WORK ZONE MANAGEMENT PROGRAM

Session 3: What's Happening Now?

September 11, 2018

U.S. Department of Transportation

Federal Highway Administration

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Work Zone Data Exchange (WZDx)

VDOT’s In-Field Mobile Application

Connected Vehicle and Work Zone Activity in Northern Virginia

Virginia Tech
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Overview

9/12/2018

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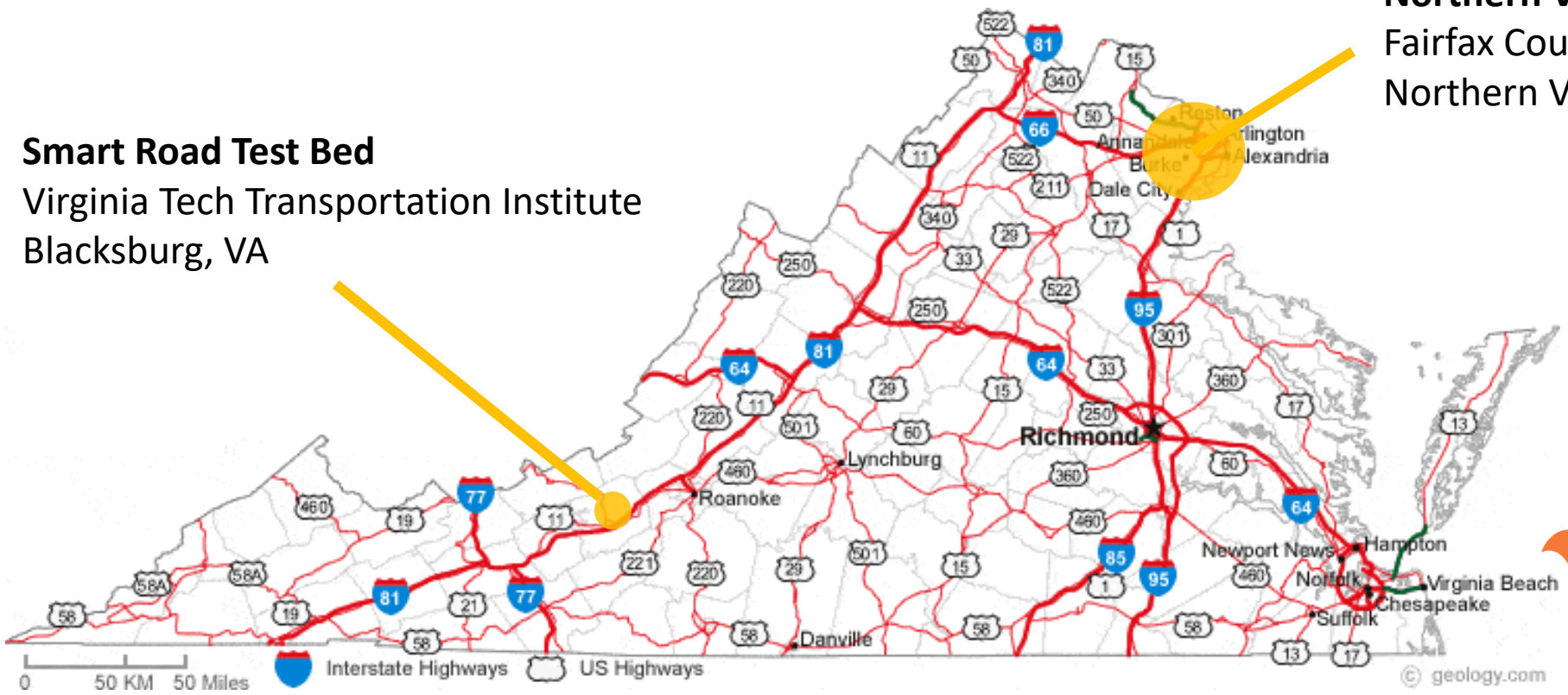
Virginia Connected Corridors

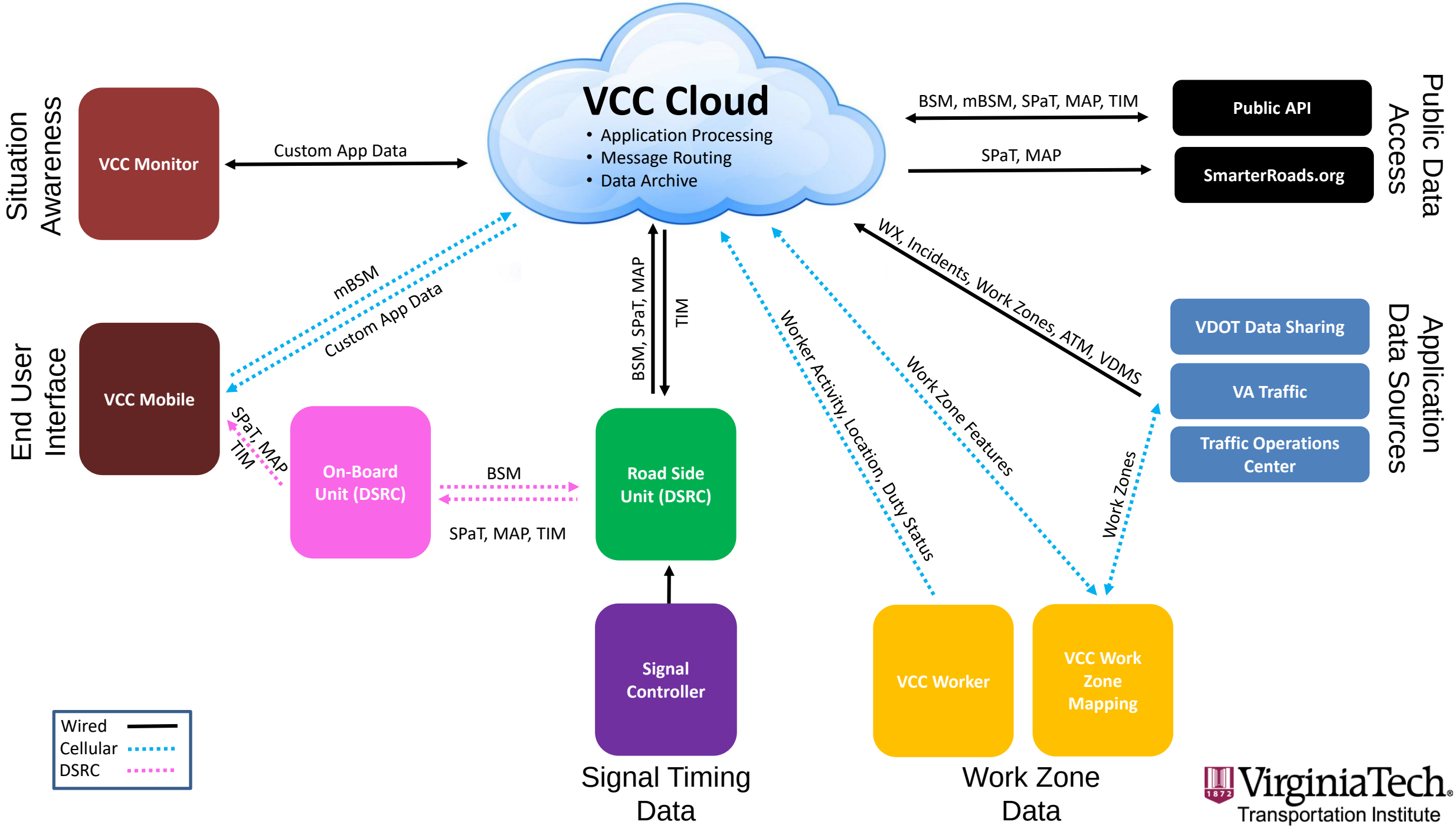
Mission: Provide an open connected vehicle environment where concepts can be developed, tested, deployed, and evaluated in real world operating environments.

Northern Virginia Test Bed
Fairfax County, VA
Northern Virginia

Smart Road Test Bed
Virginia Tech Transportation Institute
Blacksburg, VA



VDOT
Virginia Department of Transportation


VCC Cloud
• Application Processing
• Message Routing
• Data Archive
Situation Awareness
VCC Monitor
Custom App Data
End User Interface
VCC Mobile
mBSM
Custom App Data
SPaT, MAP
TIM
On-Board Unit (DSRC)
BSM
SPaT, MAP, TIM
Road Side Unit (DSRC)
BSM, SPaT, MAP
TIM
Signal Controller
Signal Timing Data
BSM, mBSM, SPaT, MAP, TIM
SPaT, MAP
Public API
SmarterRoads.org
Public Data Access
WX, Incidents, Work Zones, ATM, VDMS
Worker Activity, Location, Duty Status
Work Zone Features
Work Zones
VDOT Data Sharing
VA Traffic
Traffic Operations Center
Application Data Sources
VCC Worker
VCC Work Zone Mapping
Work Zone Data
Wired
Cellular
DSRC
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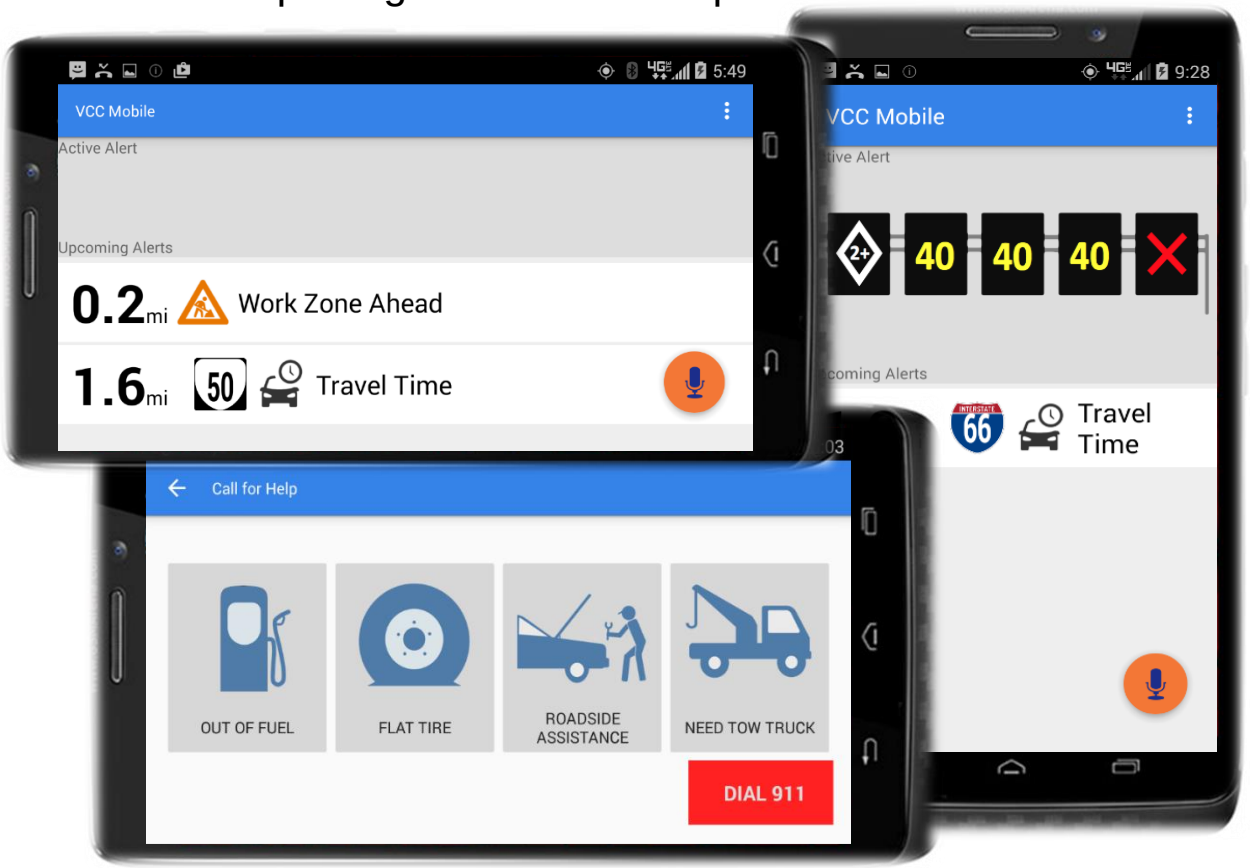
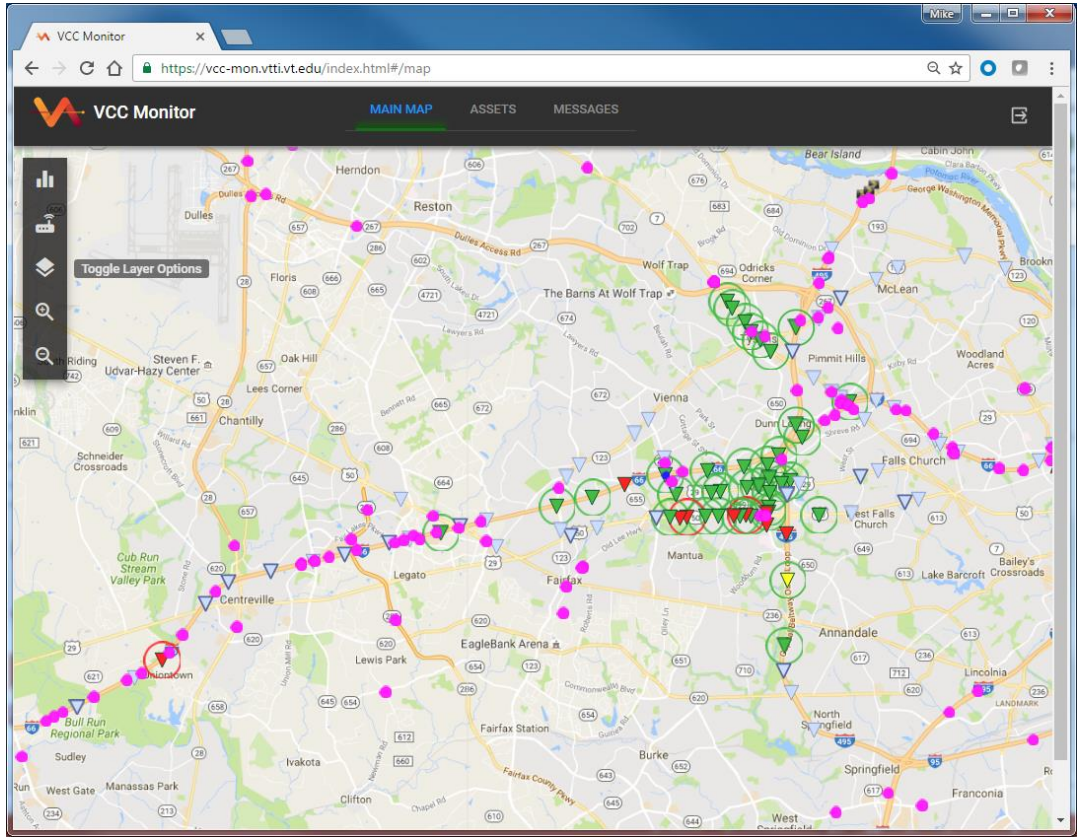
VCC Mobile

- Cellular or DSRC/OBE
- Dynamic Driver Messaging
- Work Zone Alerts
- Weather Advisories
- Traffic Incidents
- ATM/HOV Status and Alerts
- Pot Hole Detection and Road Surface Temp Monitoring
- Driver Reporting and Call for Help

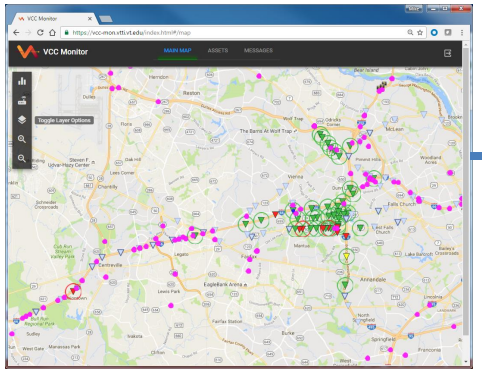


VCC Monitor

- Realtime Situation Awareness Tool
- RSU Status and Performance Monitoring
- Message Flow Monitoring (BSM, BMM, PDM, TIM, etc.)
- SPaT Status Display
- Control Message Management
- Traveler Information Message Management
- Driver Report Location

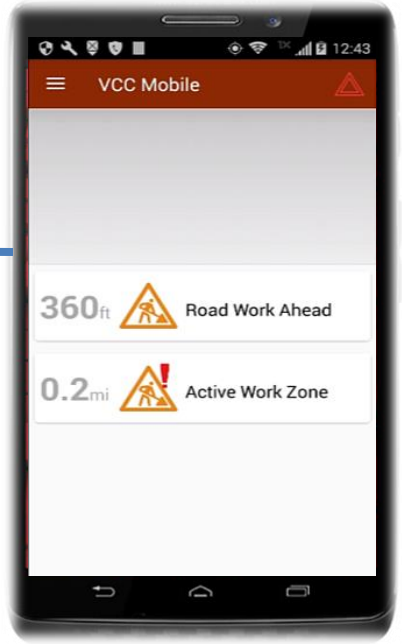


VCC Work Zone Components

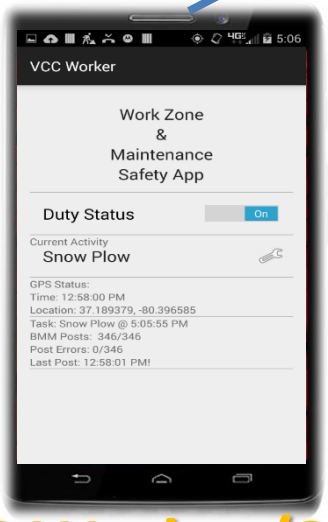


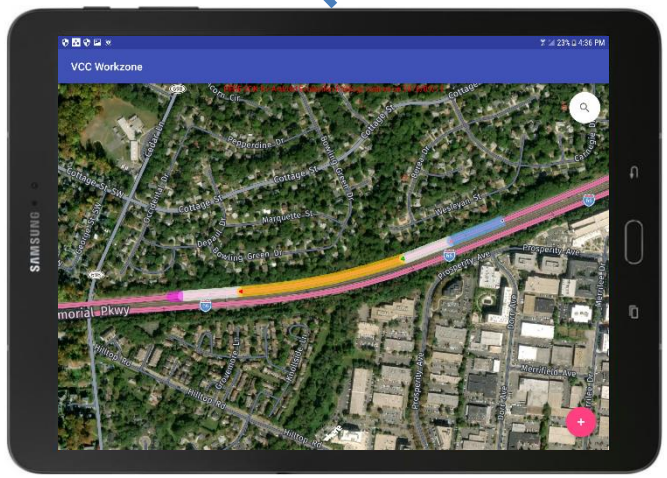
VCC Monitor
Situation Awareness

VCC Cloud
Data and Processing Hub



VCC Mobile
Driver Interface





VCC Worker/SSP **VCC Vest**
Dynamic Worker Location and Activity

Work Zone Builder
Detailed Work Zone Definition

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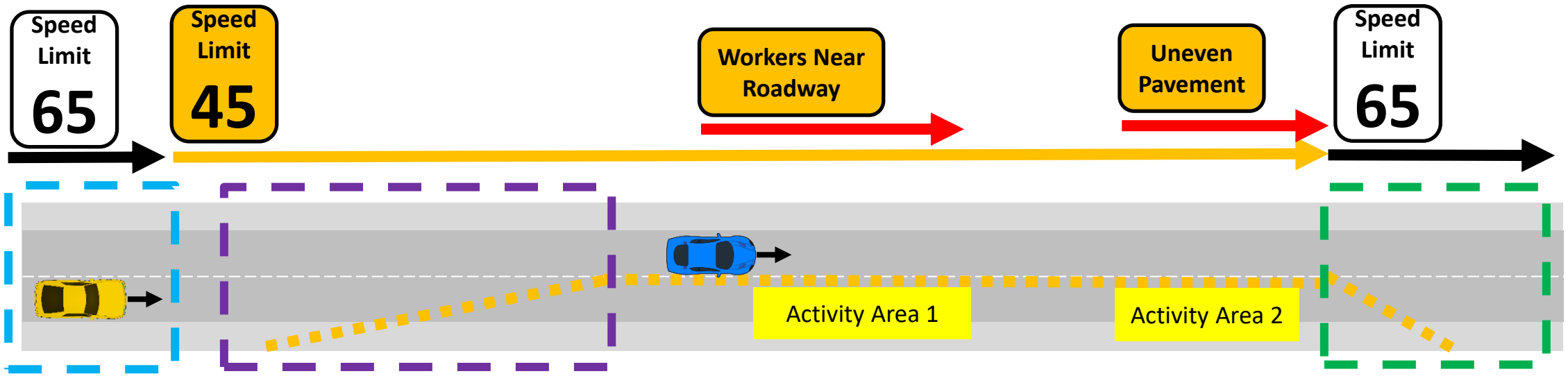
Desired CAV Data Elements



Approach
- Lat / Lon Geo Position
- General Description
- Operational Restrictions

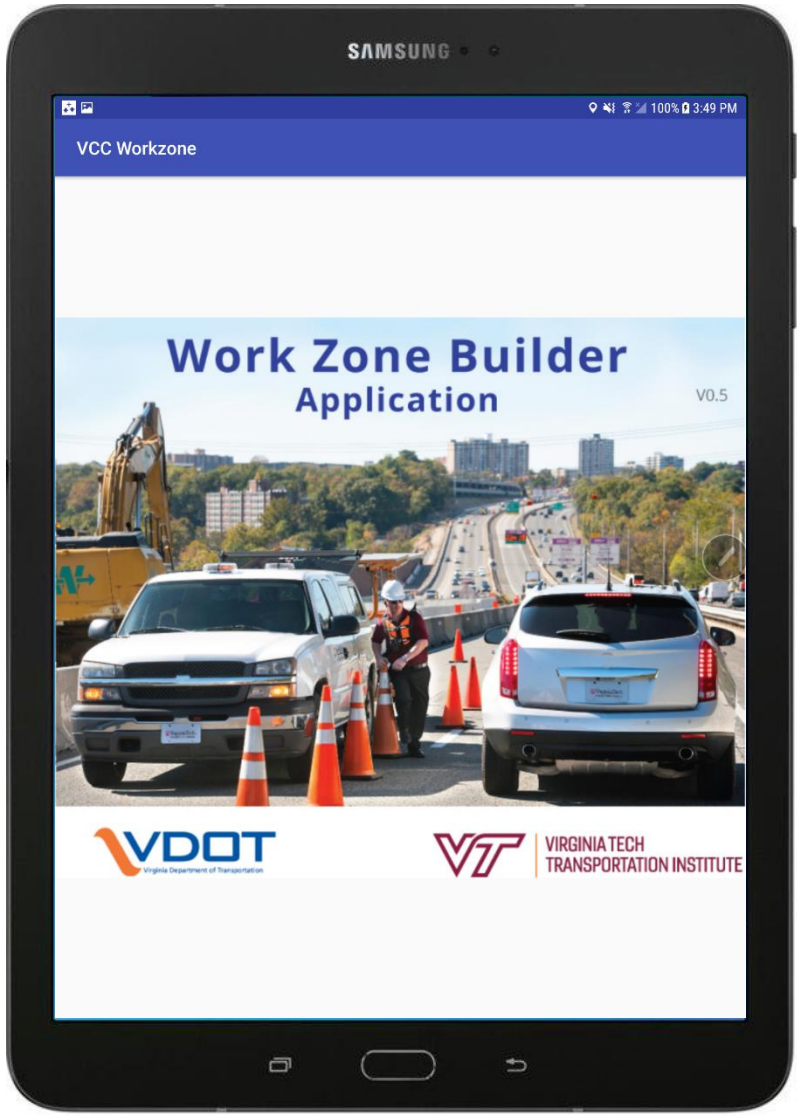
Transition
- Lat / Lon Geo Position
- Beginning of Taper
- End of Taper
- Required Actions
- Merge Direction
- Lanes Offsets / Alternate Paths
- Speed Reduction
- Maneuver Restrictions

Activity Area(s)
- Lat / Lon Geo Position
- Description
- Potential Hazards
- Barrier Type
- Active / Inactive

Termination
- Lat / Lon Geo Position
- Beginning of Taper
- End of Taper
- Resume Speed Limit

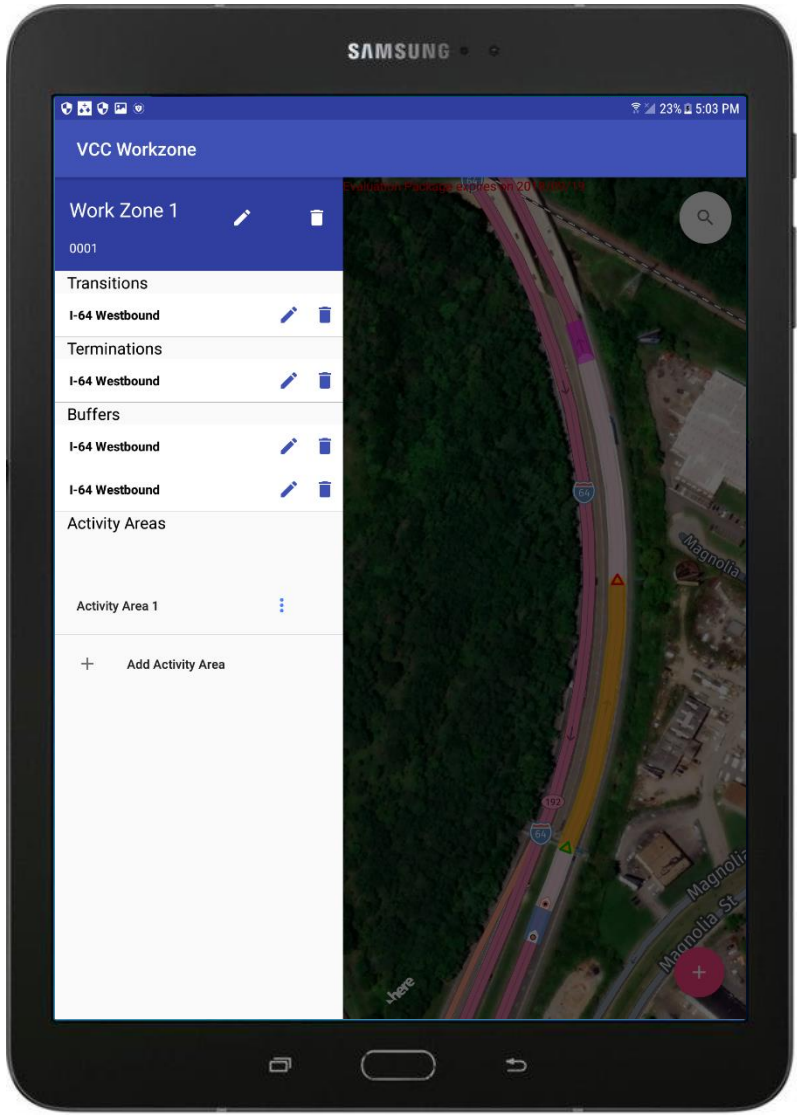
Initial Work Zone Builder POC

- Provide an app to produce work zone data suitable for use in CAVs
- Build initial tablet-based POC app to facilitate requirements generation
- Evaluate mapping and imagery data sources
- Align software with VDOT process flows
- Get feedback from SME's
- Develop feature lists and priorities
- Explore data requirements and formats for internal and external use

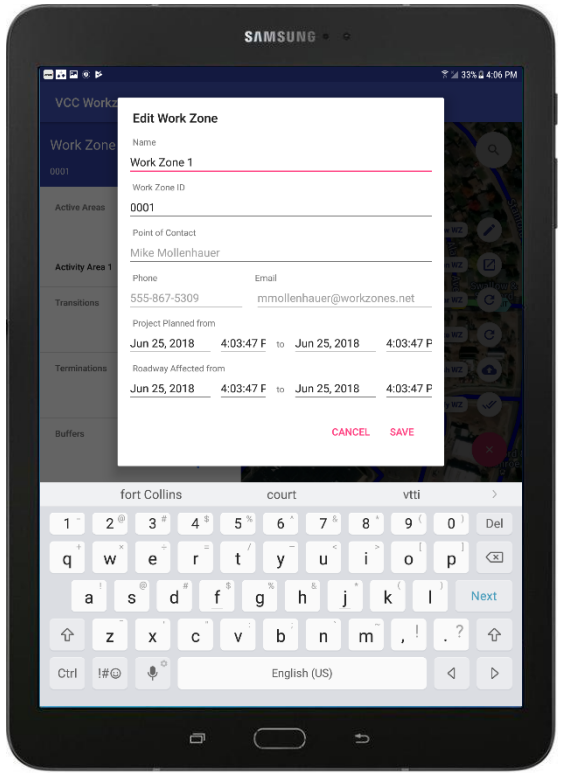


Application Goals

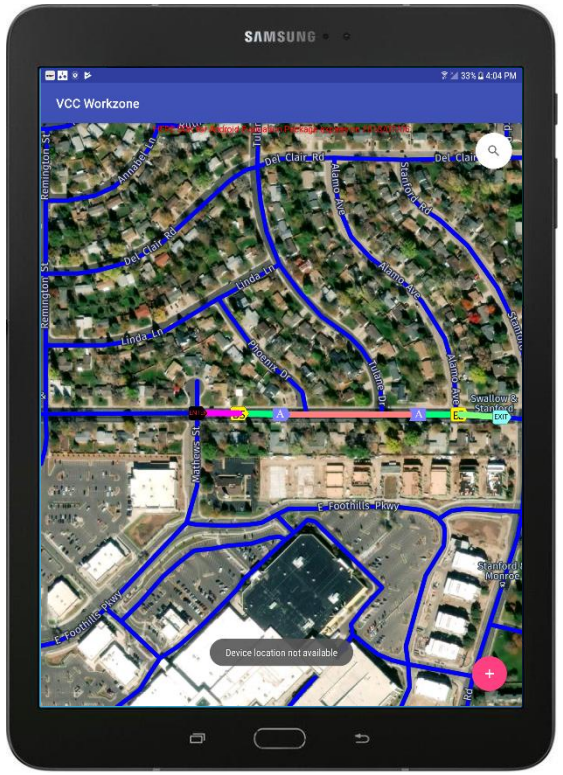
- Create an app that end-users want to use
  - Help design work zones according to WAPM rules
  - Provide a means to submit the work zone for review/approval
  - Create inventory of work zone devices required to setup the zone
- Support features that help keep work zone data up to date
  - Daily task lists presented to user upon login
  - Support direct link to TOC for work zone status info
- Develop a field mode to help validate deployed work zone
  - Drive through placement verification
- End to end demonstrations Q1 2019



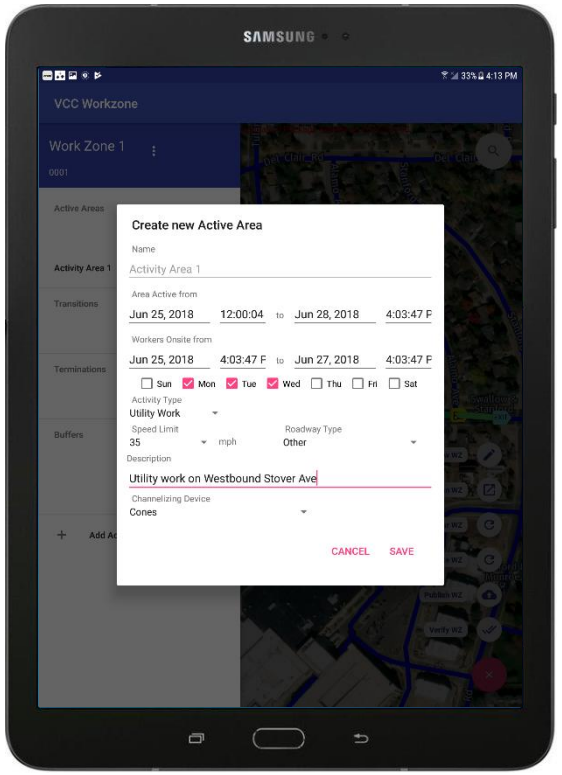
WZB Highlights



- Setup (or import) work zone administrative info
- Planned dates and scope
- Contact information
- Administrative rights



- Tap out activity areas
- Apply TTC-xx templates
- App applies WAPM rules and positions features
- Adjust/add/delete features by dragging and tapping the map
- Validate the work zone to support WAPM compliance



- Publish work zone data to VCC Cloud
- Keep activity dates up to date with daily reminders
- Adjust layout/activity as work progresses
- Export data to smarterroads.org

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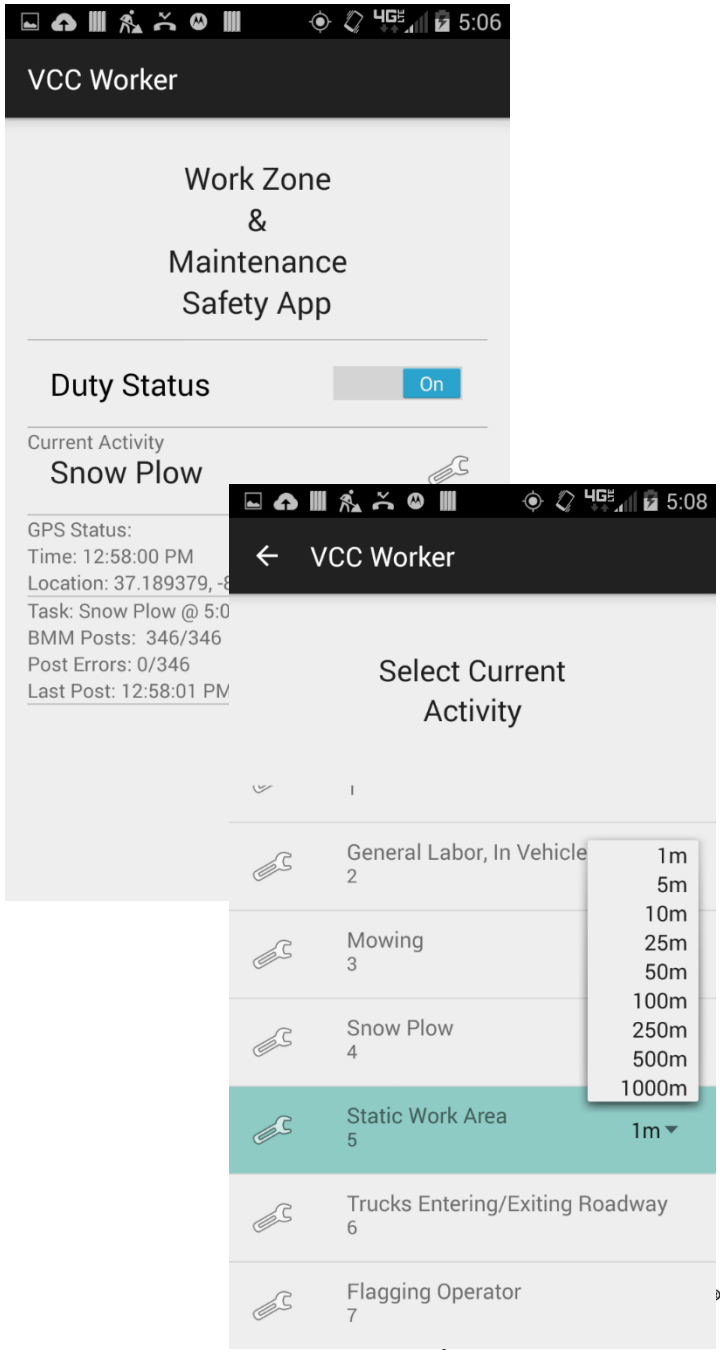
VCC Mobile Worker App

- Location and status updates from smart phone with app (for now)
- User selects an activity and duty status
- Worker app sends position and activity data directly to VCC Cloud via cellular comms
- VCC Cloud processes incoming messages and creates advisories and streaming alerts for drivers
  - Clustering of multiple worker reports
  - TIM messages sent via DSRC
  - Proprietary messages sent via cellular to VCC Mobile
- Messages are received on VCC Mobile and displayed to driver based on position, speed, direction, etc.



Safety Service Patrol App

- Cellular-based application
- Auto-detect on call and out of vehicle status
- Upload location and status to VCC Cloud
- Generate advisory TIM messages to notify connected and automated vehicles of location and activity
- Push the location and status information to smarterroads.org
- Integrate with TOC

Connected Worker Goals

- Migrate worker app from cell phone to more rugged and “automatic” platform
- Use of base station in work zone area eliminates need for multiple data plans
- Evaluate more accurate and effective localization than available via GPS
- Provides location and activity info, log workers into and out of active zones
- Warnings sent to <u>drivers</u> through mobile apps
- Warnings provided to <u>workers</u> via flashing LEDs and/or haptic cues

Questions?

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