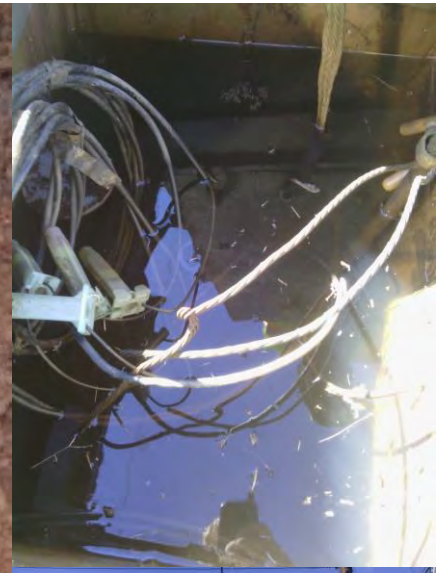
Mead & Hunt | EXPERIENCE EXCEPTIONAL



ASSET MANAGEMENT

Traffic Signals

July 25, 2023

Asset Management of Traffic Signals

Asset Management Approaches

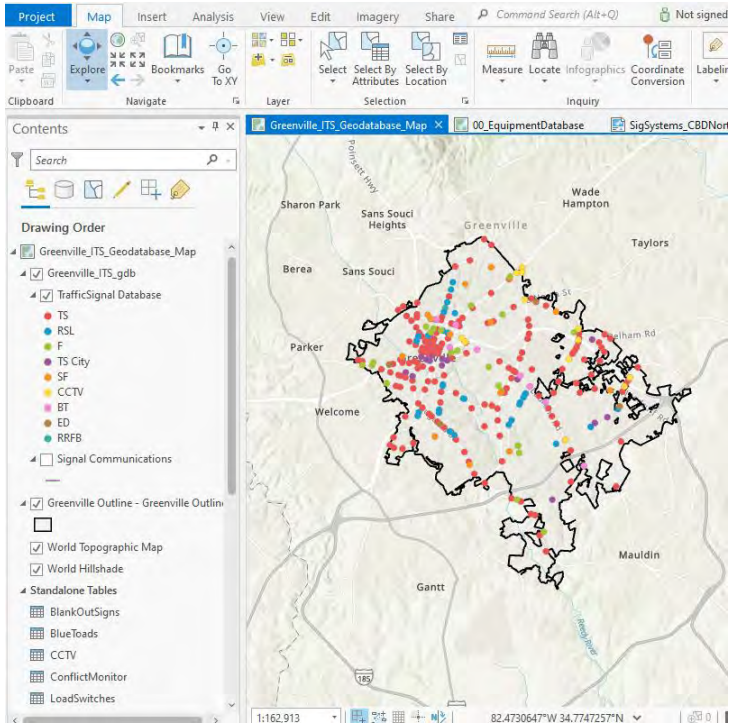
1. Non-compliance with standards
2. Technical obsolescence (including both actual and predicted)
3. Condition-based assessments with inspections to track progression over time.

These slides address type 3 (condition-based).

Outline

1. Inventory
2. Inspection
3. Analysis
4. Recommendation

1. Inventory

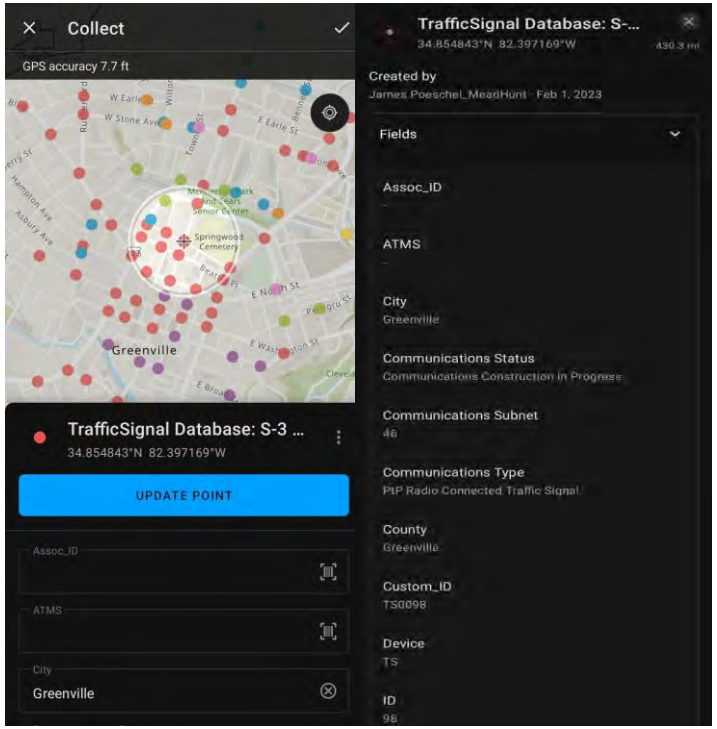


ArcPro

- Create GIS data and associated attributes
- Publish maps to AGOL
- Update data

ArcGIS Online (AGOL)

- Create Online web applications for internal use or make them public
- Create web maps for field data collection
- Update data



Mobile Apps

- Use phones or tablets to collect or update data in the field
- Updates synch in real time with web applications

1. Inventory

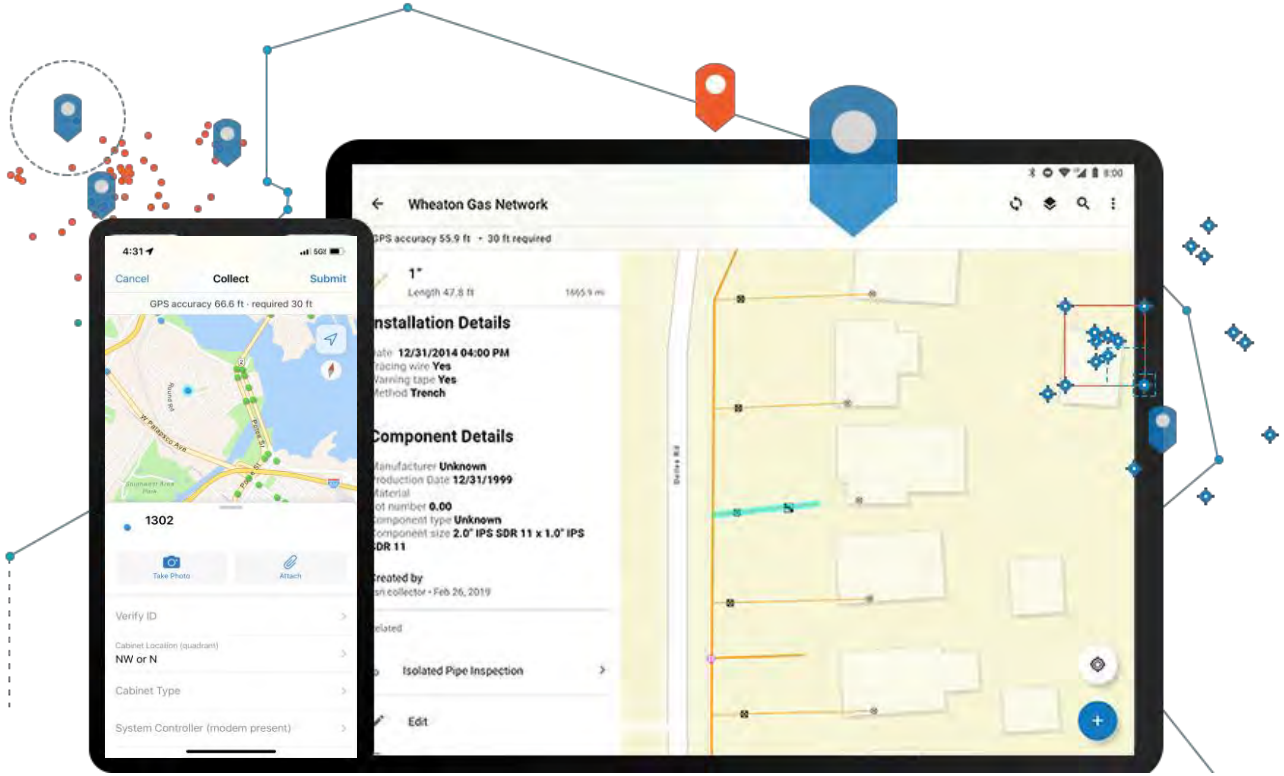
Mobile Apps for Data Collection

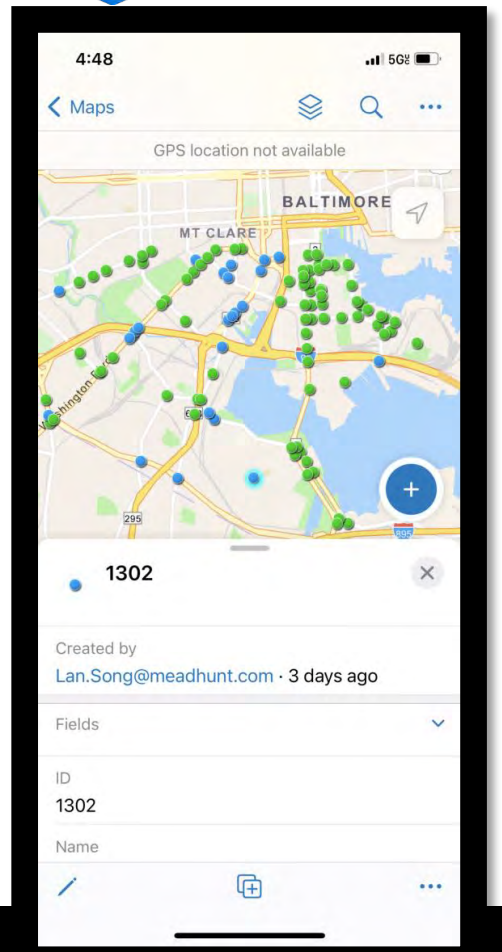
The apps help the field workers to efficiently capture assets and observations by filling out map-driven forms on their own mobile device.

- Arc Collector

OR

- Field Map

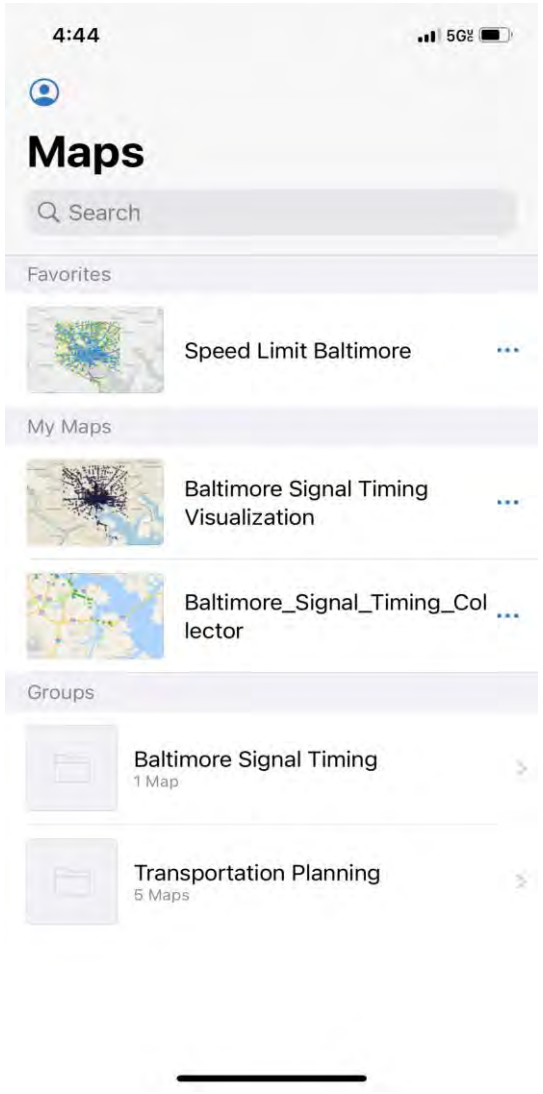


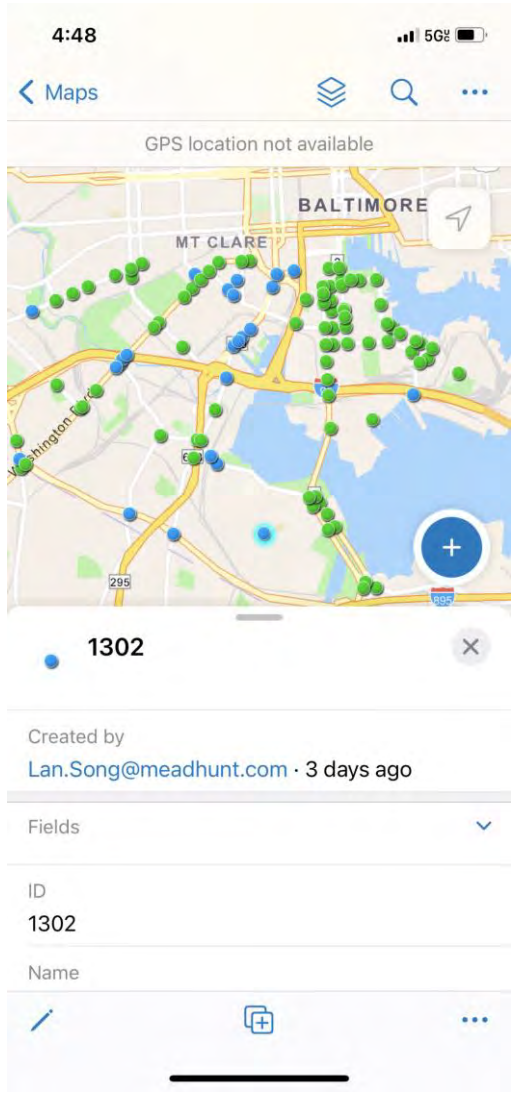


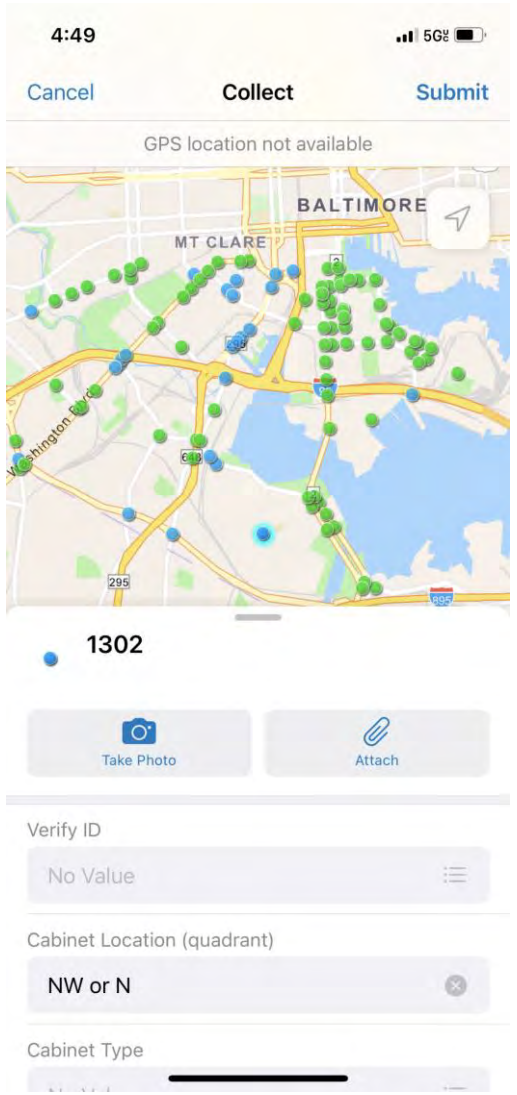
1. Inventory

Steps to Use the App

- Install the apps
- Sign In
- Select your map
- Navigate to the location
- Edit existing features or
  Add new features
- Attach media as needed
- Submit



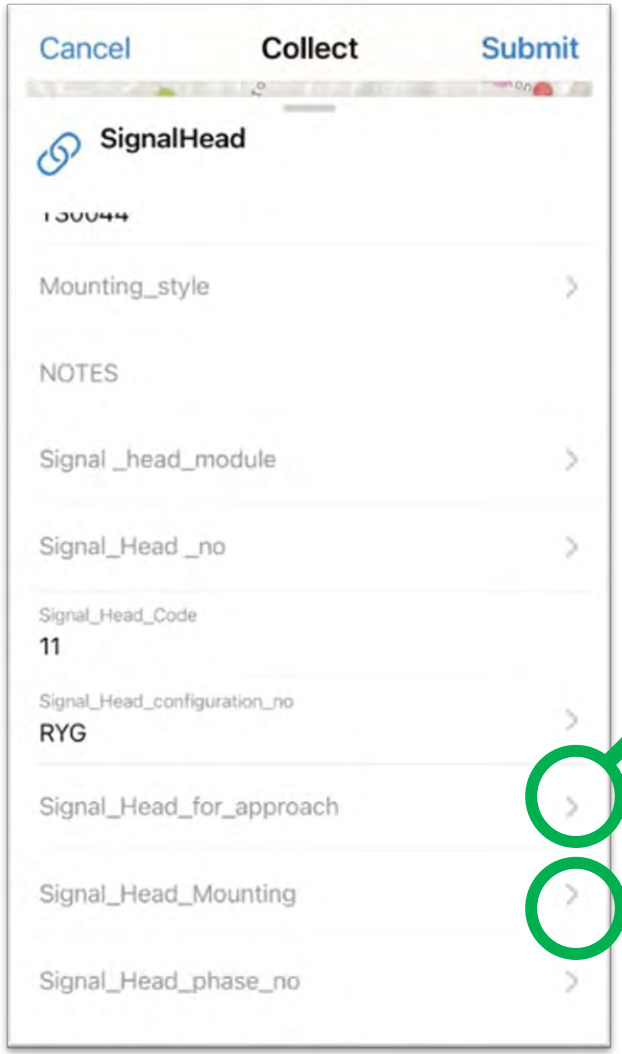


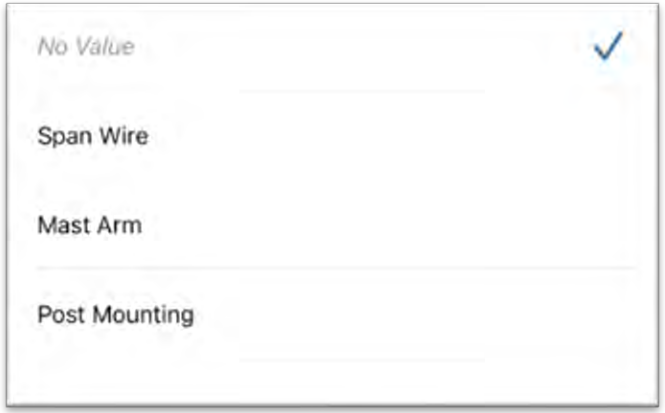


1. Inventory

Adding /Editing Data in the Field

Populate data using drop down menus





1. Inventory

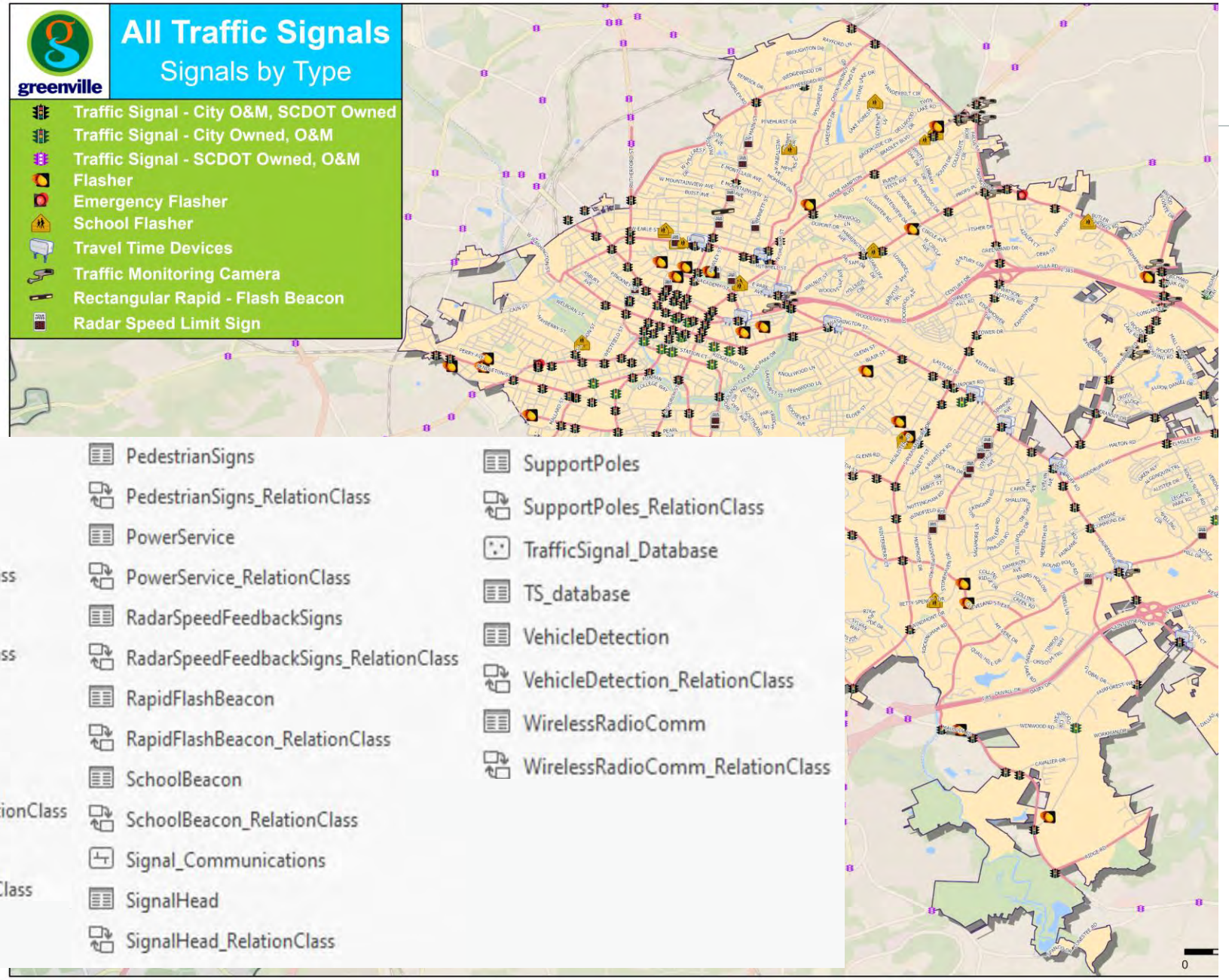
- Prepare GIS Data
  - Add attribute fields
  - Create domains
- Publish to Mead and Hunt Portal

[Mead & Hunt ArcGIS Portal (meadhunt.com)]

- Create a web map
  - Configure the fields and pop-up window
  - Share with the group and organization
- Ready to use in the apps

Field Name	Domain
ID	
Name	
Zone	
New Count Vendor	
New Count Group	
Verify ID	Yes
	NA
	No
Cabinet Location (quadrant)	NE or E
	NW or N
	SE or S
	SW or W
Cabinet Type	A (Pole Mounte
	B (Pole Mounte
	C (Base Mounte
	E (Base Mounte
System Controller (modem present)	Yes
	No
Comm Status	Online
	Offline
Coord Status	Coord
	Free
GPS Unit	Yes (disconnect
	Yes (connected
	No
Clock Drift	
Clock Fixed	Yes
LPI	Yes
	No
Ped Only Signal	Yes
	No
Right Turn on Red	Yes (all approac
	No Right Turn o
	No Right Turn o
Adjacent Parking Lane	No
	Yes (major stree
	Yes (minor stree
	Yes (major + mi
Bike Facilities (any approach)	Yes (On-Street Bike Lane)
	Yes (2-way Cycle Track)
	Yes (Both Types)
Bus Lane (any approach)	No
	Yes (painted red)
	Yes (not painted)
Barnes Dance	Yes
	No
Preemption	Yes
	No
Phase_Mode	Stnd8
	QuadSeq
	8PhSeq
	Other
Phase Diagram Complete	Yes (All phases confirmed)
	Yes (at least 1 phase unconfirmed, see notes)
Detector Type	None
	Loop
	Sensys
	Trafficon Camera
	Econolite Camera
	Other
Detector State	
Detector Note	
Phase 2/6 Ped	Recall
	No Recall
Phase 4/8 Ped	Recall
	No Recall
Phase 4/8 Push Button	Works
	Broken
Phase 4/8 Push Button Notes	
Timing Plan Field Change Notes	
MISC. NOTES	
QC Reviewer	Anam
	Ali
	David
	Katie
	Javon
	John
	Woody
QC Review Complete	Yes

1. Inventory



- Greenville_ITS.gdb
  - BlankOutSigns
  - BlankOutSigns_Relationclass
  - BlueToads
  - BlueToads_RelationClass
  - Cabinet
  - Cabinet_RelationClass
  - CCTV
  - CCTV_RelationClass
  - ConflictMonitor
  - ConflictMonitor_RelationClass
  - Controllers
  - Controllers_RelationClass
  - Flashers
  - Flashers_RelationClass
  - LoadSwitches
  - LoadSwitches_RelationClass
  - LoopDetector
  - LoopDetector_RelationClass
  - Mastarm
  - Mastarm_RelationClass
  - PedestrianDetection
  - PedestrianDetection_RelationClass
  - PedestrianPoles
  - PedestrianPoles_RelationClass
  - PedestrianSigns
  - PedestrianSigns_RelationClass
  - PowerService
  - PowerService_RelationClass
  - RadarSpeedFeedbackSigns
  - RadarSpeedFeedbackSigns_RelationClass
  - RapidFlashBeacon
  - RapidFlashBeacon_RelationClass
  - SchoolBeacon
  - SchoolBeacon_RelationClass
  - Signal_Communications
  - SignalHead
  - SignalHead_RelationClass
  - SupportPoles
  - SupportPoles_RelationClass
  - TrafficSignal_Database
  - TS_database
  - VehicleDetection
  - VehicleDetection_RelationClass
  - WirelessRadioComm
  - WirelessRadioComm_RelationClass

2. Inspection

Sample Projects

- Montgomery County, MD
- Howard County
- Frederick County
- City of Annapolis

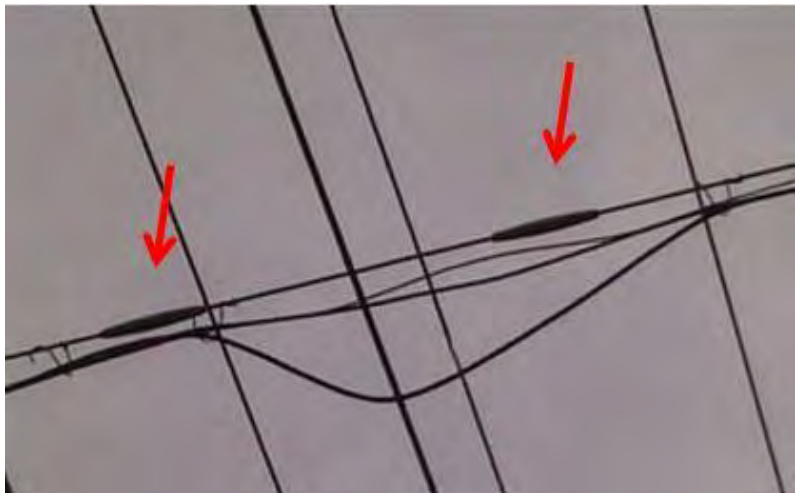
Critical Components:

- Poles and Foundations
- Mast-Arms
- Span Wires
- Hand Holes and Conduits
- *Maintenance Items*

Accident Damage

2. Inspection - Poles and Foundations

2. Inspection - Mast-Arms and Span Wires



2. Inspection - Hand Boxes and Conduits

3. Analysis

3-Point Likert Scale

- Good
- Fair
- Poor

Weighted Sum Model

- 0 to 10 points
  - Tested and refined scale
  - Adjust for each agency's input
- High score based on criticality of asset
- Maintenance items not scored

Signal Number:		**Location:**			
Date:		**Inspected By:**		**Checked By:**	

STRUCTURES:				**POINTS**	SCORE
Signal Age:	0-10 yrs: 0 pts.	11-20 yes: 5 pts.	>20 yrs: 10 pts.	0-10	0
Design Type:			(mast-arm = 0 pts, span wire = 5 pts)	0-5	0
Pole Type:			(painted = 5 pts, galvanized = 0 pts)	0-5	0
General condition of the poles:			(good = 0 pts, fair = 5 pts, poor = 10 pts)	0-10	0
Any abnormal bending or pole rake?			(moderate = 5 pts, severe = 10 pts)	0-10	0
Pole back guys in use?		(1 back guy = 3 pts, 2 back guys = 5 pts, 3 or more back guys = 10 pts)		0-10	0
Is the pole base welded steel or cast iron?			(cast iron = 10pts)	0-10	0
Any signs of cracking at or near base plate welds?			(10 pts any signs of cracking)	0-10	0
Any abnormal bending or sagging of the mast arms?			(yes = 5 pts, no = 0 pts)	0-5	0
Any signs or rust or corrosion at or near the mast arm mounting plates?			(yes = 5 pts, no = 0 pts)	0-5	0
Any abnormal sagging of the span wires?			(1 span = 5 pts, 2 or more spans = 10 pts)	0-10	0
Any signs of rust on the span wires?		(surface area: 25% or less = 5 pts, 25%-50% = 10 pts, greater than 50% = 15 pts)		0-15	0
Any span wire splices?		(1 splice = 5 pts, 2 splices = 10 points, 3 or more splices = 15 pts)		0-15	0
Any signs of erosion around any of the pole bases?			(yes = 5 pts, no = 0 pts)	0-5	0
Base plate mounted directly to foundation with no leveling nuts?			(yes = 5 pts, no = 0 pts)	0-5	0
Rust or corrosion on the base plate, anchor bolts, or nuts?			severe 25 pts, moderate 15 pts, light 5 pts, no 0 pts)	0-25	0
Any exposed rebar or abnormal exposure of the anchor bolts?			(yes = 5 pts, no = 0 pts)	0-5	0
Any abnormal cracking or spalling of concrete at any of the pole foundations?			(moderate = 3 pts, severe = 5 pts)	0-5	0
OTHER:					
Any apparent violations of the Maryland High Voltage Act?			(yes = 10 pts)	10	0
Any equipment obstructions to walking or biking paths?		(1 obstruction = 1 pt, 2 obstructions = 3 pts, 3 or more = 5 pts)		0-5	0
Cabinet conduit capacity:			(Below = 0 pt, At = 3 pts, Above = 5 pts)	0-5	0
Overall condition of the hand boxes:			(Good = 0 pt, Fair = 3 pts, Poor = 5 pts)	0-5	0
Conduit fill capacity in hand boxes:			(Below = 0 pts, At = 3 pts, Above = 5pts)	0-5	0
General condition of the electrical service:			(Good = 0 pts, Fair = 3 pts, Poor = 5pts)	0-5	0
OVERALL SCORE:			**(Maximum Points = 200)**		**0**

4. Recommendations

Proactive Maintenance & Risk Management

CONTROLLER TYPE:	TS 1		TS 2 Type 1		TS 2 Type 2	
CABINET TYPE:	TS 1		TS 2		Other	
	Base Mount		Pole Mount			

SUPPLEMENTAL ITEMS:		POINTS	SCORE
Is the cabinet in an accessible location?	(No = 1 pt)	0-1	0
Cabinet condition:	(Good = 0 pts, Fair = 1 pt, Poor = 2 pts)	0-2	0
Per the MUTCD, are there two indications per movement?	1 pt per movement not meeting this requirement)	0-4	0
Per the MUTCD, are there near-side signal heads were necessary?	(1 pt per approach not meeting this requirement)	0-4	0
Are the pedestrian indications appropriately aligned with crosswalks?	(1 pt per crossing not meeting this requirement)	0-4	0
Are pedestrian push buttons accessible?	(1 pt for each button that is not accessible)	0-8	0
Are there any utility lines touching mast-arms or span wires?	(1 pt per mast-arm or span wire)	0-4	0
Are there any signal heads that are obstructed by utility line?	(1 pt per approach with utility line obstruction)	0-4	0
SUPPLEMENTAL SCORE:			0

The Supplemental Score is a secondary score for non-critical items and is not included in the location's Overall Score.

MAINTENANCE ITEMS:		Yes/No
Cabinet door hinge or lock damaged?		
Cabinet conduits plugged?		
Rodent or bug infestation within the cabinet?		
Is the cabinet filter present?		
Is the exterior cabinet base caulked?		
Does each pole have a rodent barrier?		
Are all the tightening and leveling nuts present and tight?		
Are all mast-arm flange bolts present?		
Are all pole access covers present and secured?		
Do all "T" bases appear to be level and tight?		
Does there appear to be any LED degradation?		
Do any traffic signal indications appear to fall below MUTCD height requirements?		
Are all hand boxes accessible?		
Are all hand box lids present and secure?		
		G/F/P
Condition of stop lines:	(Good, Fair, Poor)	
Condition of crosswalks:	(Good, Fair, Poor)	
Condition of regulatory/warning signs:	(Good, Fair, Poor)	
NOTES:		

4. Recommendations

Proactive Maintenance & Risk Management

Howard County Traffic Signal Inspection and Assessment - 2018 Inspection Cycle

Maintenance Follow-up Items

Ranking	Rating	No	Location	Buried Base Plate	Cabinet Door Hinge/Lock	Rodent/ Bug	Rodent Barrier	Tightening and Leveling Nuts	Mast Arm Bolts	Access Covers	Hand Holes Retaining Water	Hand Hole Lids Shifted	Electrical Service	Electrical Service - Access Cover	Stop Lines	Crosswalks	Signs	Overgrowth	Loose Ped Pole	Other	Notes	Needs media blasting, prime and repaint	Install Date:
1	84	20	Oakland Mills Rd. at Homespun/Malindy																		Cabinet door locking mechanism is broken. Will be rebuilt with SRP widening.		12/7/1983
2	79	40	Rogers at Town and Country/Center Dr.	X				X															6/11/1992
3	71	6	Harpers Farm Rd. at Cedar La.																X				6/17/1992
4	71	15	Harpers Farm Rd. at Eliot Oaks Rd.												X	X					Will be rebuilt with SRP widening.		1/20/1986
5	66	24	Little Patuxent Pkwy. at Symphony Woods/Columbia Mall																				8/7/1992
6	66	37	Little Patuxent Pkwy. at Rouse/Mall																		Structural Evaluation Complete.		12/30/1975
7	64	28	Snowden River Pkwy. at Oakland Mills Rd.					X													Rebuild 2018. Structural Evaluation Complete.		9/1/1981
8	61	1	Snowden River Pkwy. at Berger Rd./Carved Stone		X																		9/1/1981
9	56	7	Cedar La. at Hickory Ridge										X										8/16/1984
10	56	11	Twin Rivers at Crossfox												X	X					NW corner - loose bolts.		2/4/1985
11	56	21	Little Patuxent Pkwy. at Banneker/Gov. Warfield																				11/15/1984
12	52	13	Oakland Mills Rd. at Dobbin Rd.		X																NW and SW corners - loose bolts. SW corner - mast arm bolts should be checked.		3/22/1985
13	51	4	Broken Land Parkway at Snowden River Pkwy./Patuxent Woods																				11/24/1987
14	51	33	Little Patuxent Pkwy. at Vantage Pt./W. Running Brook	X											X	X					SW corner - loose bolts. NW corner - trim over growth from around pole.		10/6/1987
15	51	53	Frederick at Plum Tree					X												street name sign possibly rubbing against span wire	Rebuild 2018		12/14/1977

4. Recommendations

Howard County Traffic Signal Inspection Summary Report:

Signal Number: 020
Location: Oakland Mills Rd. at Home Spun Dr./Malindy Circle
Inspection Date: Dec. 14, 2017

Inspection Overall Score: 84

Significant Findings:

NE Corner signal structure failed on Dec. 13, 2017. NW Corner signal structure was inspected and found to have significant deterioration and cracking around the base plate weld area. Immediate removal of this pole was recommended.



Maintenance Issues:

N/A

Howard County Traffic Signal Inspection Summary Report:

Signal Number: 028
Location: Snowden River Parkway at Oakland Mills Rd.
Inspection Date: May 2, 2018

Inspection Overall Score: 64

Significant Findings:

Combination of one mast-arm and three spans. Older span wire poles have cast iron base plates. Poles are in fair condition with some coating failure, and light rusting around the base plate and tightening nuts. Pole on NE corner has vehicle impact damage. Newer mast-arm pole has significant coating failure.




Maintenance Issues:

NE and NW Corners – loose tightening nuts.

4. Recommendations

- All four agencies used the information gathered during the inspection and condition phase to justify additional funding to replace aged traffic signal infrastructure, and to justify additional funding.
- Repeat the cycle!

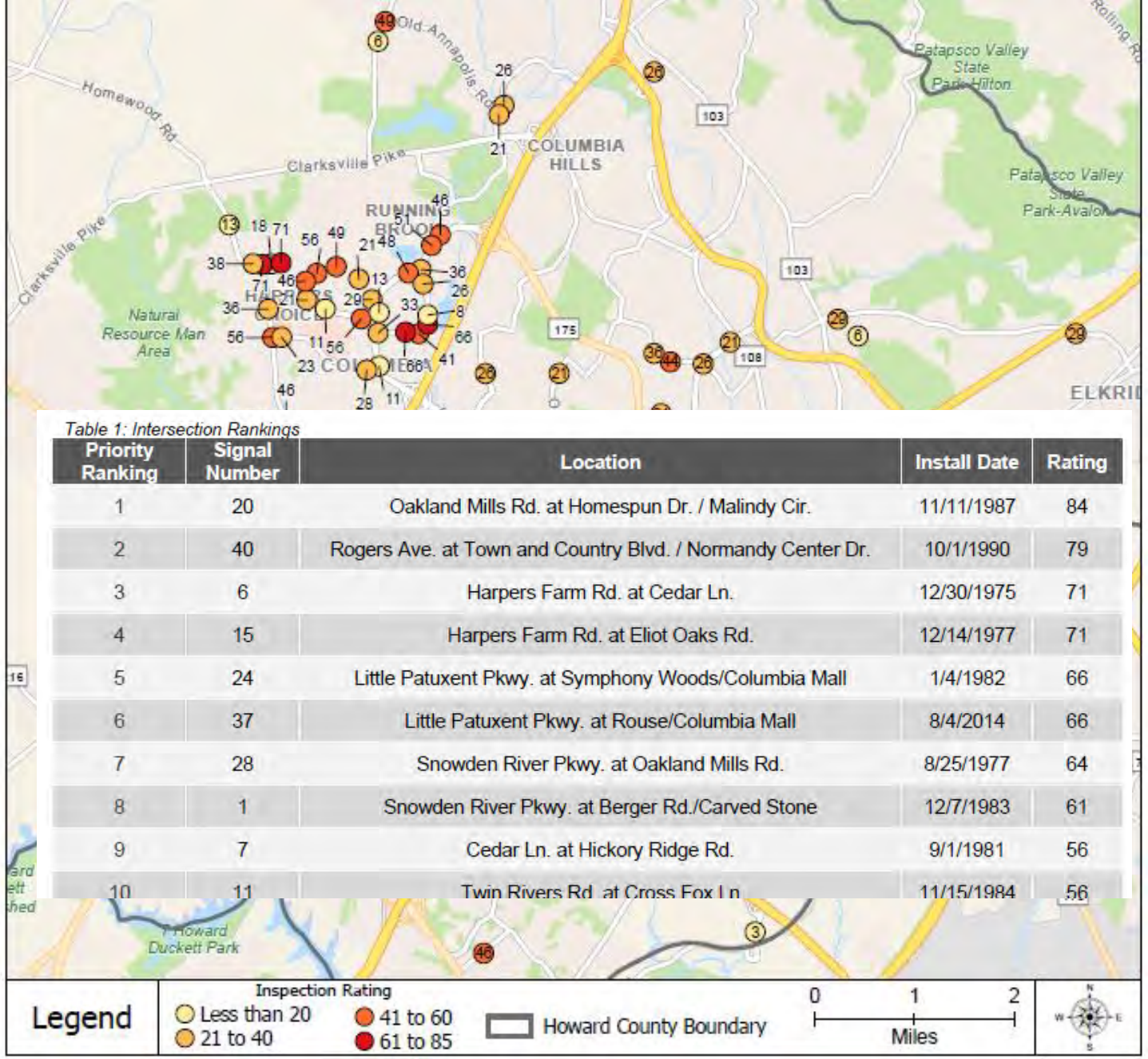


Table 1: Intersection Rankings

Priority Ranking	Signal Number	Location	Install Date	Rating
1	20	Oakland Mills Rd. at Homespun Dr. / Malindy Cir.	11/11/1987	84
2	40	Rogers Ave. at Town and Country Blvd. / Normandy Center Dr.	10/1/1990	79
3	6	Harpers Farm Rd. at Cedar Ln.	12/30/1975	71
4	15	Harpers Farm Rd. at Eliot Oaks Rd.	12/14/1977	71
5	24	Little Patuxent Pkwy. at Symphony Woods/Columbia Mall	1/4/1982	66
6	37	Little Patuxent Pkwy. at Rouse/Columbia Mall	8/4/2014	66
7	28	Snowden River Pkwy. at Oakland Mills Rd.	8/25/1977	64
8	1	Snowden River Pkwy. at Berger Rd./Carved Stone	12/7/1983	61
9	7	Cedar Ln. at Hickory Ridge Rd.	9/1/1981	56
10	11	Twin Rivers Rd. at Cross Fox Ln.	11/15/1984	56