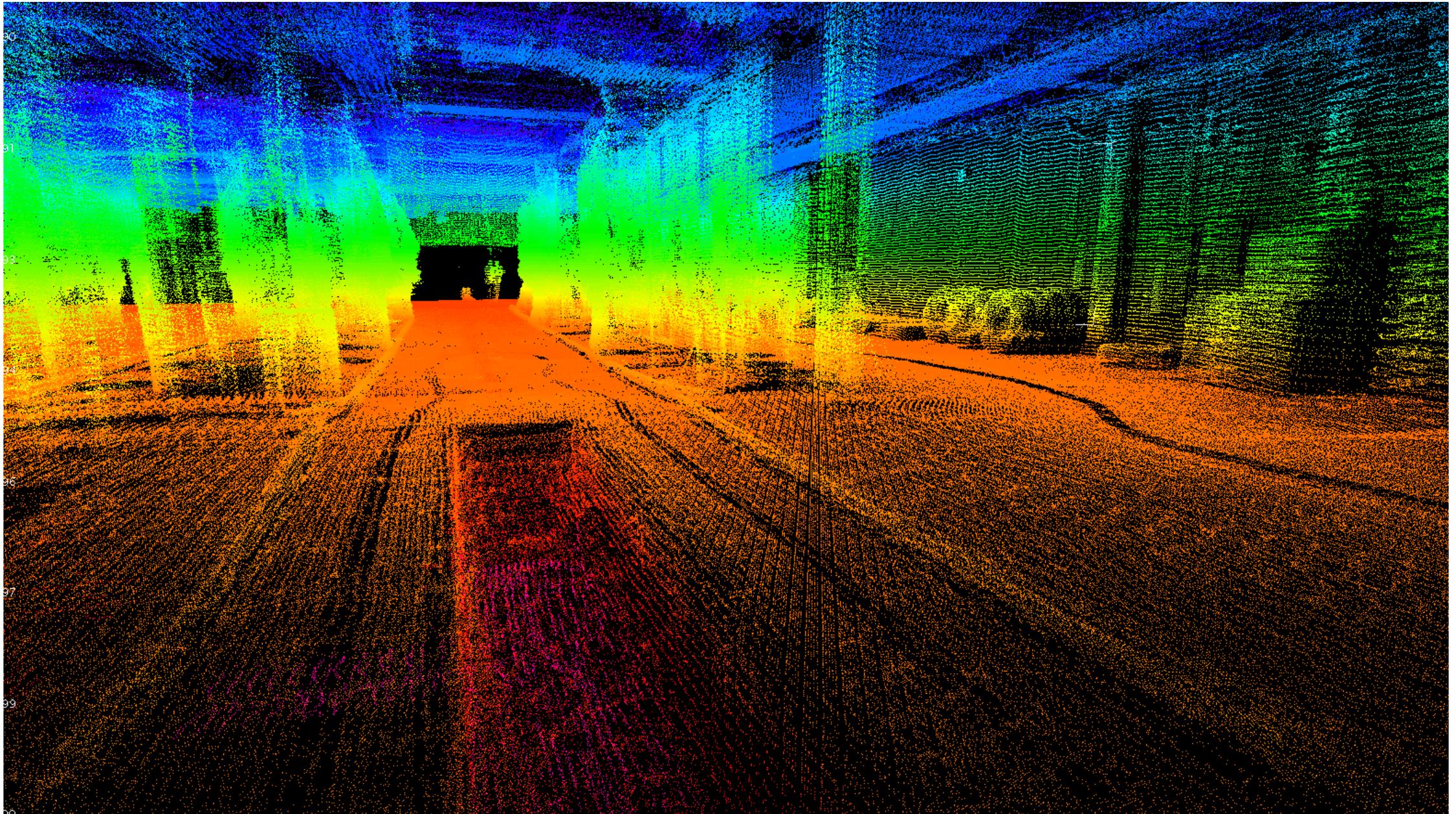
- 3-D exterior view



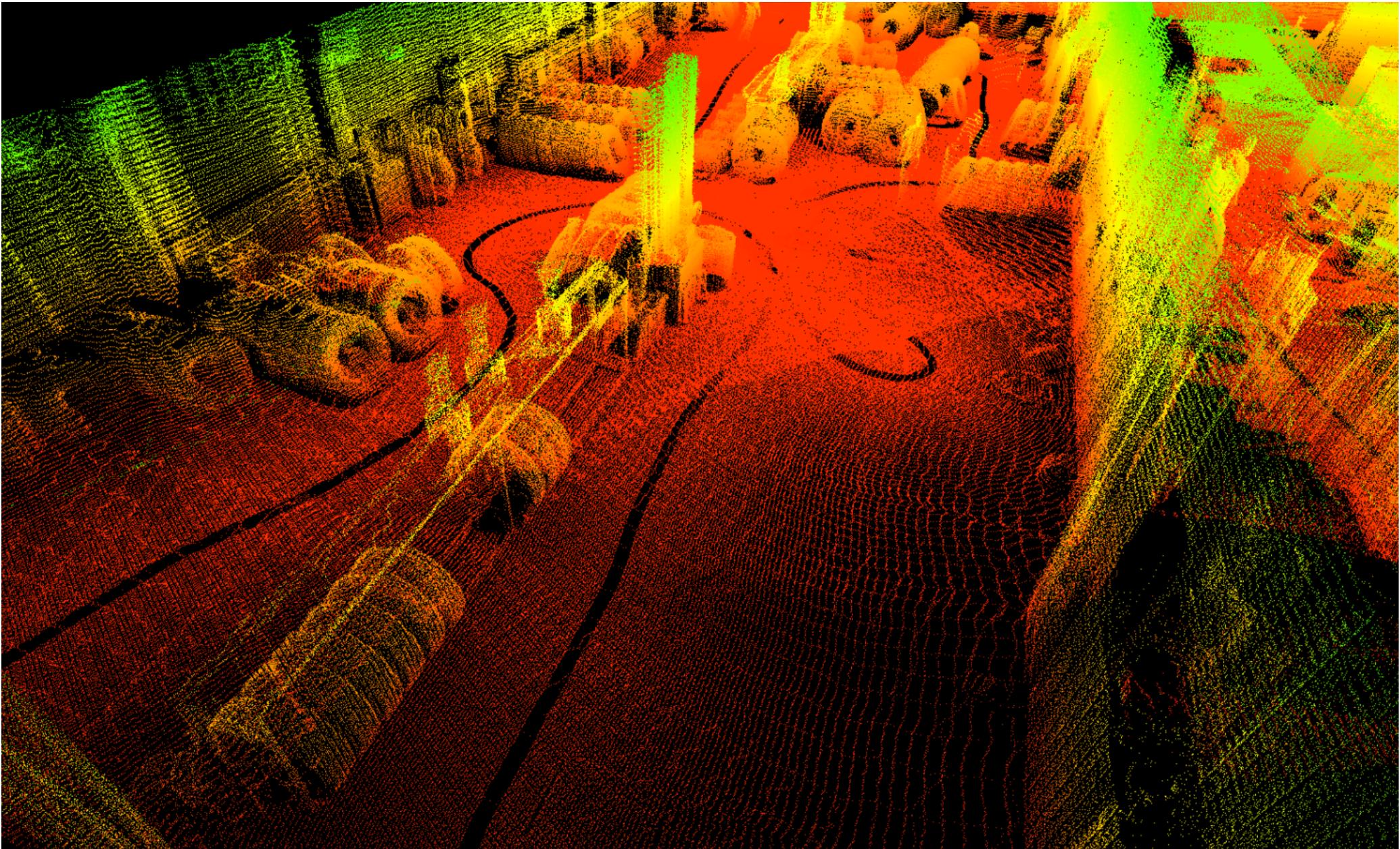


Building Mapping

- Interior view



- Recomputed view





Building Mapping

- 360° Imagery





More Complex Applications

- Incident analytics
- Safety dashboards
- Impact zone and plume dispersion overlays
- Geo-data feeds to external fusion centers
- Station or rail evacuation planning
- Preset map configurations for emergency planning scenarios



Pathways to Success

- Build from simple to complex.
- Write once, use many. (Integrate, don't replicate.)
- Build a close partnership between IT and business departments.
- Use and improve on legacy data.
- Set strategy first, then obtain system infrastructure; then data and maintenance processes. Build applications only after they have a solid foundation.



Questions and Discussion

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