



milo: autonomous shuttle program



- **Program Basics**
- **Routes**
- **Vehicle Specifications**
- **Procurement and Project Timing**
- **Insurance**
- **Deployment Environment**
- **Resource Considerations**
- **Maintenance Considerations**
- **Operations Considerations**

- Milo is the first autonomous shuttle offered by a municipal government to the public on a continuous basis
- Two main goals – testing the technology in a real world environment and public education on autonomous vehicles
- Project partners include the City of Arlington, the Arlington Convention and Visitors' Bureau, EasyMile, and First Transit



- Milo operates before and after major events at Globe Life Park and AT&T Stadium in Arlington's Entertainment District
- Milo operates solely on an off-street trail that is 10' wide, with no other vehicular traffic
- Milo does interact with pedestrians and bicyclists on the trail
- Pilot project is based on a 6 month lease with a 6 month renewal option
- Milo operates with a certified, trained operator on board at all times

milo routes



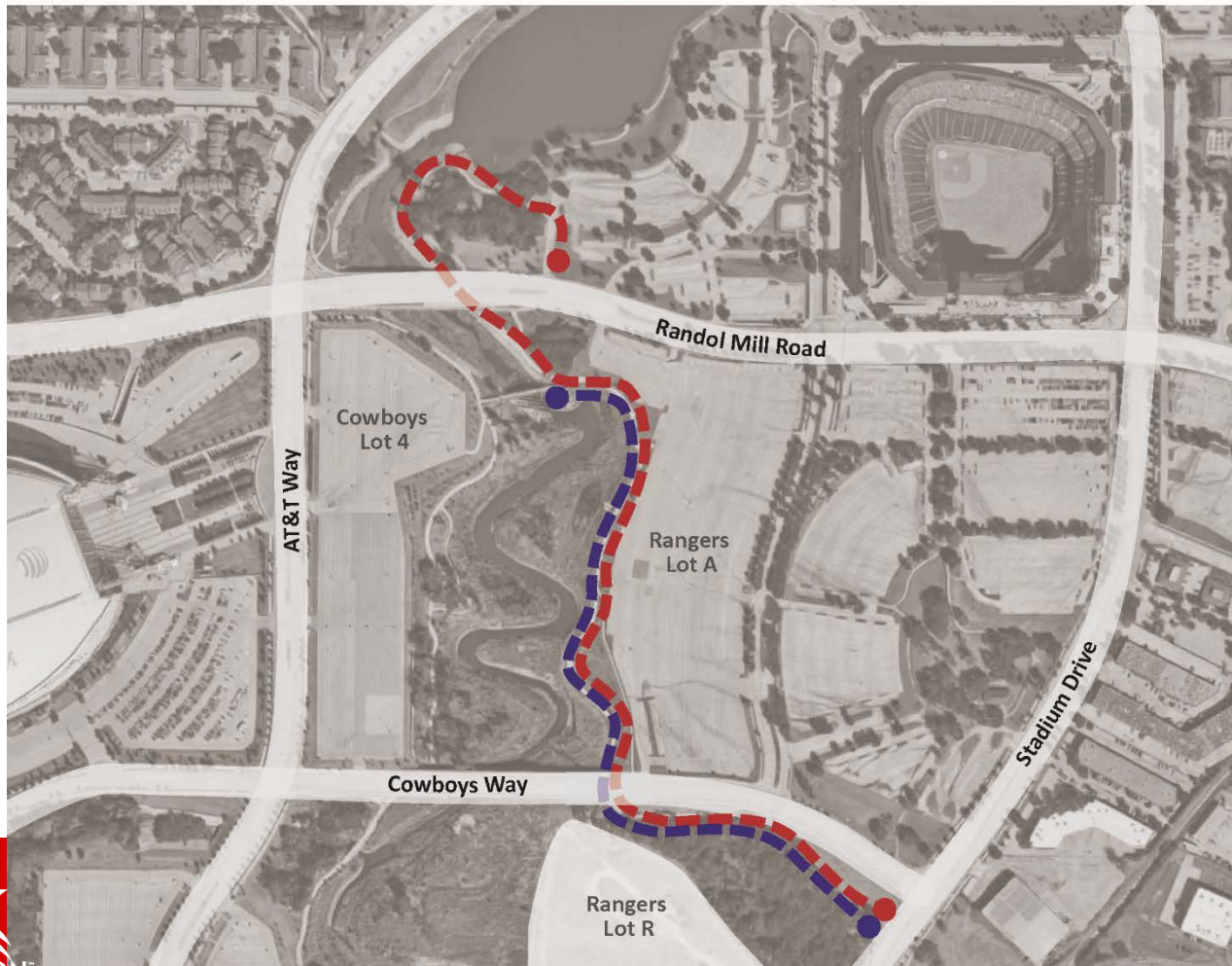
--- GLOBE LIFE PARK EVENTS

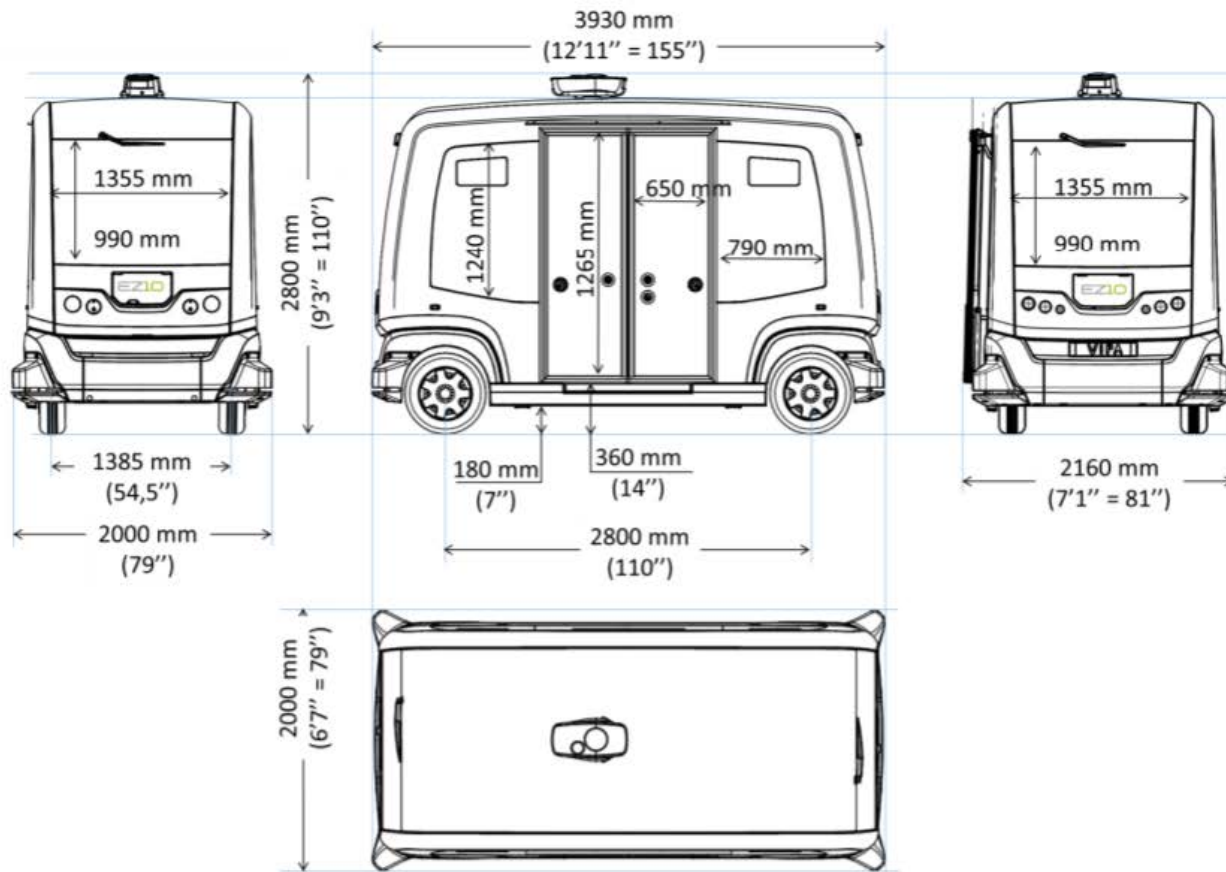
● Pick Up & Drop Off

--- AT&T STADIUM EVENTS

● Pick Up & Drop Off

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- Vehicles are approximately 7' X 12' X 9'
- 220V power source or 110V with transformer required

- **EasyMile visited Arlington in February 2017 for a public demonstration**
- **City pursued a sole-source procurement with EasyMile based on their provision of a wheelchair ramp**
- **City Council approved a 6-month lease for two vehicles with EasyMile in March 2017**
- **Vehicles arrived in May 2017**
- **Vehicle set-up, route mapping, and staff training occurred June-August 2017**
- **Service launched late August 2017**

- **Securing the correct types of insurance was one of the biggest challenges for the project**
- **Vehicles are insured with General Liability & Auto Liability policies carried by EasyMile**
- **Operations are insured with Auto Liability, General Liability, and Workers' Compensation policies carried by First Transit**

Costs not included in the vehicle lease:

- NRTK subscription (satellite-based localization)
- Vehicle wrap
- Data plan
- SIM cards
- Mowing and landscaping issues
- Pavement additions
- Towing & transport
- 3rd party operators & maintenance
- Voltage transformers
- Additional training
- Signage and brochures



- Vehicles took about 5 days to wrap due to non-standard shape & size
- Site assessment and physical adjustments caused delays
- Vehicle set-up and localization issues caused delays (faulty LIDAR, physical environment)
- Route mapping, staff training, and trajectory fine-tuning is very time-intensive
- Staff time spent on project greatly exceeded expectations

- The deployment environment is the most critical element to a successful program
- EasyMile vehicles are very sensitive to their environments
- Space requirements:
 - At least 10' width of pathway
 - Minimum clearance of 18" from lower safety lasers – free of obstacles and landscaping
 - Height clearance of 11'
- Localization considerations:
 - Few if any underpasses
 - Minimize sharp turns
 - Regular stationary vertical elements
 - Low level of tree cover



- EasyMile conducts a Site Assessment Report for each project location and recommends alterations to the environment
- Very important to implement these recommendations for a successful deployment
- Arlington examples:
 - Addition of large rocks to assist with safety
 - Addition of birdhouses to provide stationary vertical elements for localization
 - Frequent maintenance of landscaping next to trail – cannot allow grass/shrubs to get too high



Other Alterations to Physical Environment:

- Installation of signage and concrete decals to mark station locations and warn pedestrians and bicyclists of Milo operation on the trail
- Additional concrete poured to add to trail, to create station pads, and to create a vehicle passing area
- Pathway underneath a roadway bridge had to be lowered 1 foot



- **Storage – covered space and electricity access**
- **Cleaning – plan for spills, bodily fluids, blood-borne pathogens, exterior cleaning is a challenge**
- **Repairs and maintenance – often requires specialized parts and knowledge**
- **Maintenance expertise not currently readily available in United States**
- **Transport – must be loaded onto a flatbed tow truck or special trailer; requires trained operator and is expensive**



- The City, through the CVB, elected to contract out operations to First Transit
- Milo must have a trained operator on board at all times to monitor possible obstacles and technical issues, and provide customer service
- Specialized training required – training is expensive and takes time
- These are hourly wage positions and tend to have high turnover
- Technical and customer service skills very important

- **Public safety plan – make fire and police aware of operations and basic functions of vehicle**
- **Establish numbers to call for maintenance & emergencies**
- **Plan for two way communications between operators and chief operator**
- **Operating two vehicles in platooning or passing mode (both operating on same trail) requires 3 people – one chief operator and two operators**

AT&T Stadium & Globe Life Park Event Service:

- 30 events since August 26

Public Demonstration Rides:

- 9 demos from August to January

Group Demonstration Rides:

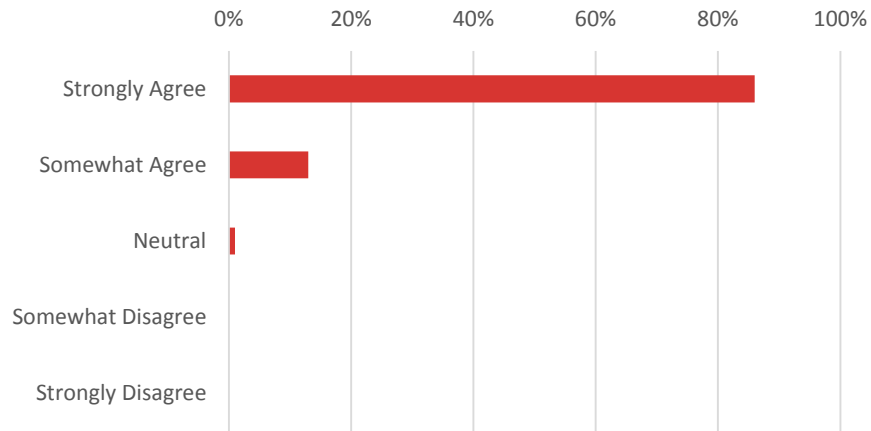
- 7 demos from September to December

Special Events:

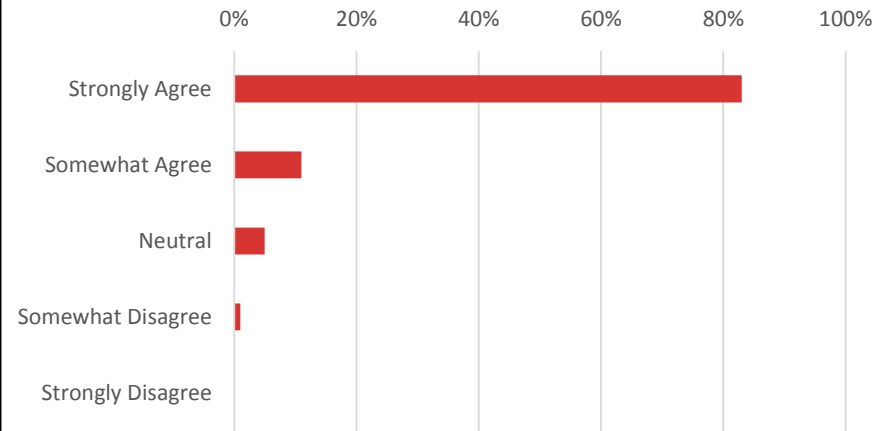
- 3 community events in October & November

**Total
Ridership:
over 740**

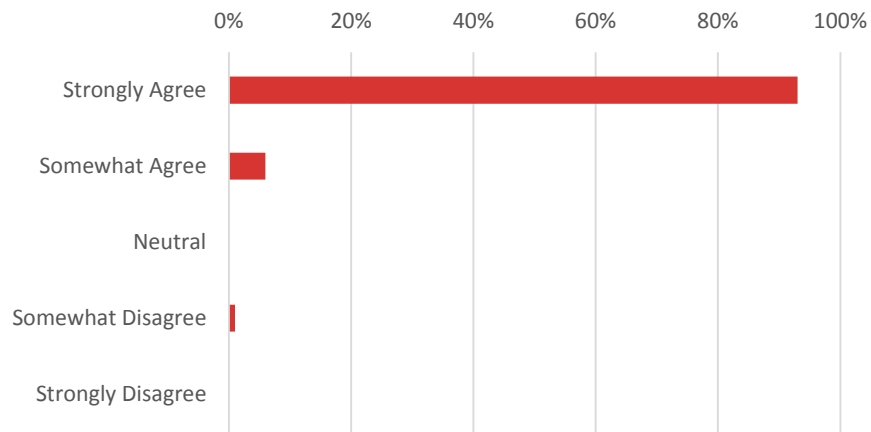
I enjoyed riding Milo.



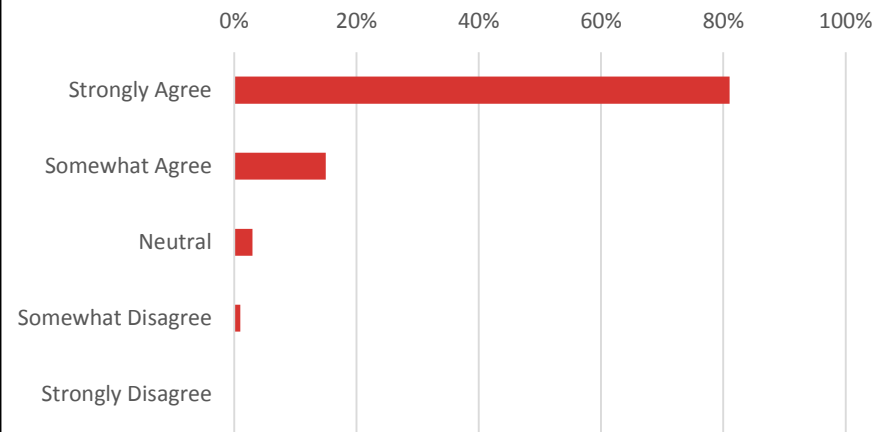
I would ride Milo again.



I felt safe riding Milo.



I support AV technology.



n = 168

Phase 2 Testing

- Hope to test AVs in an on-street environment in Arlington
- Currently exploring available technology, vehicle options, and locations
- Potential to access up to \$350,000 in CMAQ funding for on-street testing





Alicia Winkelblech, AICP
Assistant Director, Strategic Planning
Alicia.Winkelblech@arlingtontx.gov

Ann Foss, Ph.D., AICP
Principal Planner
Ann.Foss@arlingtontx.gov

Lyndsay Mitchell, AICP
Planning Manager
Lyndsay.Mitchell@arlingtontx.gov