

Yale New Haven
Hospital Inter-
Campus AV Routes

Fully
Autonomous
Vehicle Testing
Pilot Program



Agenda

Item	
1	Goals of Meeting and Project
2	Fully Autonomous Vehicle Overview
3	Route Review
4	Operational Details/Challenges
5	Safety Strategy Overview
6	Questions for Traffic Authority
7	Next Steps

Goals for meeting

For Traffic Authority stakeholders to:

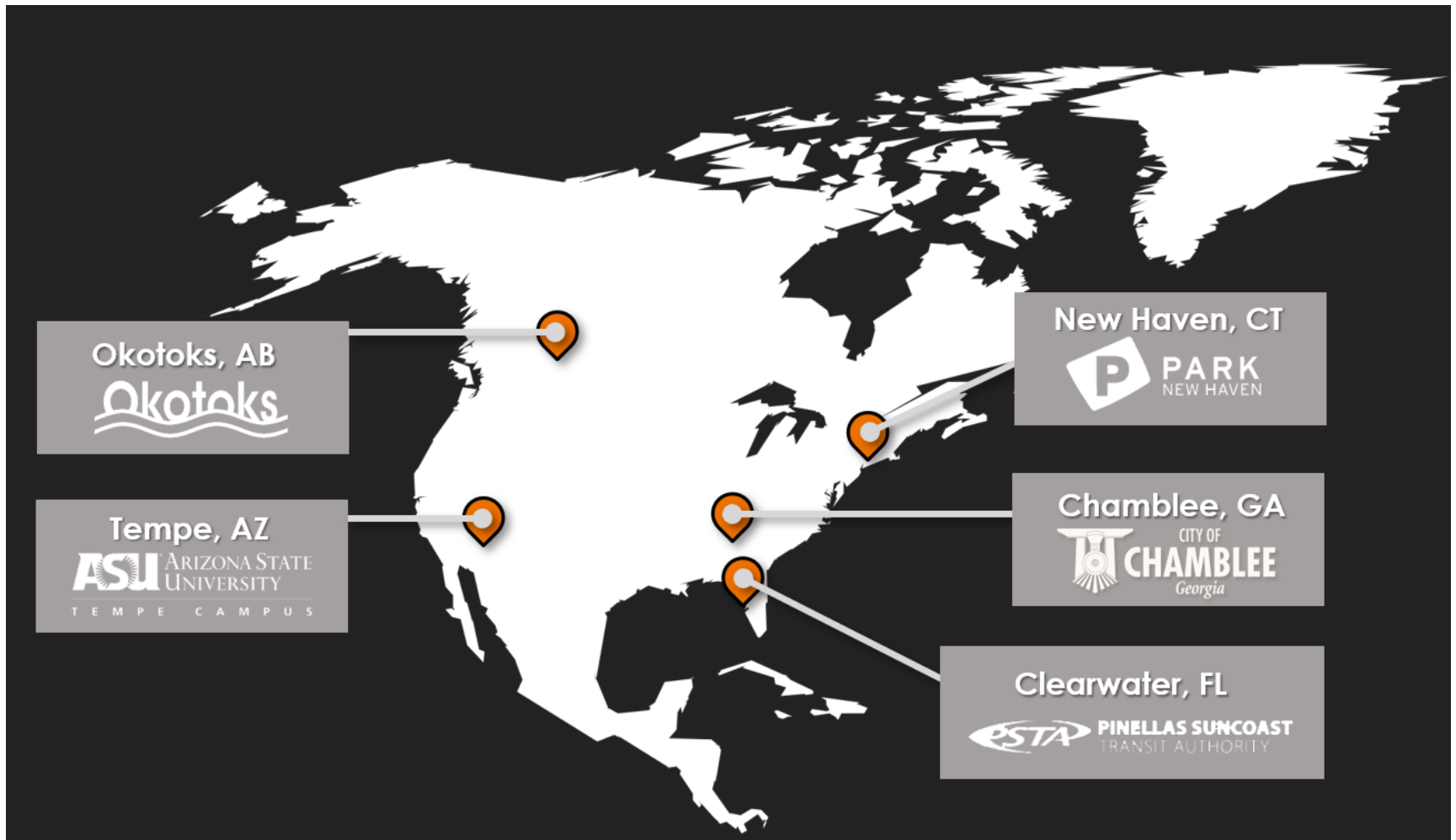
- Gain understanding of technology and project objectives; and
- Consider and define roles/responsibilities in an autonomous vehicle pilot program for the City of New Haven.

Goals for project

Design a concept plan that allows project stakeholders (NHPA, YNHH, Yale) to:

- Provide greater access to YNHH campuses and parking facilities such as Air Rights Garage;
- Observe how an AV performs under real-world conditions and meets user needs in comparison to legacy vehicles; and
- Gain AV operations experience to create short- and long-term AV strategy.

Stantec's Recent Smart Mobility Projects



Fully Autonomous Vehicle Overview - Examples

Manufacturers and Self-Driving Shuttles in the process of testing and launching pilot programs.



Easy Mile
EZ10



Local Motors
Olli



Navya
Arma

Shuttle Details

Notable Features:

- » Tight enough of a turning radius (13-15 feet) to drive on existing streets
- » Operates in both directions, eliminates the need to turn around
- » Works with a mobile app for on demand calls and real time monitoring
- » Wheelchair accessible and working to offer more accessibility features and compliance with Americans with Disabilities Act (ADA) regulations
- » Redundant breaking mechanisms
- » Emergency stop button on-board
- » Direct telecom connection to central command hub for passengers

Self-Driving Shuttle Specifics



25 mph
top speed

8-16 people
maximum capacity

3-10 hours
amount of time on a
single battery charge

16'x7'x9'
typical size

Self-Driving Shuttle and Standard Bus Comparison



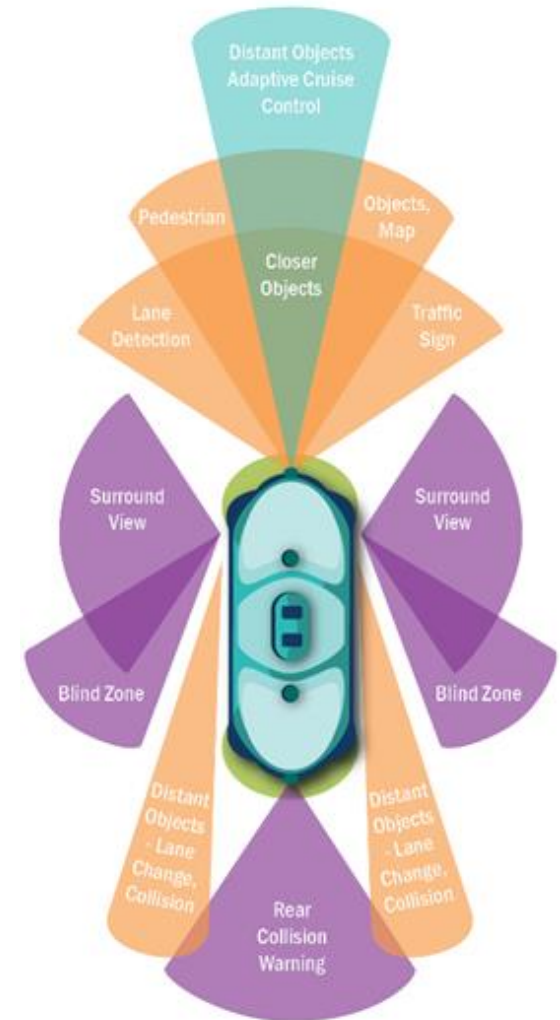
16 feet



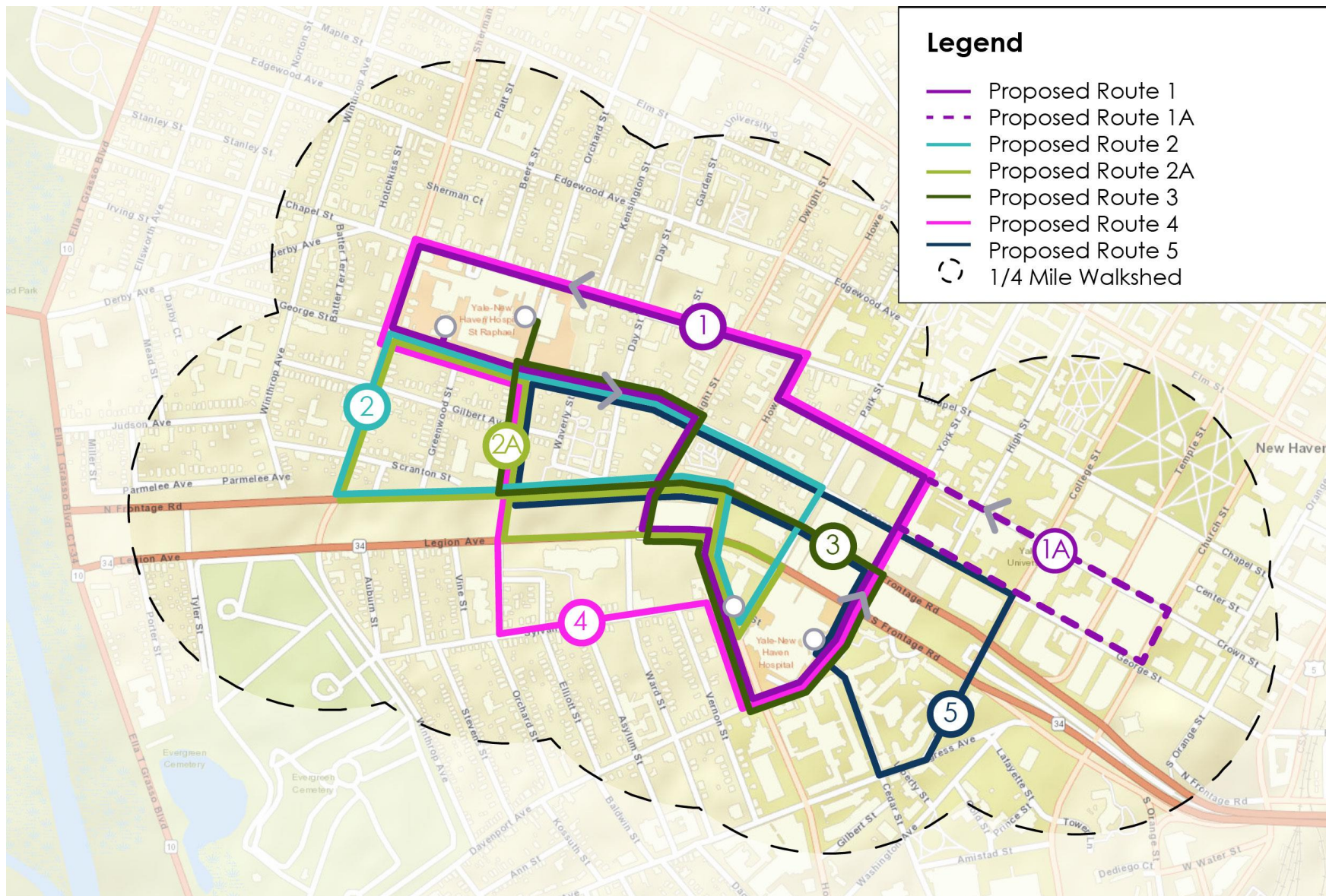
40 feet

Overview Cont. - Safety Measures

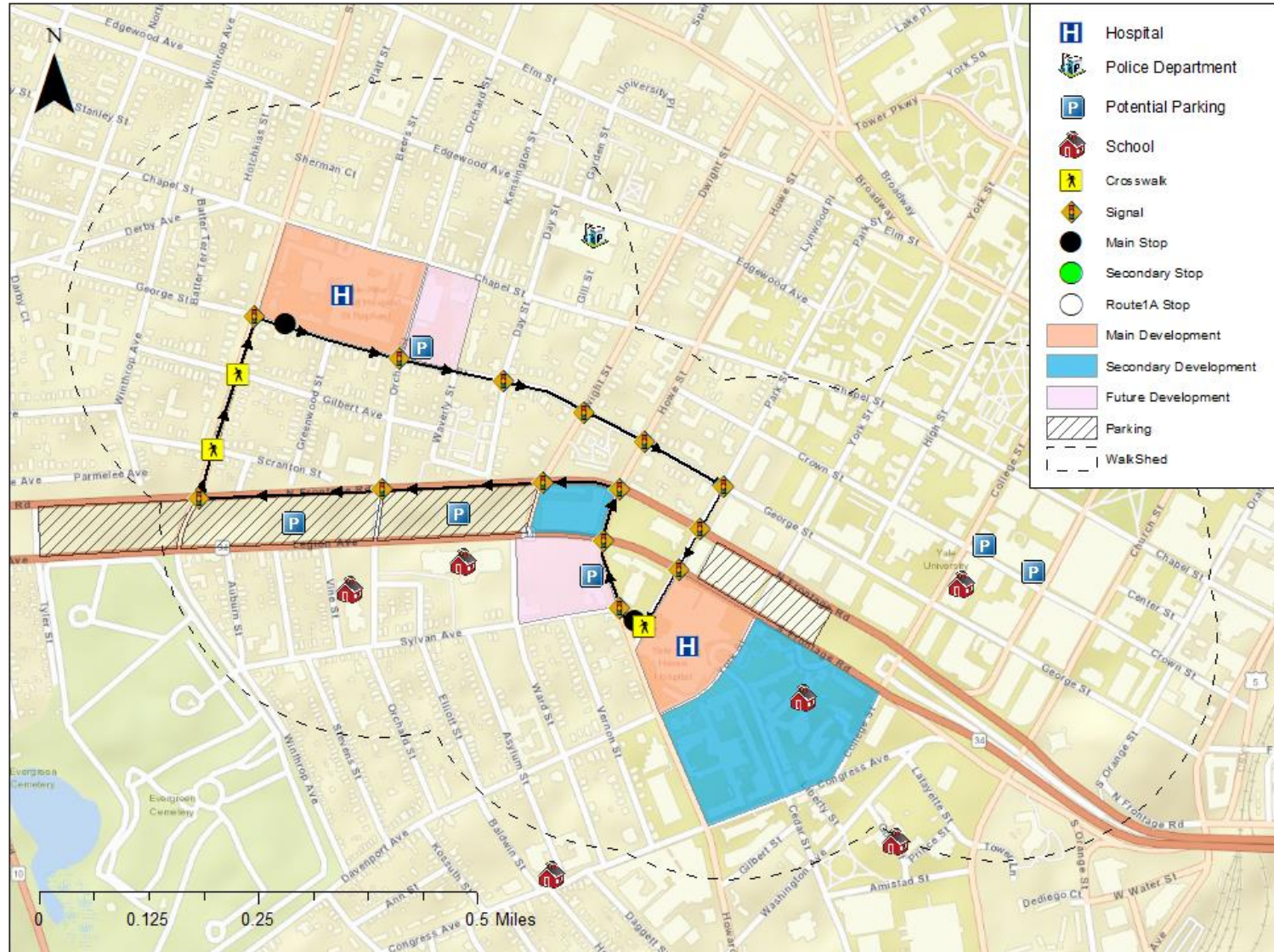
- Onboard operator/ambassador
- Geofenced operations
- 2-way communication with remote supervisor (human in the loop)
- Low-speed (<25 mph; avg. 12 mph)
- Redundant sensors (lidar, radar, ultrasonic, 3D camera, IMU)
- Redundant communications (Wi-Fi, LTE, 4G/5G)
- Redundant braking (electric and mechanical)
- V2X if required



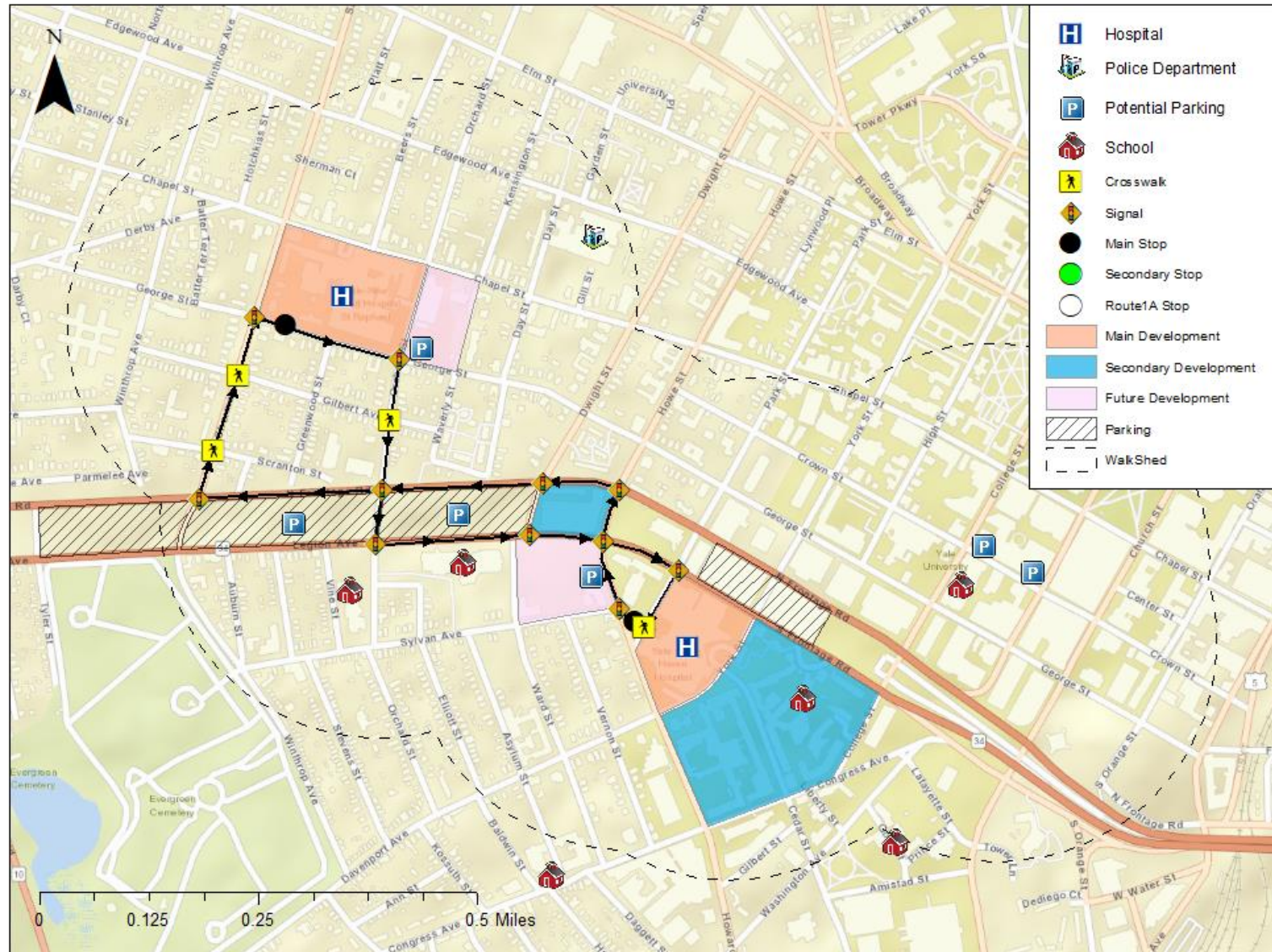
Hospital Connector Routes



Preferred Hospital Connector – Route 2



Preferred Hospital Connector – Route 2A



Route Comparison

	Route 2	Route 2A
Route Length (mi)	1.7	1.7
Avg. Route Speed (mph)	5.3	5.6
Headway with One Shuttle (min)	19	18
Speed limit \leq 25 miles/hour	Yes	Yes
Viable Storage Location	Yes	Yes
Number Traffic Signals	14	11
Number of Stops at Stop Signs	0	0
Number of Pedestrian Crossings	3	4
Number of Lane Changes	3	3

Preliminary Operational Details

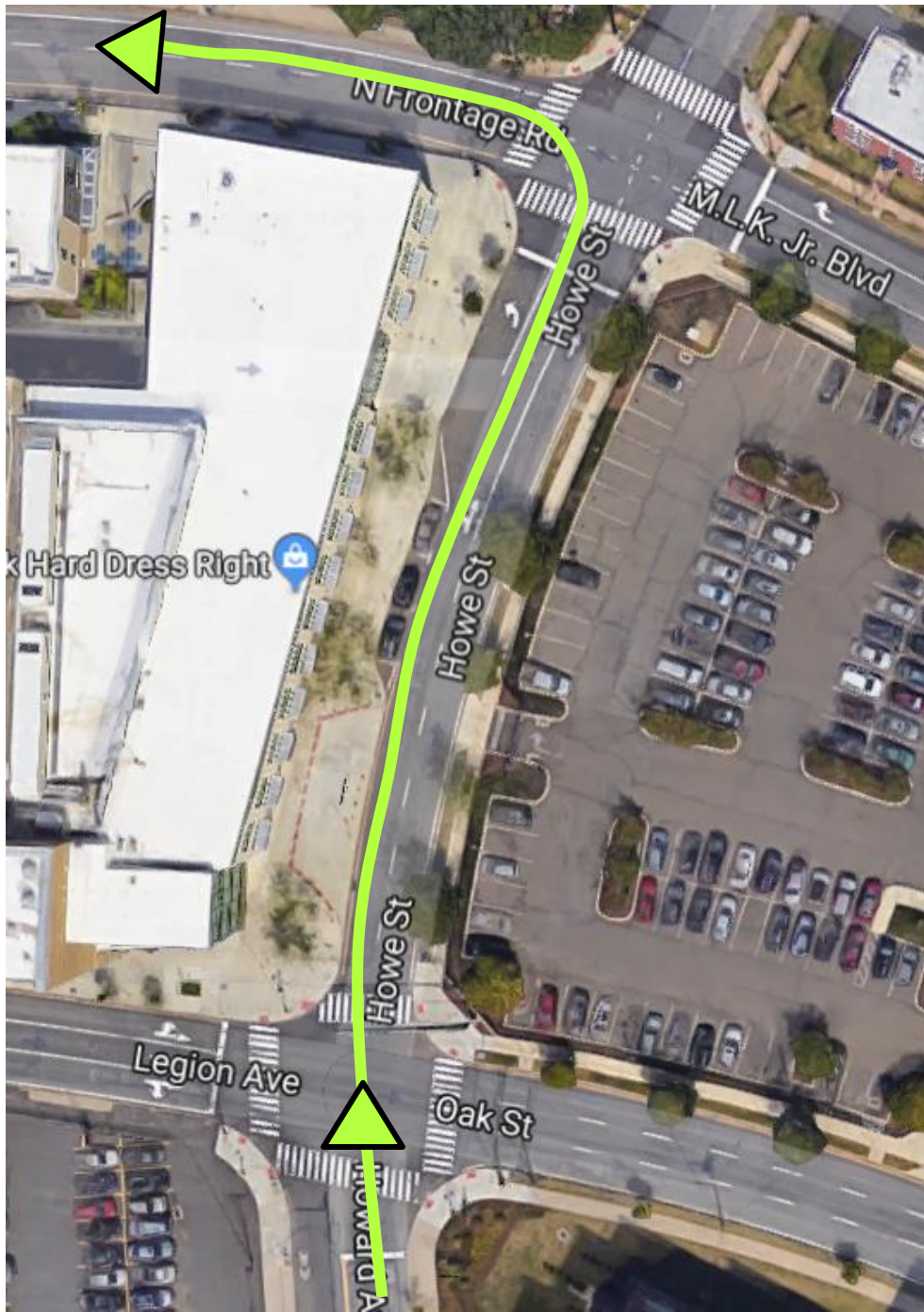
Hours of Operation: 8am – 6pm, Monday through Friday

Challenges:

- Lane changes
- Left hand turns

Storage/Charging:

- Current options include **surface lots** along Legion/Frontage and **parking garage** on Crown and College or Frontage and Howe.





Safety Strategy

- State of Connecticut Compliance
 - Public Act 17-69
 - OPM's minimum requirements framework
- Risk Assessment and Mitigation
 - NHTSA VSSA and approval documentation
- Safety Operations Plan
 - Operations tools and training for key roles
- Emergency Response Protocols
 - Protocol documentation and training for EMS (work with chosen vehicle provider)

Questions for Traffic Authority

- Level of involvement
 - Awareness to hands-on
- Future coordination
 - Updates at monthly Traffic Authority meeting?
 - Safety Committee creation?
 - Other?

Next Steps

- Record comments/questions from Traffic Authority (email by **4/19**)
 - Return responses by **5/3**
- Complete concept plan
- Provide overview to CT DOT on **5/1**
- Finalize application to OPM and submit by end of May
- If successful, choose vehicle provider and begin protocol documentation and training

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