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Model Task Force & Transportation
Data and Analytics Workshop

FTO FORECASTING & TRENDS OFFICE
FDOT TDA TRANSPORTATION DATA & ANALYTICS

District 3
Mobile Imaging Pilot Project

Southeastern Surveying & Mapping Corp.

Southeastern Surveying & Mapping Corp.

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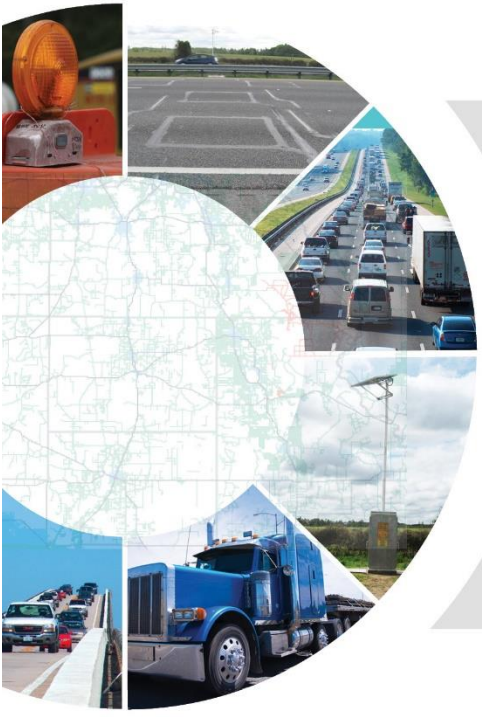
- GIS Developer

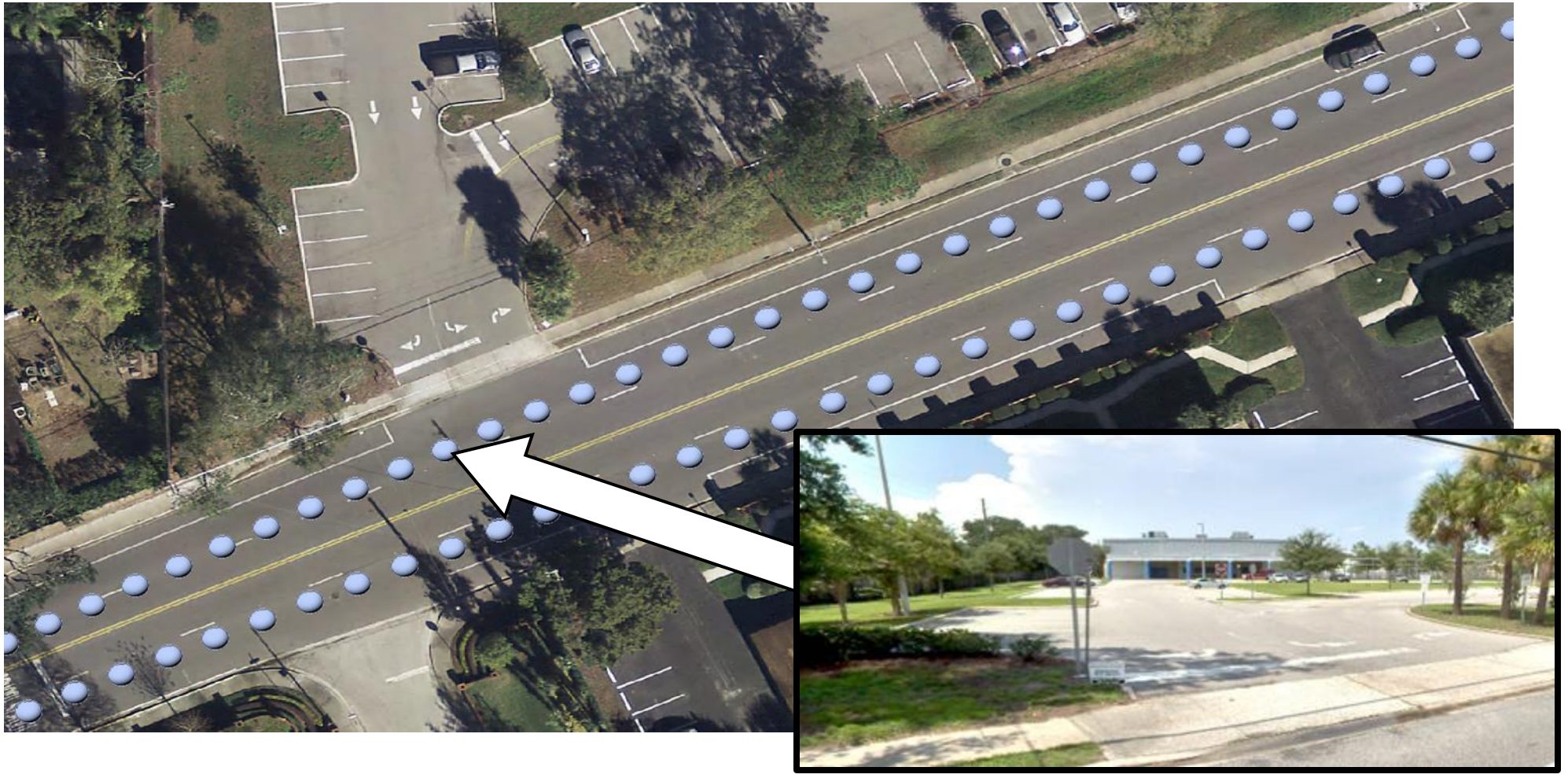
Southeastern Surveying®

100% Employee Owned

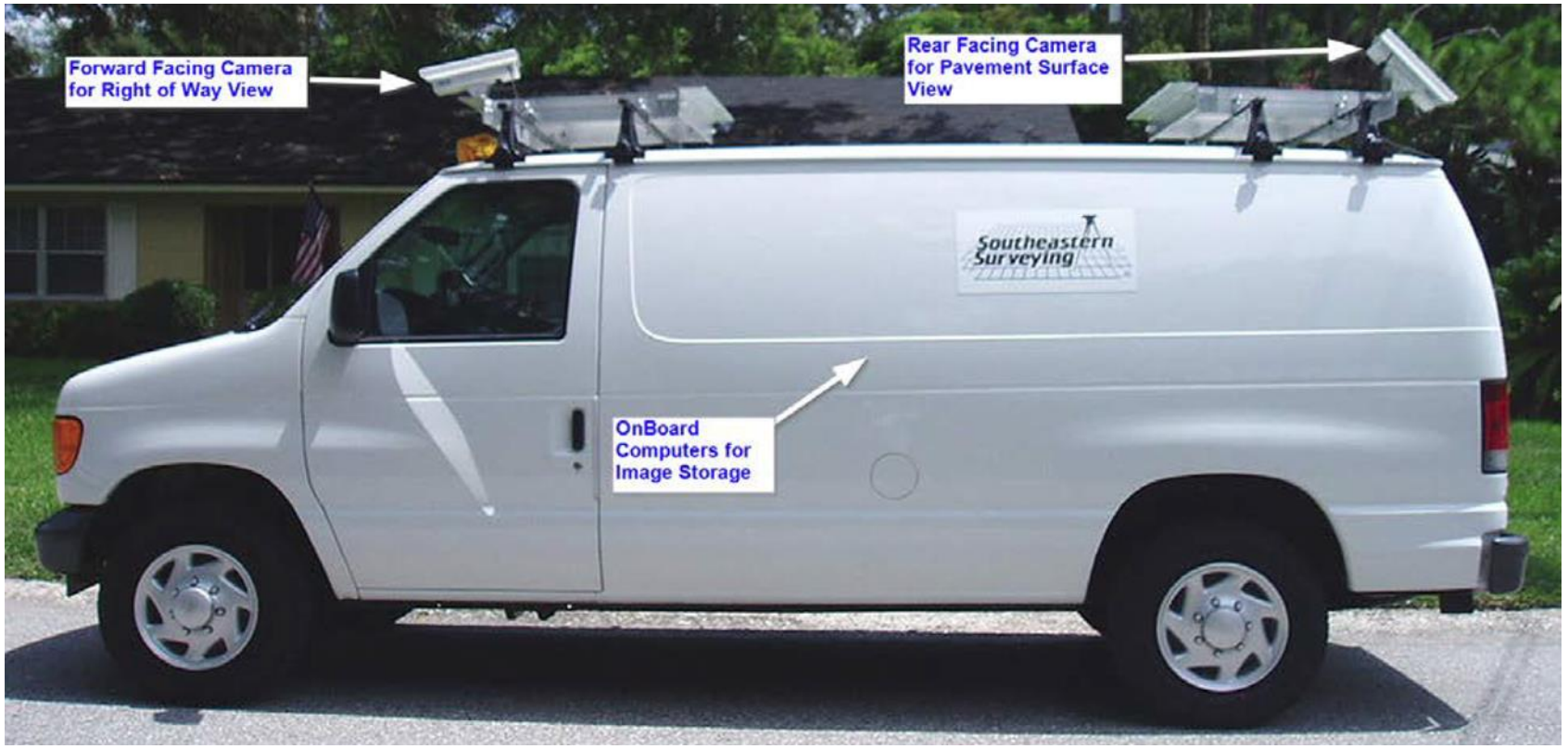


SSMC's Background with Mobile Imaging

What is Mobile Imaging?

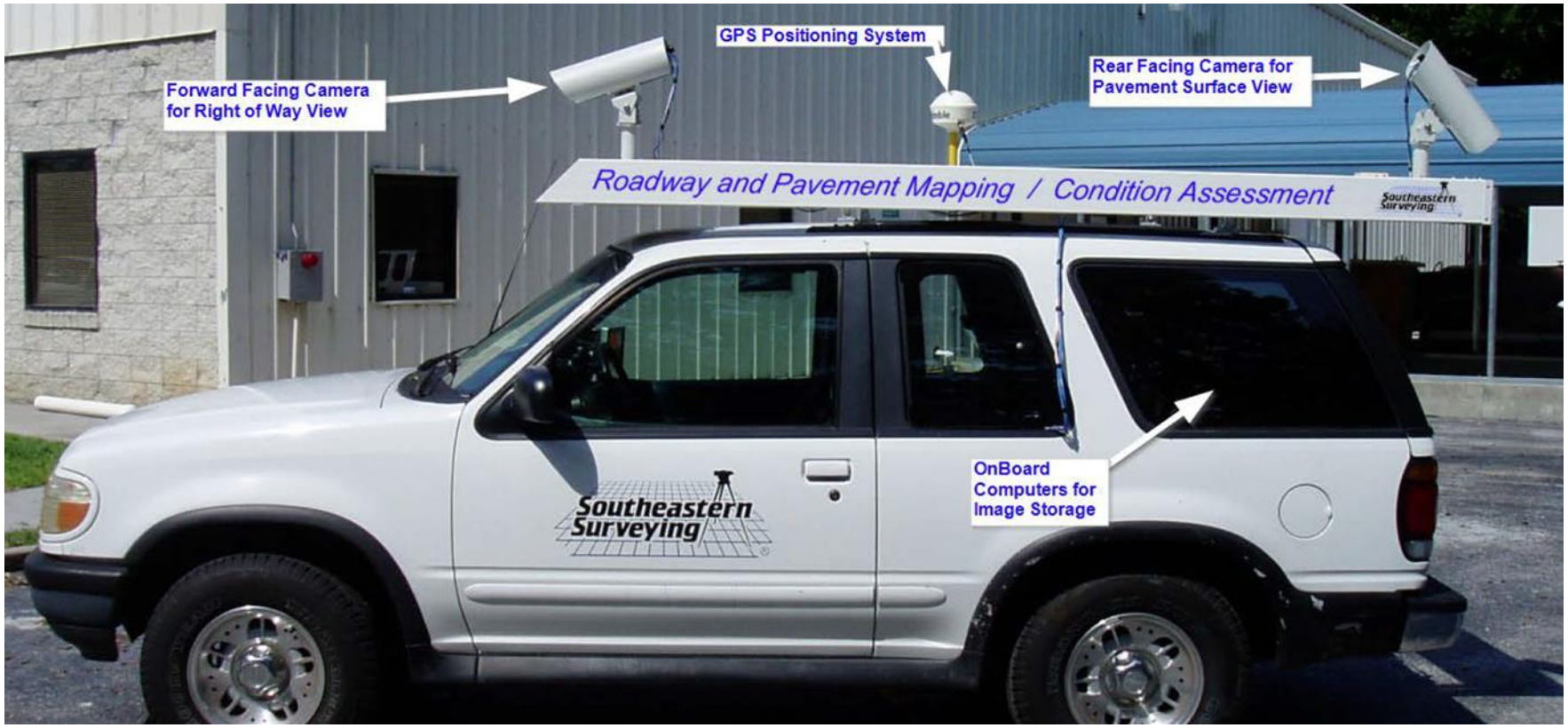


How do we collect Mobile Imaging?



2007: SSMC's 1st Generation Mobile Imaging Vehicle

How do we collect Mobile Imaging?



2009: SSMC's 2nd Generation Mobile Imaging Vehicle

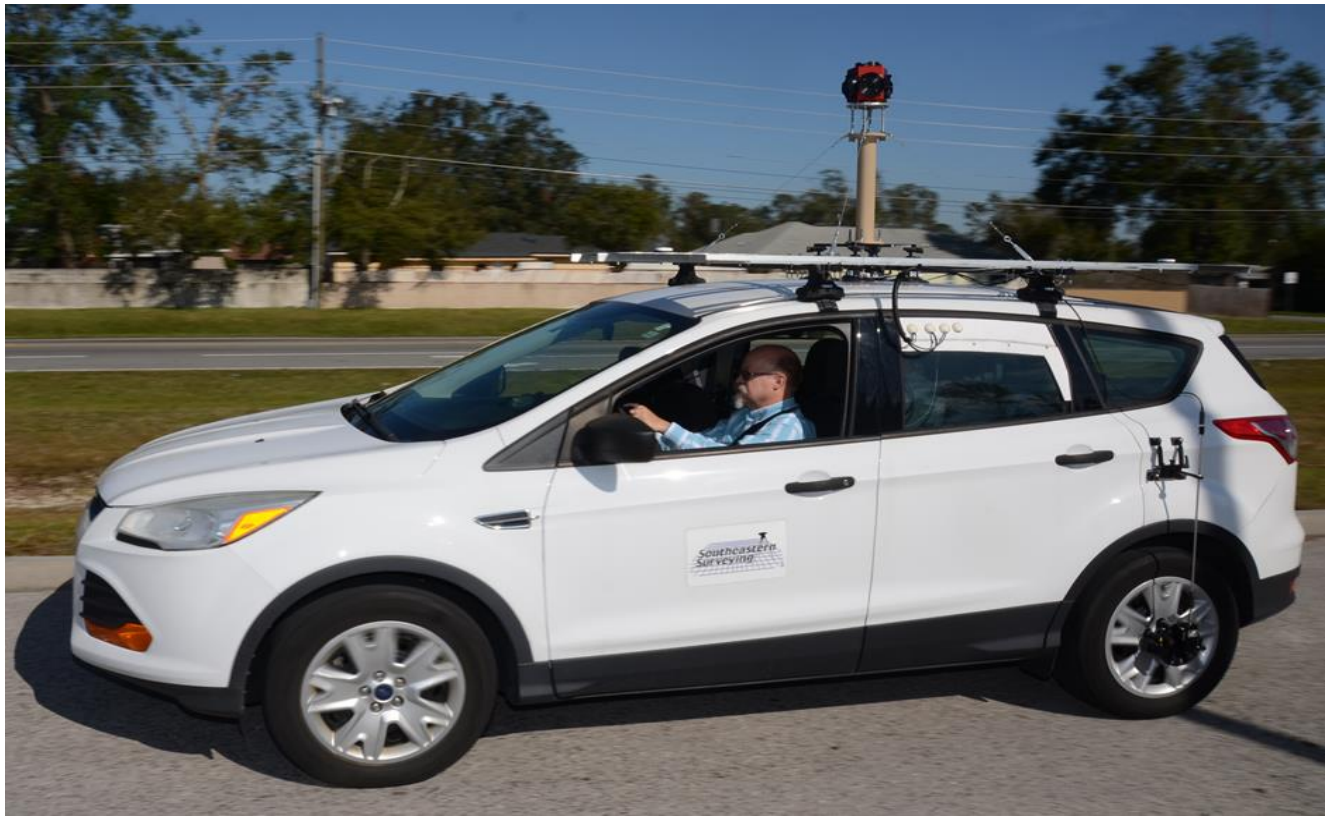
How do we collect Mobile Imaging?

2010: SSMC's 3rd Generation Mobile Imaging Vehicle

How do we collect Mobile Imaging?

2014: SSMC's 4th Generation Mobile Imaging Vehicle

How do we collect Mobile Imaging?



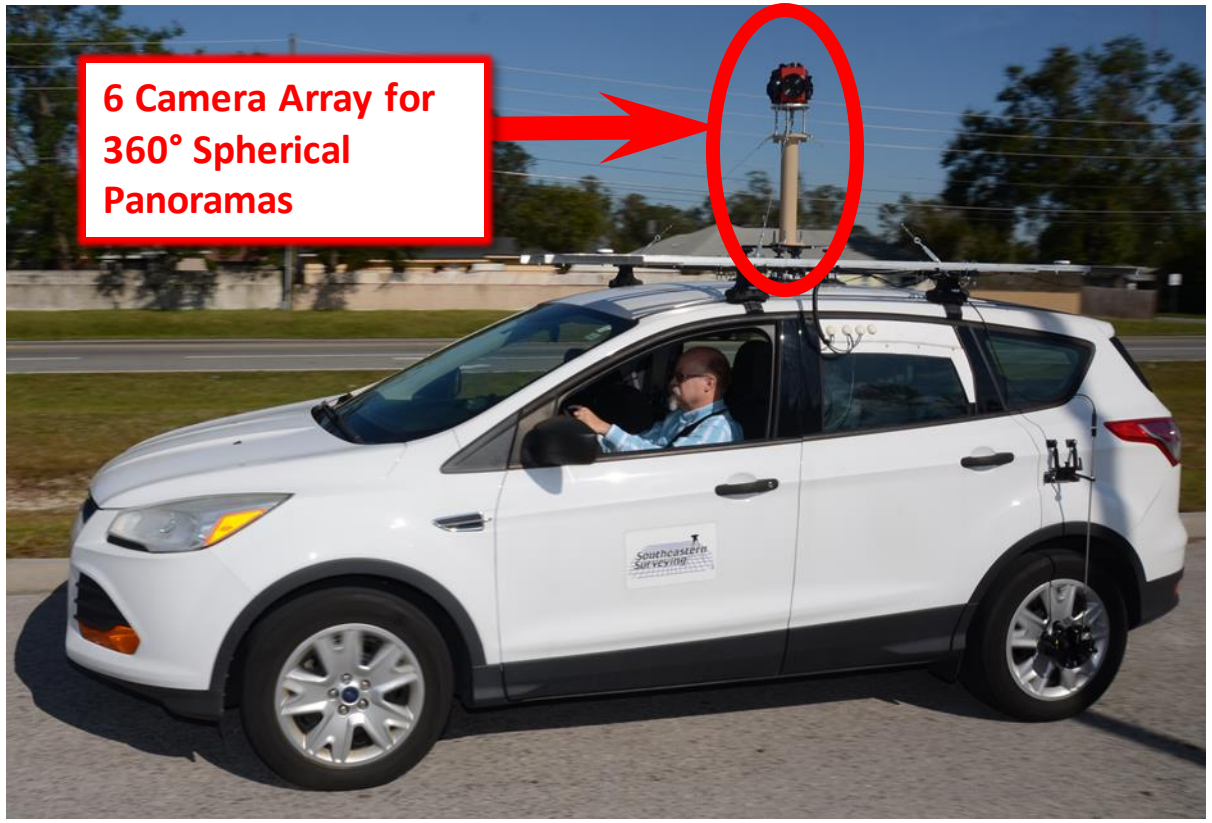
2016: SSMC's 5th Generation Mobile Imaging Vehicle

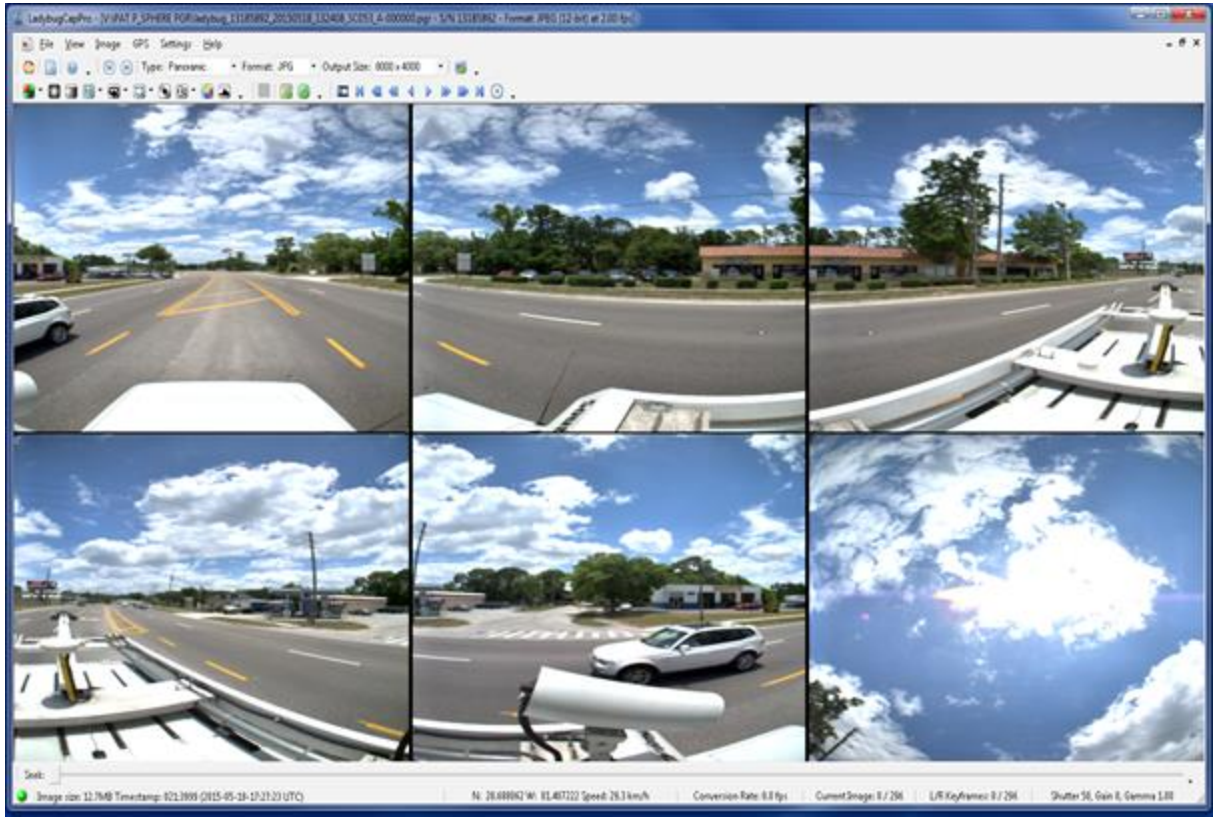
How do we collect Mobile Imaging?

Vehicle Composition

How do we collect Mobile Imaging?

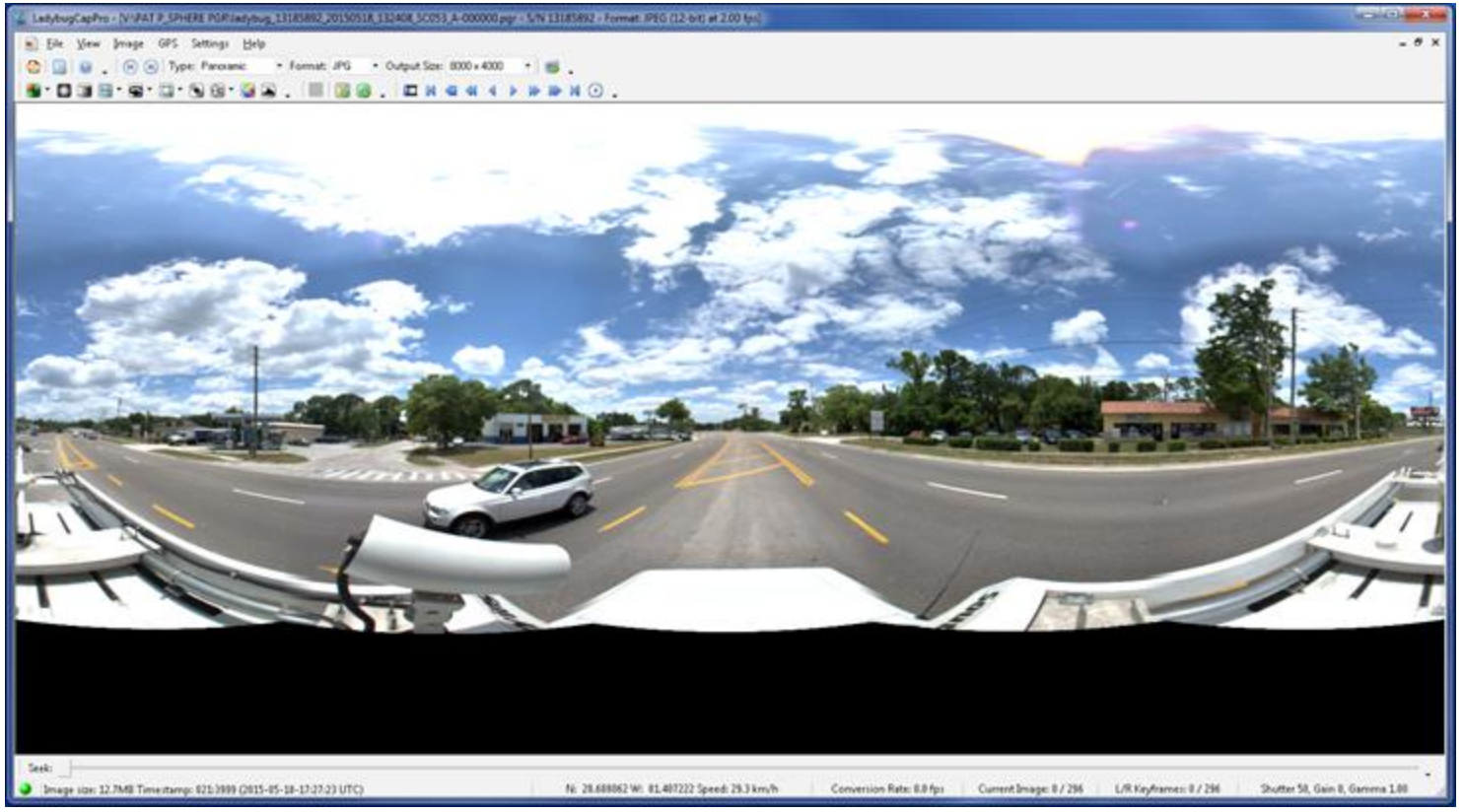
Vehicle Composition

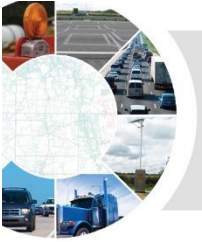




Using Mobile Imaging for Mapping

Six Images Become One Equirectangular Panorama





Using Mobile Imaging for Mapping

Establish Image Position and Heading

ladybug_frame_gps_info_297.txt - Notepad

File Edit Format View Help

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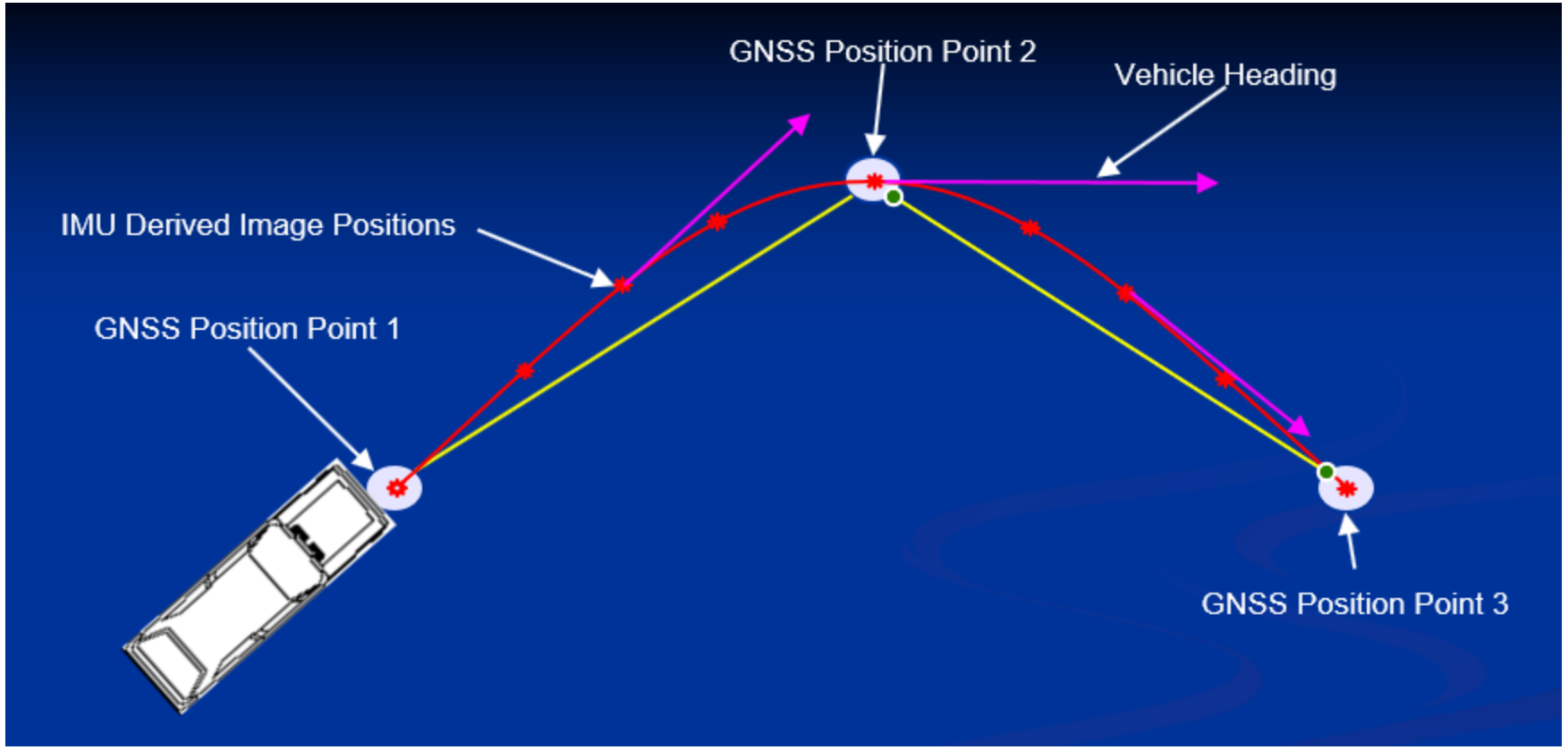
Ln 1, Col 1

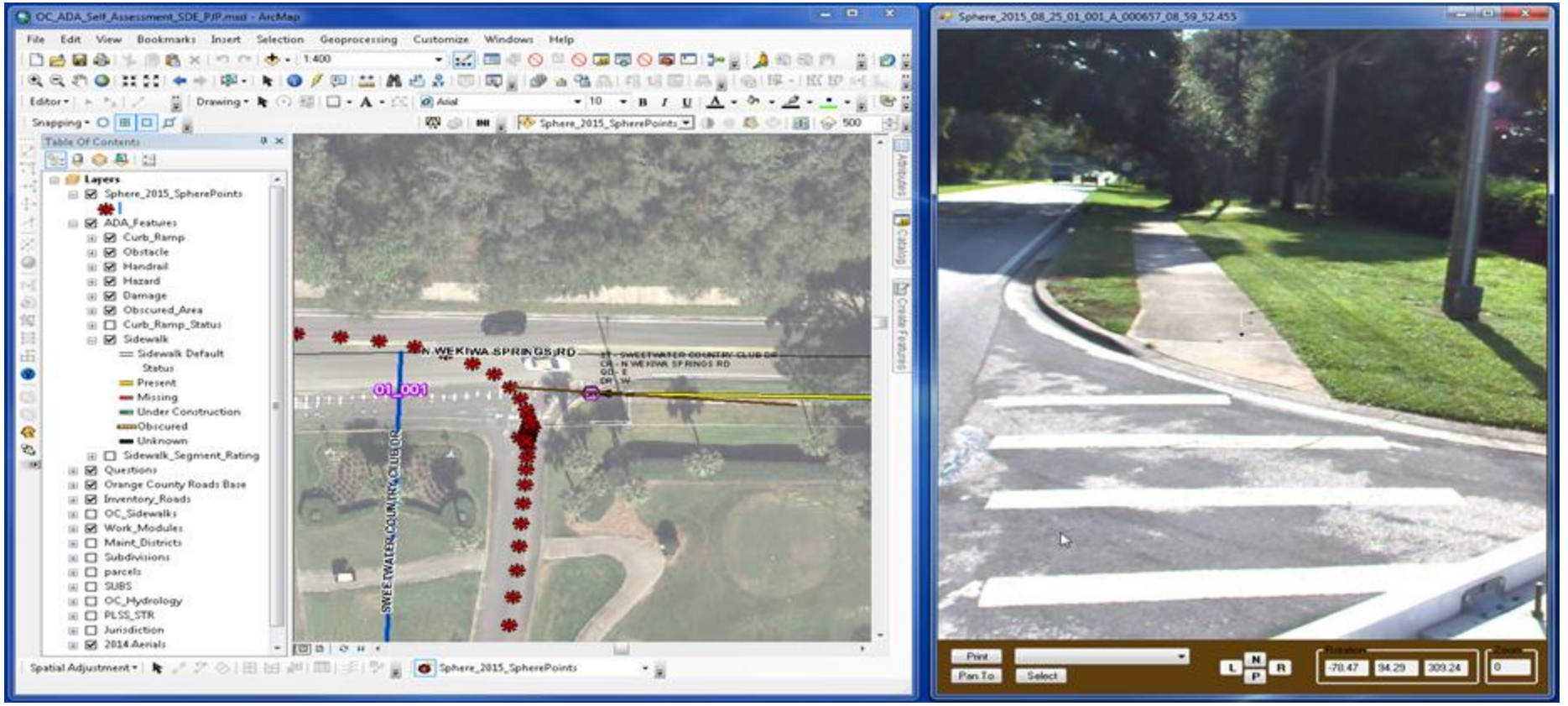
Using Mobile Imaging for Mapping

Establish Image Position and Heading

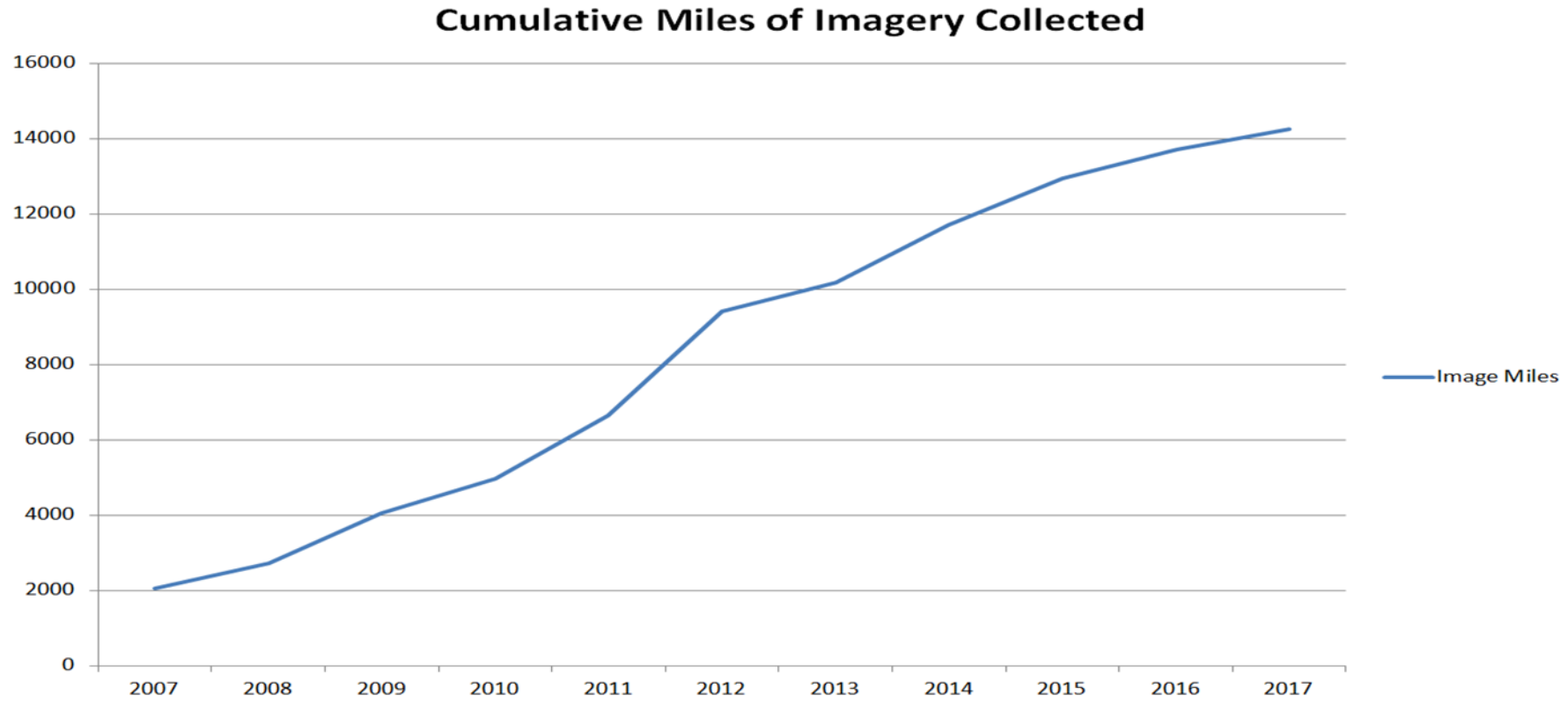


Using Mobile Imaging for Mapping

Graphics in GIS Representing Position and Viewing Direction



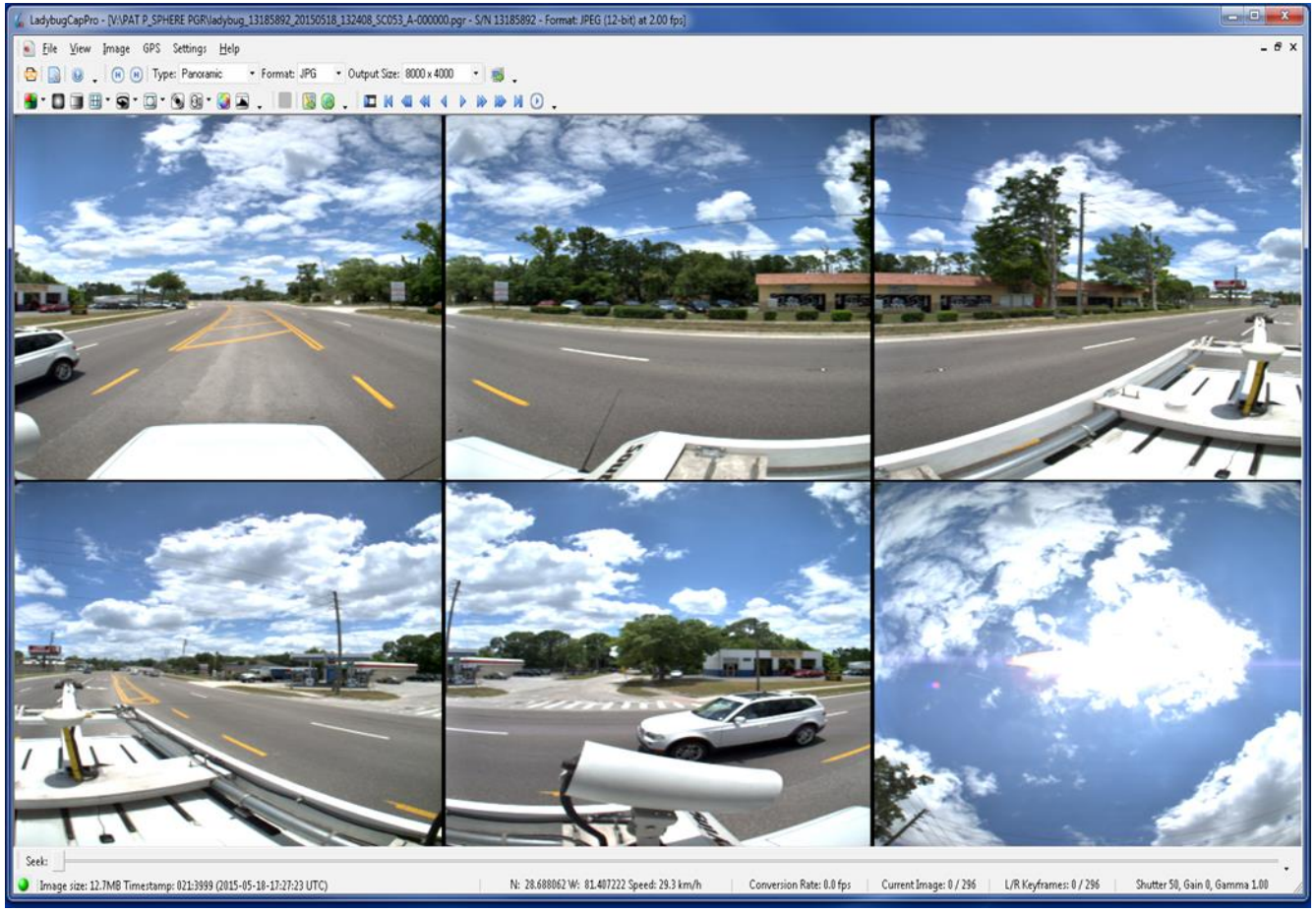
Mobile Imaging Project Experience



Over 14,000 lane miles of imagery since 2007.

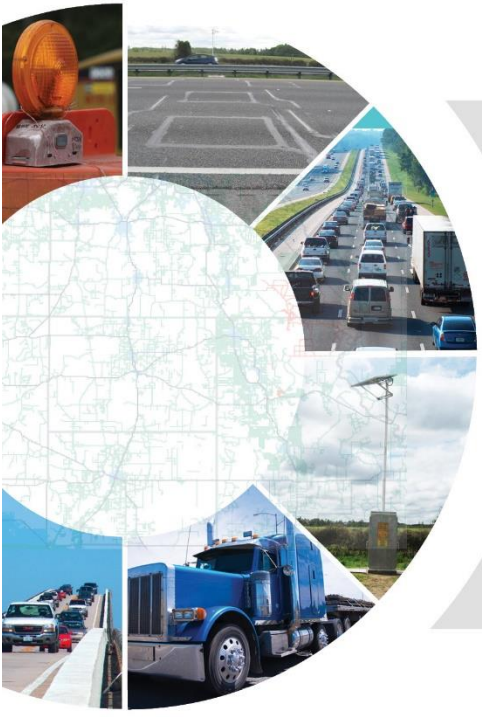
Advantages of Mobile Imaging?

- Limits non-vehicular interactions with traffic. SAFETY!
- No proprietary software needed. No costs for any users.
- Ease of use and minimal training needed to use data.
- Eliminates repeated field visits.
- 1/10 the storage requirements and 1/10 the collection cost of LiDAR.



FDOT Videolog Status

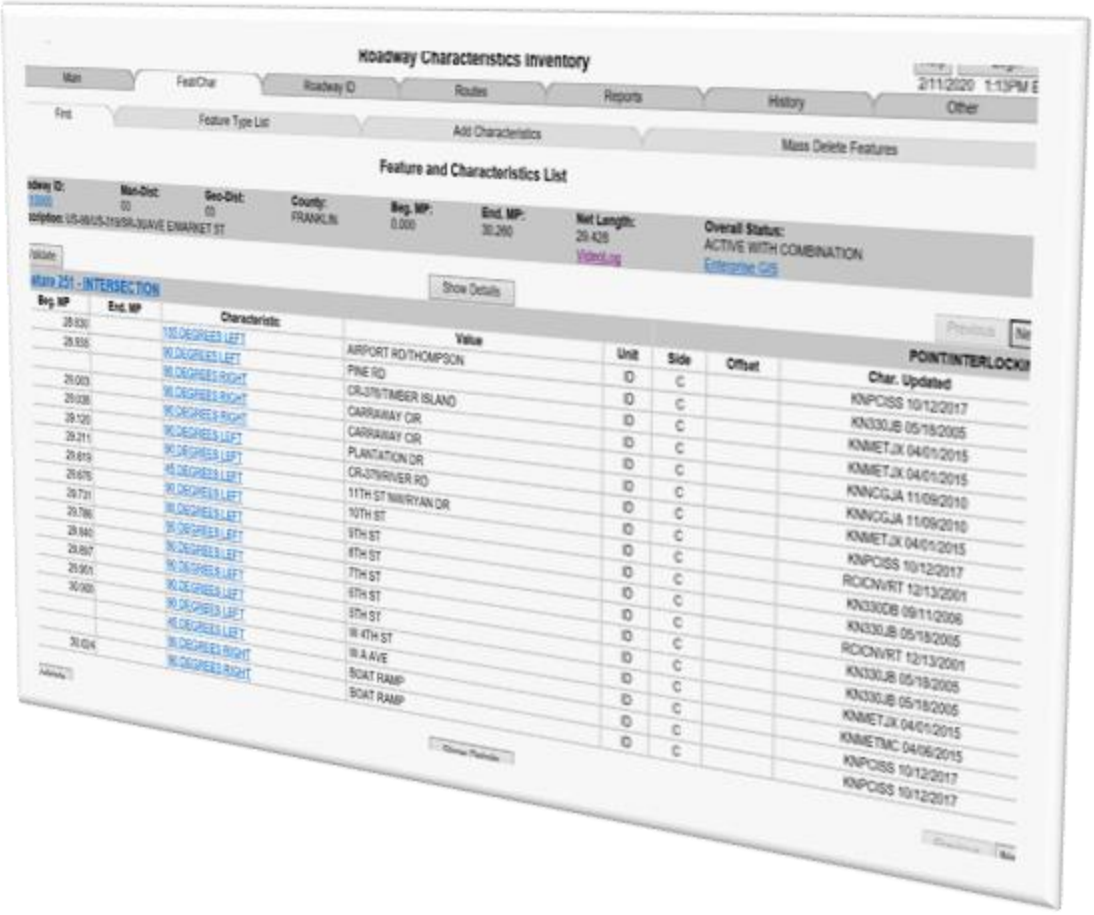
- Last updated 2017.
- Two images comprised of a forward-facing and oblique right.
- Unable to collect measurements or identify MP's of non-perpendicular characteristics.

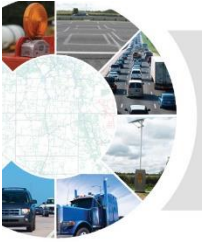


Mobile Imaging Pilot and FDOT

Mobile Imaging Pilot Goals

- Improve upon FDOT's previous videolog.
  - Collect measurements and mile points for features and characteristics.
- Gets all Districts and Departments using same data sources.
- Safer way to collect roadway data.





Mobile Imaging Pilot

- We were given 4 roadways in District 3 totaling 49.136 centerline miles.
  - 46160000 – US98/SR-30A/PANAMA CITY BEACH PKWY
  - 48003000 – US-98/SR-289/N 9TH AVE
  - 55010000 – US-27/SR-63/MONROE ST
  - 57050000 – SR-85/S FERDON BLVD

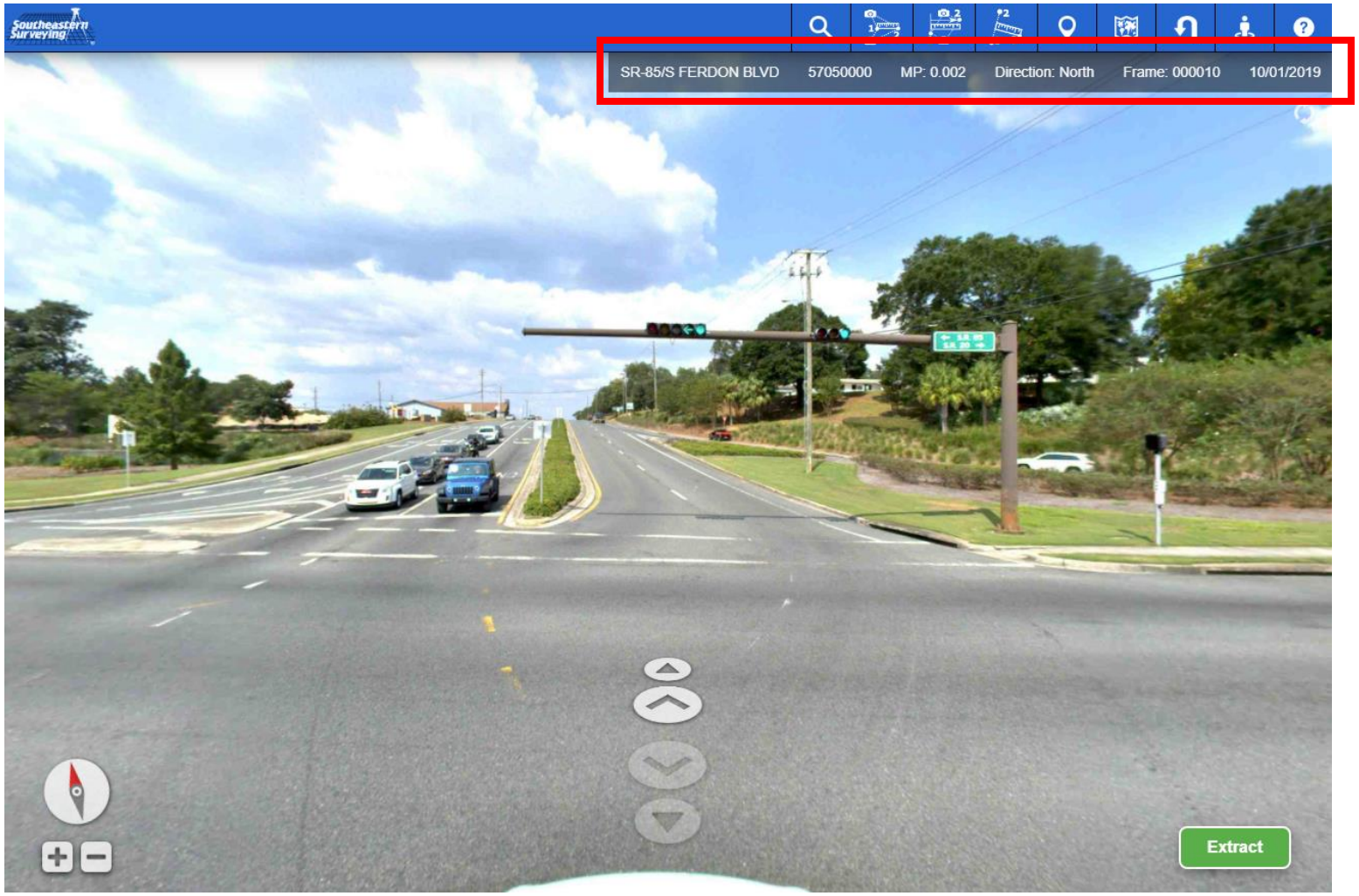
Mobile Imaging Pilot

- We then used the mobile imaging vehicle to create a "videolog" of the routes and collect the following RCI features:
  - F212 – Through Lanes
  - F213 – Auxiliary Lanes
  - F214 – Outside Shoulders
  - F215 – Medians
  - F216 – Bike Lanes and Sidewalks
  - F219 – Inside Shoulders
  - F251 - Intersections

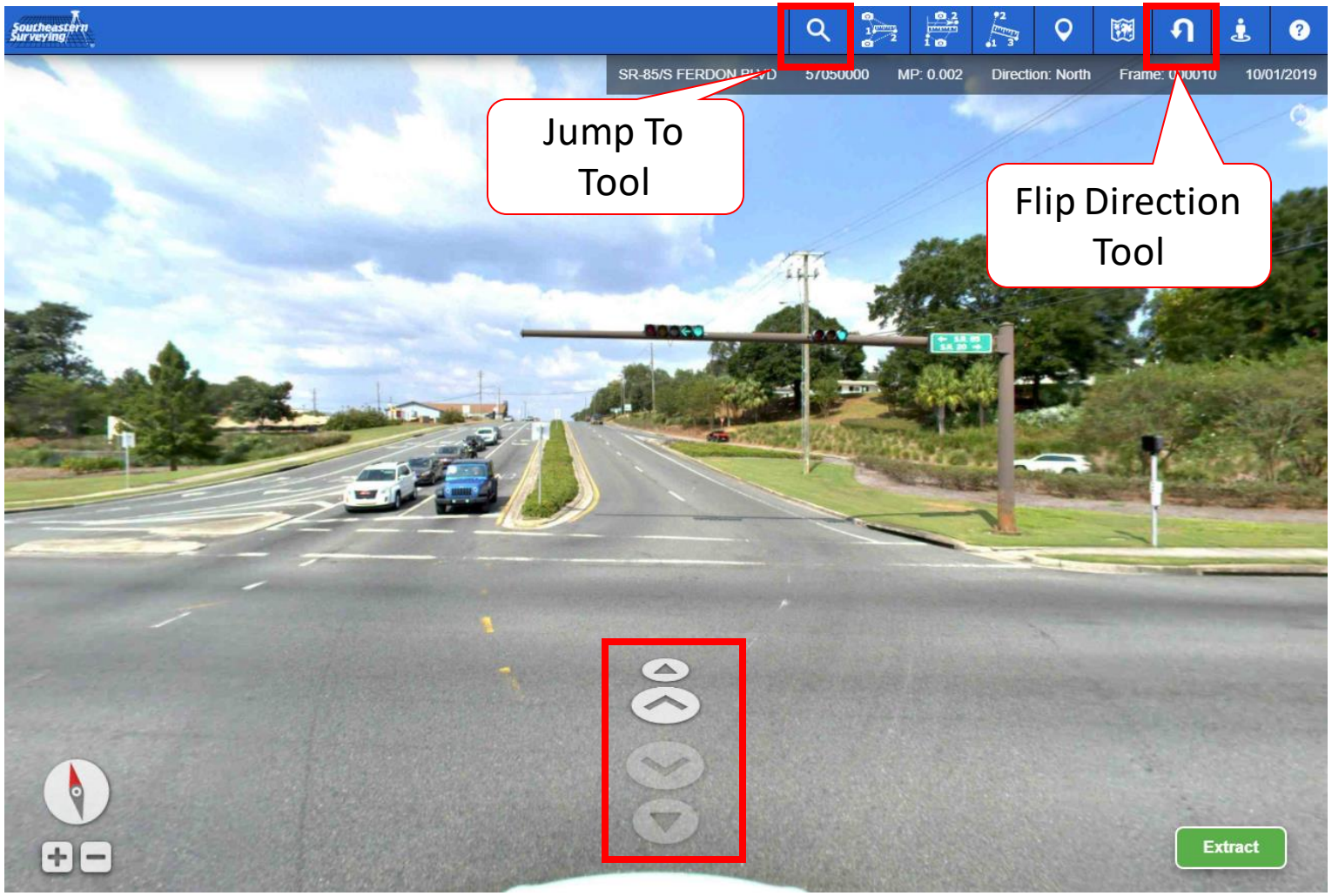
Mobile Imaging Pilot – Must Haves

- Need to transition our viewer to ArcGIS Online.
  - No software investment or licensing fees for FDOT.
- Keep it familiar but build upon old Videolog.
- Measurement tools need to be user friendly.
- ACCURATE!

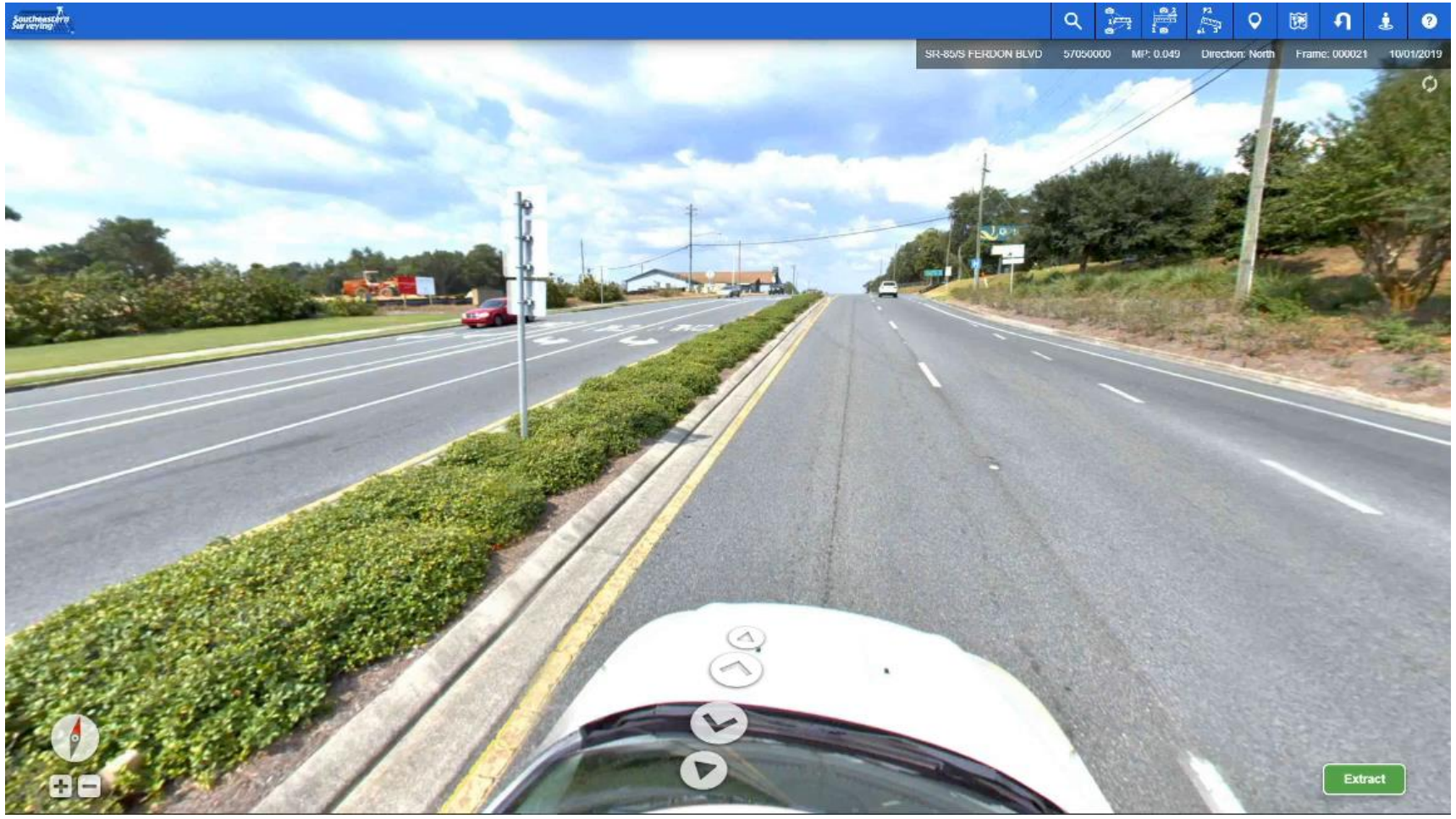
Mobile Imaging Pilot – Roadway Information



Mobile Imaging Pilot - Navigation

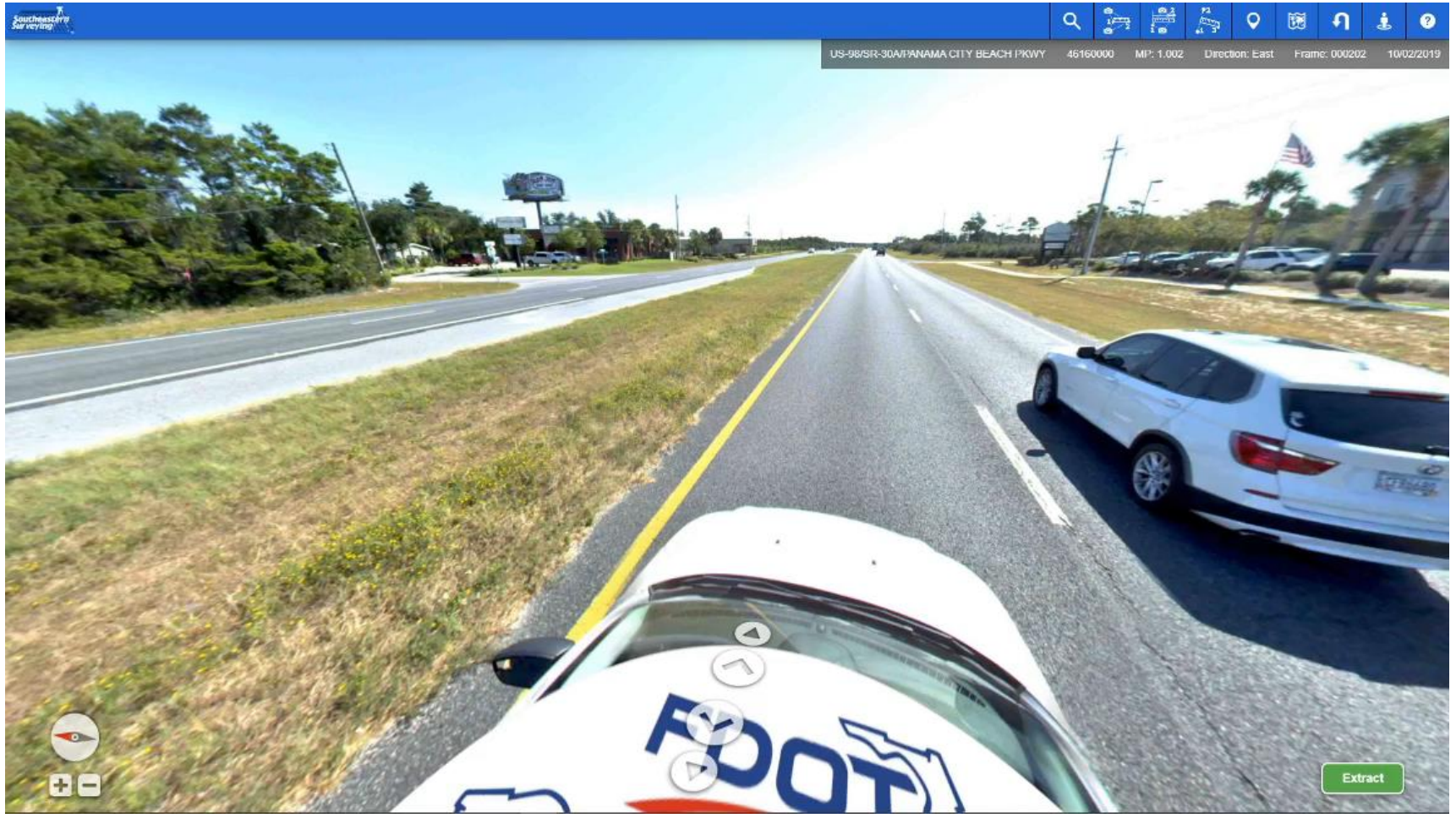


Mobile Imaging Pilot - Navigation

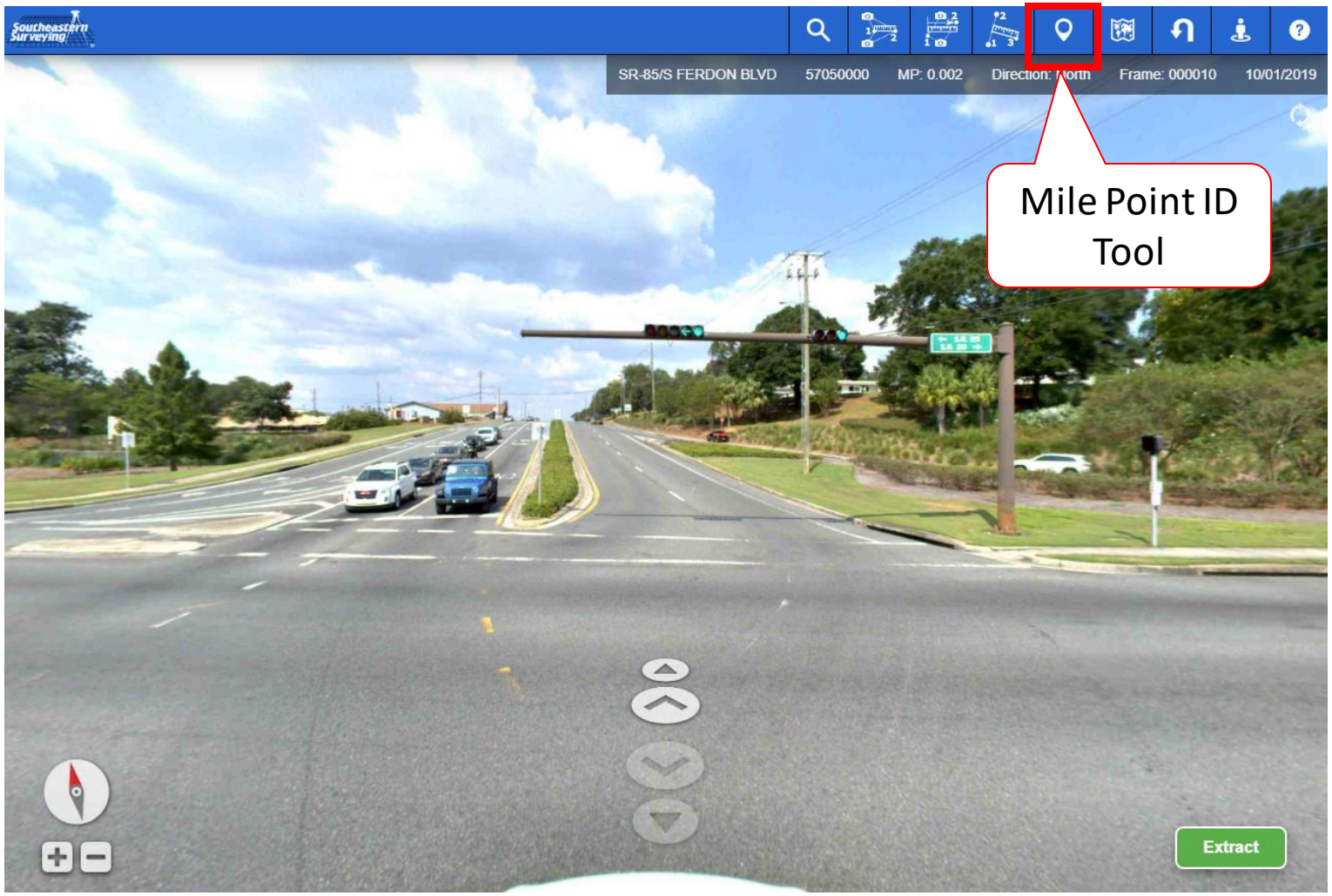


Mobile Imaging Pilot - Navigation

Mobile Imaging Pilot - Navigation

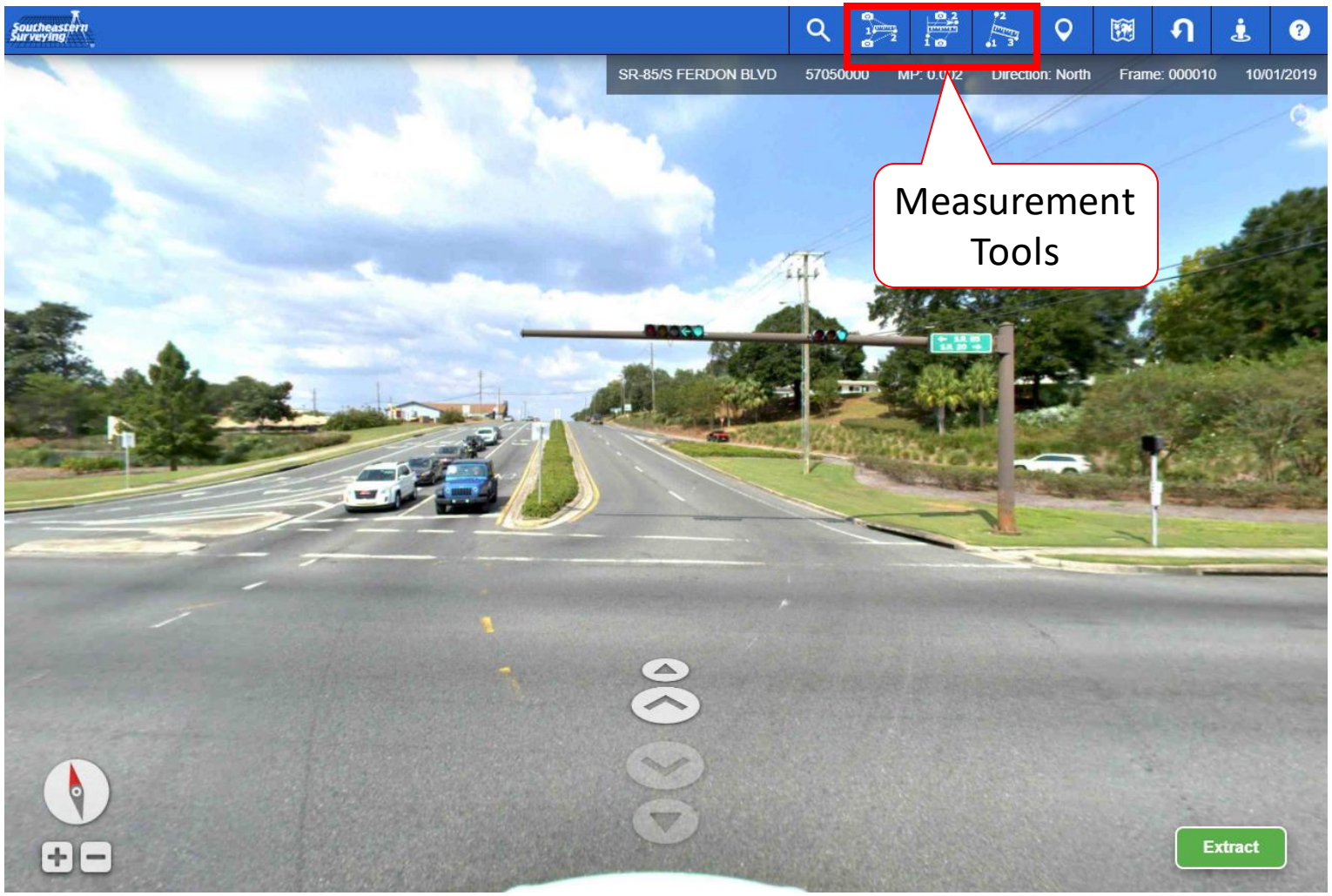


Mobile Imaging Pilot – Mile Point Identifier

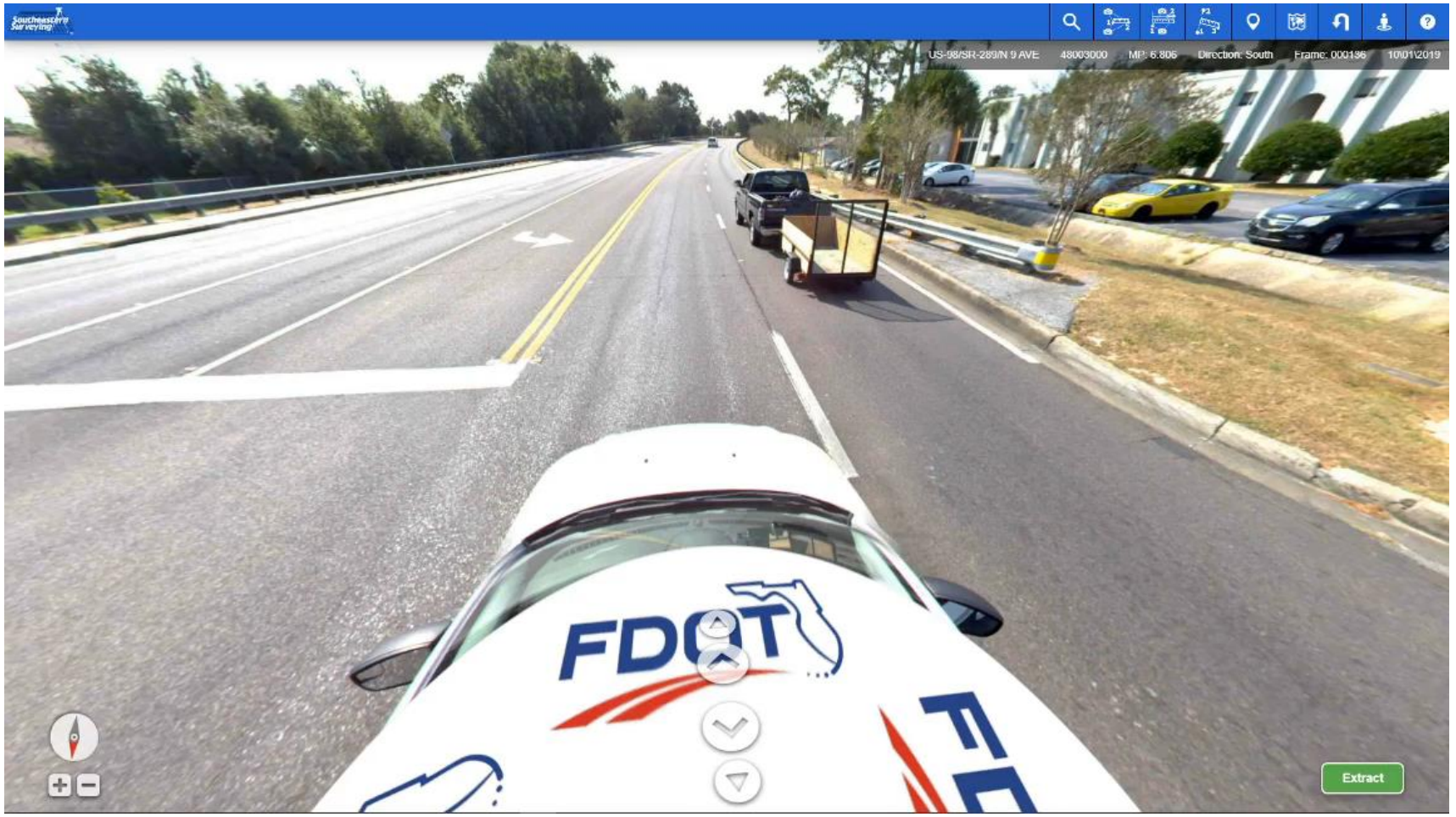


Mobile Imaging Pilot – Mile Point Identifier

Mobile Imaging Pilot – Feature Measurements

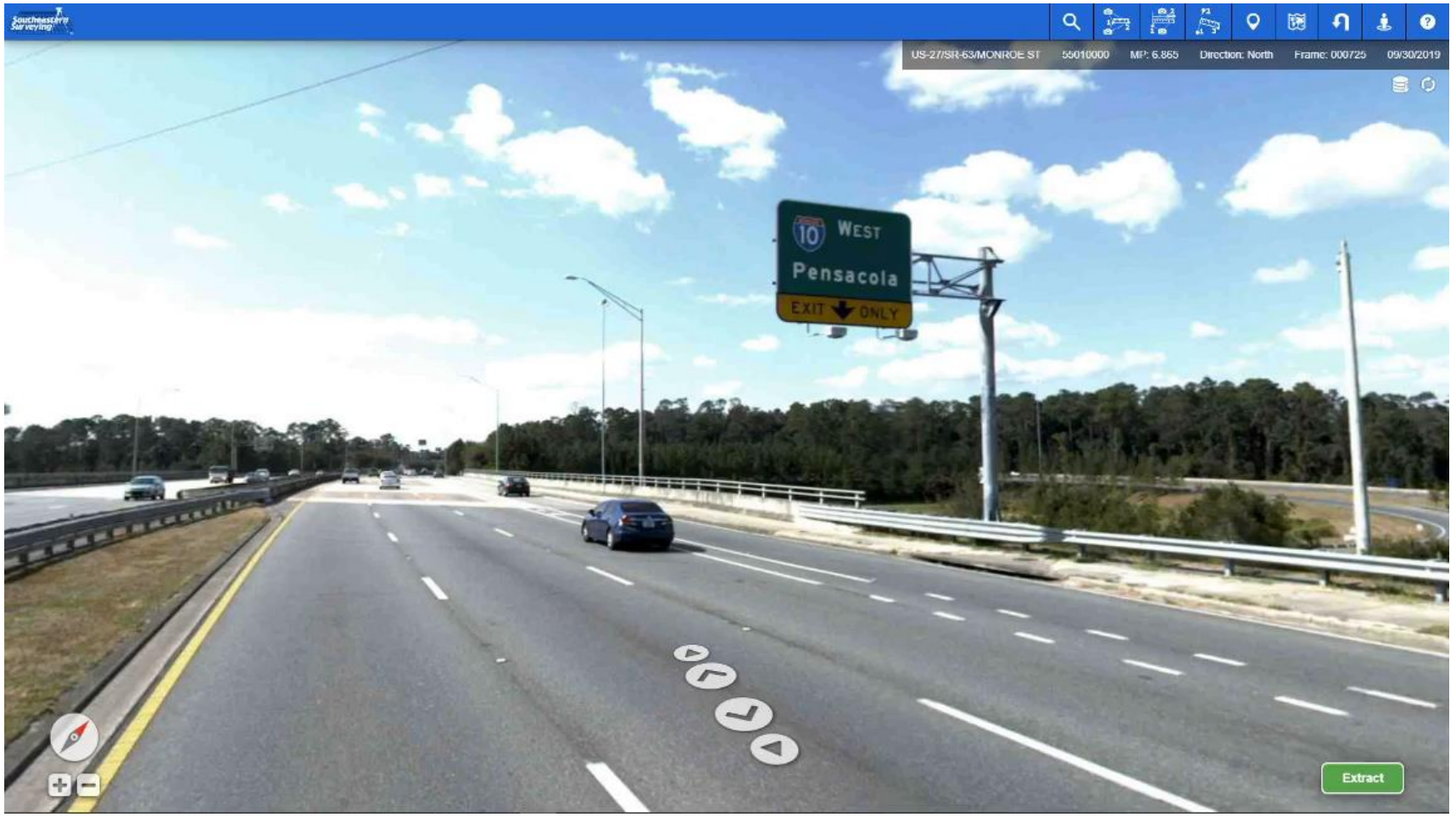


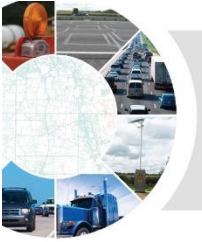
Mobile Imaging Pilot – F212 Measurement



Mobile Imaging Pilot – F215 Measurement

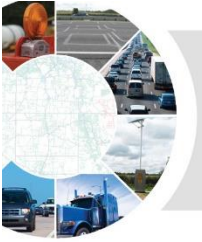
Mobile Imaging Pilot – Sign Measurement





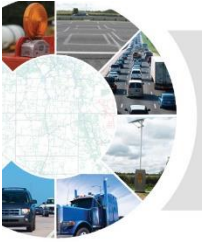
Mobile Imaging Pilot Timeliness

- Mobile Imaging of the roadways took two days due to the distance separating the segments from one another.
  - 50 miles of roadway could be collected daily with a condensed cluster of segments.
- Images can be uploaded for measurement and mapping within 48 hours after capture.
- On average, 1.1 miles of data was extracted per technician per hour.



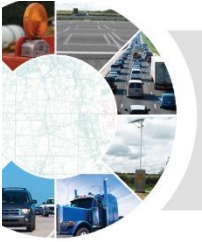
Mobile Imaging Pilot Timeliness

In the time it took to collect F213 (Auxiliary Lanes) by traditional means in the field, we were able to collect F212, F213, F214, F215, F216, F219 & F251 from the office.



Mobile Imaging Pilot Inventory Methodology

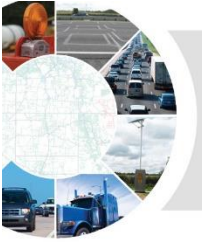
- Inventoried roadways as if they were new roadways with no previous data associated other than total length.
- Measurements were collected at easily identifiable roadway markings with those locations being notated.
  - Asphalt cracking, stop bars, spilt paint markings, curb & gutter joints…
- Identifiable measurements were visited in the field to obtain field measurements.



Mobile Imaging Pilot Accuracy – Through Lanes

- 25 through lane measurements
- Average difference of 6.05″ or 0.504′.

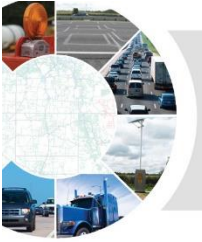
Roadway	Milepoint	Side	Field Measure	Viewer	Difference (Feet)	Difference (Inches)
55010000	1.261	R	24	23.774	-0.226	-2.7
	1.261	L	25.1	24.611	-0.489	-5.9
	4.192	L	23.5	22.542	-0.958	-11.5
	4.197	R	24	24.065	0.065	0.8
	6.189	R	23.8	24.601	0.801	9.6
	9.106	R	23.1	23.901	0.801	9.6
	9.107	L	23.95	24.176	0.226	2.7
	9.509	R	22.9	23.231	0.331	4.0
	9.509	L	23.6	22.845	-0.755	-9.1
48003000	0.115	C	45	44.621	-0.379	-4.5
	0.575	C	45.15	45.76	0.610	7.3
	0.949	R	21.9	21.317	-0.583	-7.0
	1.287	C	45.8	46.158	0.358	4.3
	1.366	L	19.7	18.769	-0.931	-11.2
	1.350	R	20.1	19.715	-0.385	-4.6
	2.457	C	45	45.048	0.048	0.6
	3.202	C	44.95	44.971	0.021	0.3
	4.783	L	23.9	24.531	0.631	7.6
	4.785	R	24.15	24.55	0.400	4.8
	5.968	L	22.2	23.17	0.970	11.6
	5.968	R	22.3	22.858	0.558	6.7
	6.816	L	23.3	22.901	-0.399	-4.8
	6.803	R	23.3	24.06	0.760	9.1
46160000	13.501	L	22	22.52	0.520	6.2
	13.496	R	21.8	21.4	-0.400	-4.8



Mobile Imaging Pilot Accuracy – Auxiliary Lanes

- 27 auxiliary lane measurements
- Average difference of 5.03″ or 0.419′.

Roadway	Milepoint	Side	Field Measure	Viewer	Difference	Difference (Inches)
57010000	0.012	L	13.55	13.950	0.400	4.8
	0.171	R	16.2	16.624	0.424	5.1
	0.267	R	10.7	10.841	0.141	1.7
	9.160	R	14.0	13.061	-0.939	-11.3
	17.359	L	8.2	7.889	-0.311	-3.7
	17.492	R	13.4	13.399	-0.001	0.0
	18.251	L	13.02	12.824	-0.196	-2.4
55010000	1.258	R	11.3	11.341	0.041	0.5
	4.211	L	12.7	12.920	0.220	2.6
46160000	0.383	R	15.9	16.163	0.263	3.2
	0.863	R	16.6	17.166	0.566	6.8
	1.092	L	16.48	16.552	0.072	0.9
	1.096	L	12.04	11.394	-0.646	-7.8
	2.427	R	13.85	14.111	0.261	3.1
	3.347	L	18.45	18.416	-0.034	-0.4
	5.487	R	11.9	11.025	-0.875	-10.5
	6.070	R	15.6	15.005	-0.595	-7.1
	7.071	R	15.39	14.617	-0.773	-9.3
	9.259	R	12.4	12.694	0.294	3.5
	9.244	R	13.85	14.322	0.472	5.7
	10.106	R	16.42	15.705	-0.715	-8.6
	10.193	R	16.68	16.027	-0.653	-7.8
	12.008	R	11.6	12.296	0.696	8.4
	12.214	R	10.6	9.993	-0.607	-7.3
	12.790	R	15.24	14.905	-0.335	-4.0
	13.496	R	11.0	10.930	-0.070	-0.8
	13.496	R	18.1	17.379	-0.721	-8.7



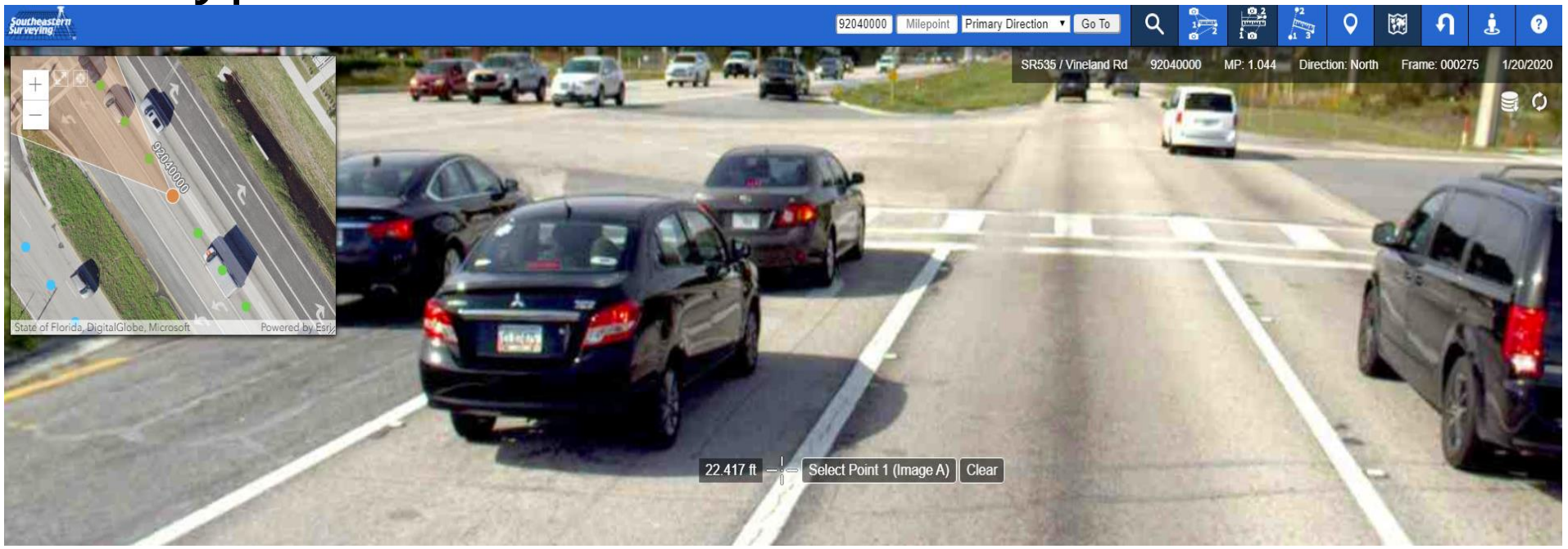
Mobile Imaging Pilot Accuracy – Median

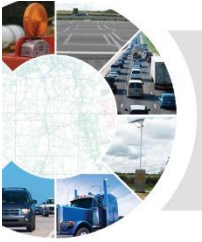
- 10 median measurements
- Average difference of 4.03″ or 0.336′.

Roadway	Milepoint	Field Measure	Viewer	Difference	Difference (Inches)
55010000	1.263	29	28.377	-0.623	-7.5
	4.204	30.8	30.858	0.058	0.7
	9.106	15.9	16.096	0.196	2.4
	9.507	10.9	10.663	-0.237	-2.8
48003000	4.901	12.3	12.400	0.100	1.2
	5.695	11.84	12.365	0.525	6.3
	5.957	26.4	25.922	-0.478	-5.7
	6.396	12.655	12.400	-0.255	-3.1
	6.864	22.3	22.400	0.100	1.2
46160000	13.501	26.6	25.810	-0.790	-9.5

Mobile Imaging Pilot Accuracy – Overall

Upon compiling all our measurements, we calculated an average root mean square error of **0.4968 feet** for all feature types.

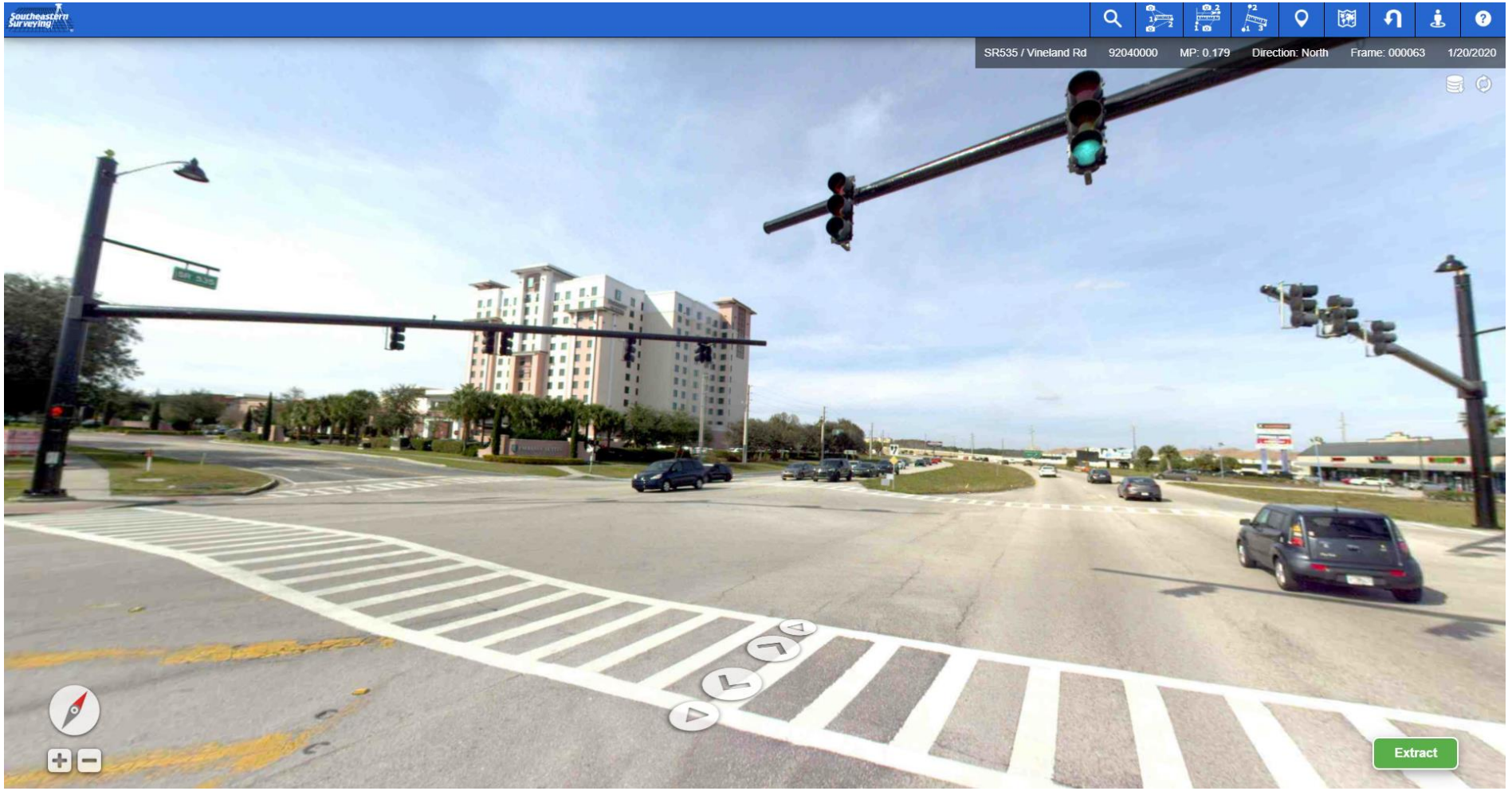




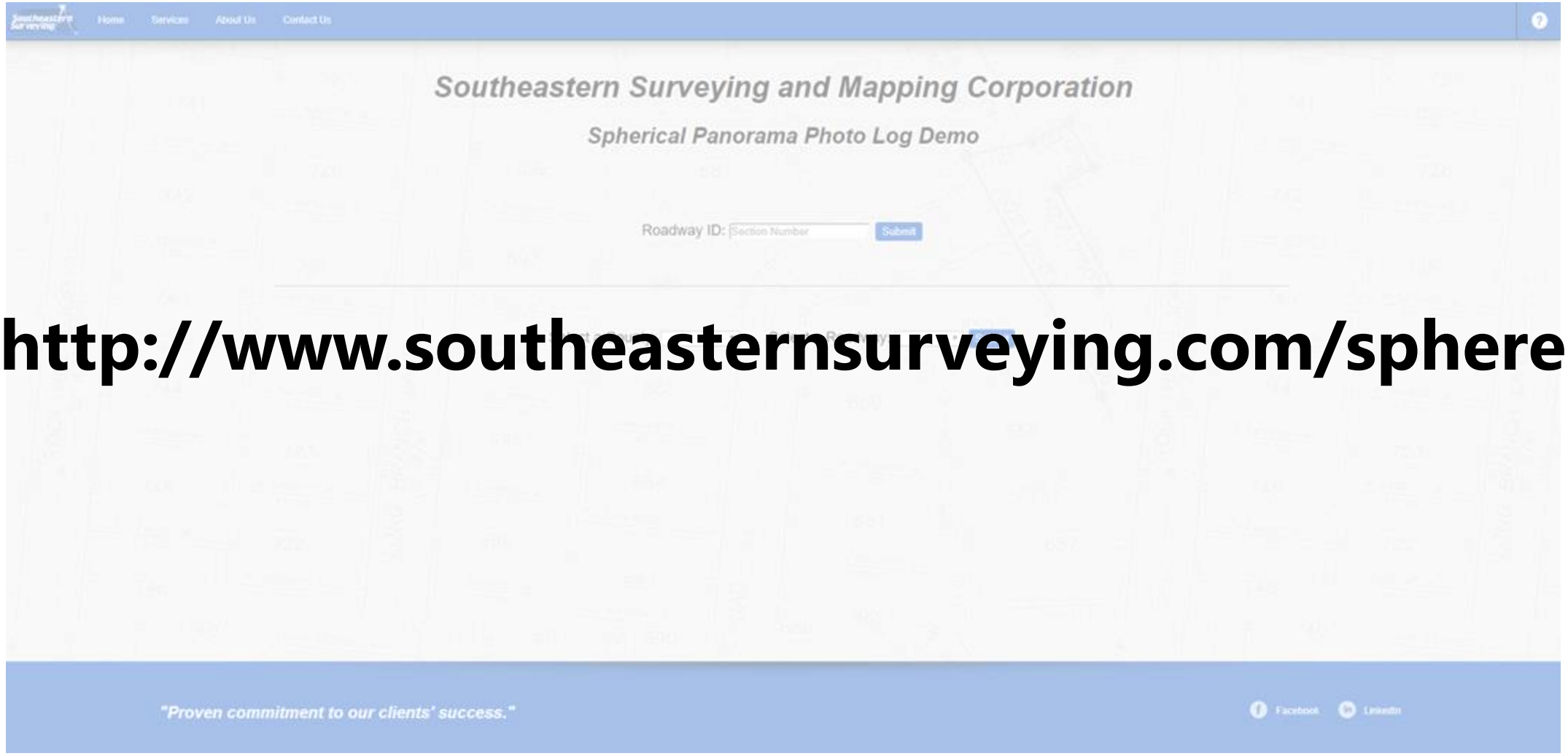
Collect Once, Use Many Times

- Collected imagery can become a single source of knowledge for all FDOT Departments.
  - Planning – RCI
  - Maintenance – Signage, Striping, Turnouts
  - Traffic Operations – Speed Limits, Signals
  - Safety – ADA Compliance, Bike/Ped Facilities
- Everyone uses an inventory pass that shares identical mile points.
- No software license cost for use of imagery and web-viewer.
  - No software installation required. Just go to a web address.

Mobile Imaging Pilot – 92040000



Mobile Imaging Website



http://www.southeasternsurveying.com/sphere