MEETING NOTES

Iowa Advisory Council on Automated Transportation (ATC)
Infrastructure Readiness (IR) Subcommittee Meeting

Monday, December 13, 2021
1:00-2:00 pm CT

Action Items:

- Adam and Erin to share final report from Enterprise pooled fund study *Understanding Infrastructure Impacts Based on Automated Vehicle Demonstrations*.

1. **Welcome and Introductions** – Erin Mullenix, Infrastructure Readiness (IR) Subcommittee Chair
    a. Attendees – 26 attendees
        - Erin Mullenix – Iowa League of Cities (IR Chair)
        - Blake Hansen – Olsson
        - Dave Ness – City of Dubuque
        - John Davis – City of Des Moines
        - Sven Peterson – City of Perry
        - Mark Nahra – Woodbury County
        - Brian Keierleber – Buchanan County
        - Derek Snead – Jones County
        - John Gibson – Iowa Division of the FHWA
        - Andy McGuire – Keokuk/Mahaska Counties
        - Mike Lauer – Iowa Communications Network
        - Skylar Knickerbocker, Neal Hawkins – Iowa State University
        - Dan McGehee, Omar Ahmad, Jacob Heiden – University of Iowa, National Advanced Driving Simulator
        - Susan Fenton, Tim Simodynes, Newman Abuissa, Jim Schnoebelen, Emma Borchers, Mark Van Dyke, Clayton Burke, Garrett Pedersen, Tina Greenfield, Adam Shell – Iowa DOT

    b. Summary of new members
        i. Ron Otto – Technical Director, Associated General Contractors
        ii. Brian Keierleber – Buchanan County Engineer
        iii. Derek Snead – Jones County Engineer
        iv. Andy McGuire – Keokuk and Mahaska County Engineer
        v. Blake Hansen – Vice President, Olsson Associates
        vi. Sven Peterson – City Administrator, City of Perry
        vii. Iowa DOT
            1. Andrea White, Statewide Planning Coordinator – Systems Planning
            2. Chris Poole, State Traffic Engineer – Traffic & Safety
            3. Emma Borchers, Research & Technology Manager – Transit
            4. Madeline Schmitt, Sustainability Program Manager – Location & Environment
            5. Mark Van Dyke, ITS Engineer – Traffic Operations
            6. Traffic Operations Engineers
                a. Ben Hucker, District 1
                b. Austin Yates, District 4
                c. Newman Abuissa, District 6

2. **Short Term Road Condition Forecasts: Enabling Practical Trip Modification in Adverse Weather**
Tina Greenfield, Road Weather Information System (RWIS) Coordinator at the Iowa DOT

a. Tina Greenfield is the Road Weather Coordinator at the Iowa DOT. Tina oversees the installation and maintenance of the RWIS, conducts road weather training for the DOT winter maintenance personnel, and analyzes the DOTs salt use. She is also the chair of the TRBs Winter Maintenance committee.
b. Adverse weather is a major source of surface transportation problems due to many factors (decreased visibility, reduced tire grip, road debris, road closures, sudden bottlenecks). Automated vehicles (AVs) must be able to sense and react to these common situations.
c. A number of sources can be useful when forecasting road conditions. Many sources like the National Weather Service and commercial sites (AccuWeather, Weather Channel, etc.) provide standard weather info regarding precipitation, winds, etc. Some companies provide pavement-specific impacts of weather. Newer sources are being developed to forecast routes in adverse weathers.
d. Iowa uses DTN ClearPath to forecast road conditions. The forecast is hourly from current to 48 hours in future. ClearPath offers information on road/bridge temperatures, road conditions (21 categories), contaminate coverage percentage, depths of coverage (laterally across the lane and wheel path), estimation of future plowing & treatment with its assumed impact, friction index, and "Mobility index." This information is crucial for providing practical real-time solutions for all travelers, especially those with current and future AVs.
e. The road condition information provided by DTN is currently only for DOT use. There are efforts to make this information publicly available with condition predictions on 511. DTN is working with the 511 vendor to convert the detailed DTN info into familiar road condition assessments for the public. Proper testing will be done internally before opening to the public.
f. There are many possible AV use cases for weather-related data in the future. Could an AV interpret forecast friction/depth info and reroute if it's beyond its capabilities? Could it yield control back to the driver well in advance of the inclement weather? While the possibilities exist, it's important to consider limitations especially when these technologies currently aren't implemented in Iowa. Data redundancy will also be crucial when trusting vehicles to operate in automated mode.

3. **IR Subcommittee Work Plan & Tactical Actions**
    a. AT Readiness
        i. Update on national guidance and research – Adam Shell (Iowa DOT)
            1. National Roadway Integration of Automated Driving Systems Concept of Operations: Its purpose is to present a shared future vision of how ADS can safely, equitably, and efficiently be integrated with the overall transportation system.
            2. 2021 FHWA Policy Symposium – Understanding Current and Emerging Planning and Policy Needs for Connected and Automated Vehicles: Virtual symposium held in December 2021. Iowa DOT has representation at the national level.
            3. Enterprise Pooled Fund Study – Understanding Infrastructure Impacts Based on AV Demonstrations: Iowa DOT is involved in this multi-state study.
        i. Work Zone Data Collection Toolchain - Skylar Knickerbocker (ISU)
            1. US DOT is developing tools to support work zone data exchange as part of a V2X mapping project. Iowa is testing the US DOT Toolchain for work zones to better estimate and communicate road geometry and roadside information. These tools utilize common work zone event data.
            2. DOT workers program the work zone manually which enables greater precision and detail. This effort requires two workers to prevent distracted driving: one driver and one to input data. After defining the work zone, the application will automatically start and stop data collection once the vehicle enters the zone. The data output will automatically populate based on the inputs.
            3. Some limitations to this tool include: it requires external GPS, the automatic collection doesn't factor in direction, and the tool isn't intuitive at the end of collection. Latency in updating data will exist. US DOT is working on additional systems to automate worker presence, work zone location, reading signs, etc. While limitations exist, this is another

tool in the toolbox to collect better data. Using connected devices should result in quicker updates and less additional work.

4. **Open Discussion** – All subcommittee members
    a. The Bipartisan Infrastructure Law (BIL), also known as the Infrastructure Investment and Jobs Act (IIJA), is leading to Traffic Safety Management Operations funding, which includes automated transportation, opportunities for the state of Iowa and for other entities through discretionary grants. Some resources on the IIJA are below:
        i. FHWA BIL Update: https://www.fhwa.dot.gov/bipartisan-infrastructure-law/
        ii. USDOT BIL Update: https://www.transportation.gov/sites/dot.gov/files/2021-11/Bipartisan_Infrastructure_Law_Iowa.pdf
        iii. AASHTO Analysis of BIL: https://policy.transportation.org/wp-content/uploads/sites/59/2021/09/2021-09-15-AASHTO-Comprehensive-Analysis-of-IIJA-FINAL.pdf

5. **Information and key upcoming dates**
    a. **Economic Development Subcommittee Meeting** – Wednesday, January 5 from 1-2 pm
        i. ITS Labor and Workforce Readiness (draft title) – Emily Lawless and Tara Reels (Volpe Center)

    b. **Policy & Legislation Subcommittee Meeting** – Wednesday, January 19 from 1-2 pm
        i. Austin, TX PDD Deployment Experience – Alex Payson (City of Austin, TX)

    c. **Public Safety & Enforcement Subcommittee Meeting** – Tuesday, January 25 from 1-2 pm
        i. Preparing Law Enforcement, First Responders, and Crash Investigators for Automated Vehicle Technology – Tammy Trimble (Virginia Tech Transportation Institute)

    d. **AT Council Meeting** – Wednesday, March 16 from 1-3 pm

ATC SUBCOMMITTEE MEETING

Infrastructure Readiness
December 13, 2021

MEETING AGENDA

1. Welcome and introductions – Erin Mullenix, Infrastructure Readiness Subcommittee Chair
2. Short term road condition forecasts: Enabling Practical Trip Modification in Adverse Weather - (30 minutes)
    a. Tina Greenfield, Road Weather Information System (RWIS) Coordinator at the Iowa DOT
3. IR Subcommittee Work Plan & Tactical Actions – (20 minutes)
    a. AT Readiness
        i. Update on National Guidance and Research – Adam Shell (Iowa DOT)
        ii. Work Zone Data Collection Toolchain - Skylar Knickerbocker (ISU)
4. Open Discussion – All subcommittee members (10 minutes)
5. Information and key upcoming dates
    a. Economic Development Subcommittee Meeting – Wednesday, January 5 from 1-2 pm
    b. Policy & Legislation Subcommittee Meeting – Wednesday, January 19 from 1-2 pm
    c. Public Safety & Enforcement Subcommittee Meeting – Tuesday, January 25 from 1-2 pm
    d. AT Council Meeting - TBD

WELCOME AND INTRODUCTIONS

Erin Mullenix –

Infrastructure Readiness Subcommittee Chair

NEW SUBCOMMITTEE MEMBERS

- Ron Otto – Technical Director, Associated General Contractors
- Brian Keierleber – Buchanan County Engineer
- Derek Snead – Jones County Engineer
- Andy McGuire – Keokuk and Mahaska County Engineer
- Blake Hansen – Vice President, Olsson Associates
- Iowa DOT
  - Andrea White, Statewide Planning Coordinator – Systems Planning
  - Chris Poole, State Traffic Engineer – Traffic & Safety
  - Emma Borchers, Research & Technology Manager – Transit
  - Madeline Schmitt, Sustainability Program Manager – Location & Environment
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  - Traffic Operations Engineers
    - Ben Hucker, District 1
    - Austin Yates, District 4
    - Newman Abuissa, District 6

SHORT TERM ROAD CONDITION FORECASTS: ENABLING PRACTICAL TRIP MODIFICATION IN ADVERSE WEATHER

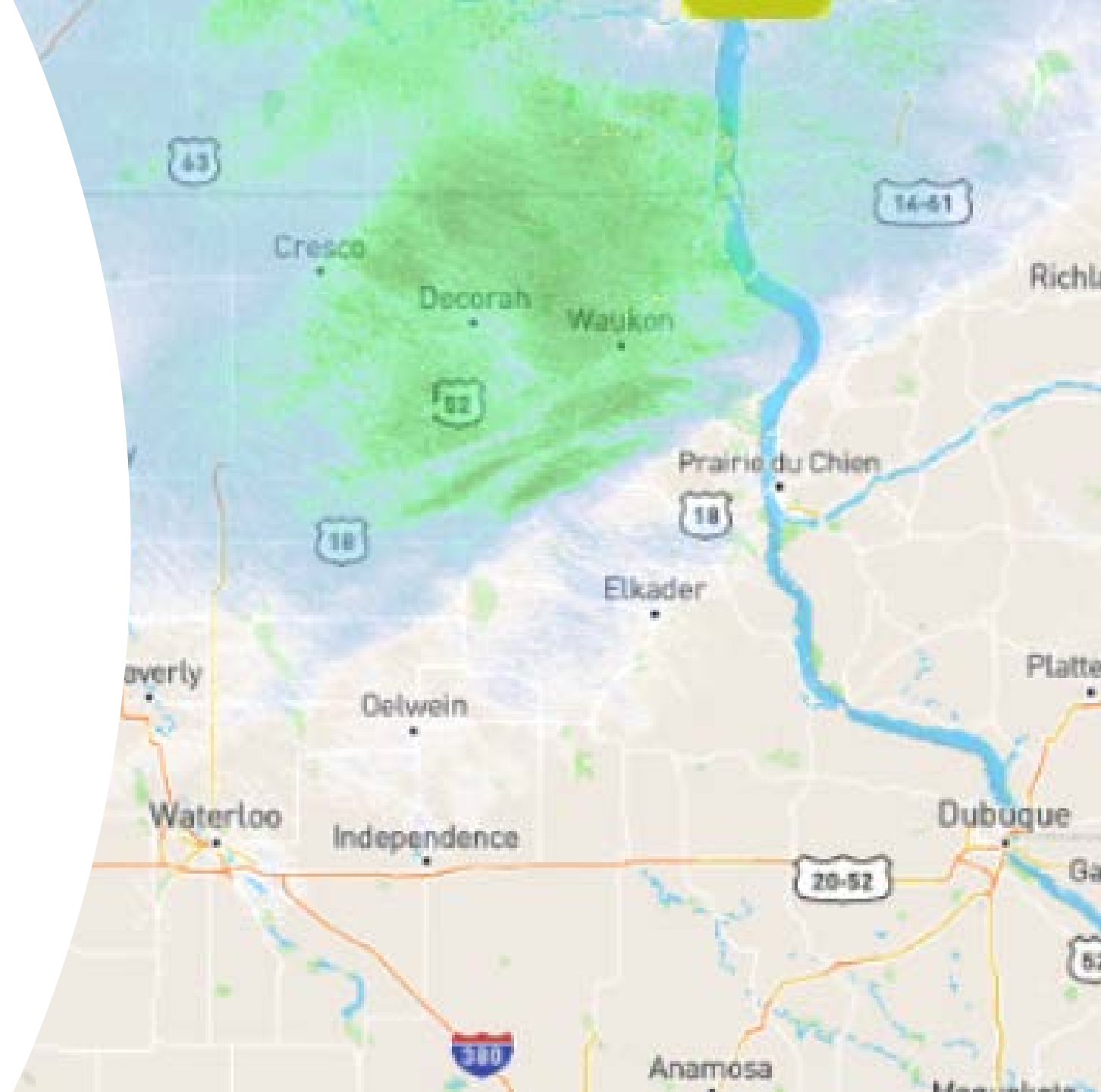
Tina Greenfield – Road Weather Information System (RWIS) Coordinator at the Iowa DOT

Short Term Road Condition Forecasts

Enabling Practical Trip Modification in Adverse Weather

Iowa Advisory Council on Automated Transportation

December 2021



Background

- Adverse weather is a major source of surface transportation problems
  - Decreased visibility (human eye or vehicle sensor)
  - Reduced tire grip
    - Longer stopping distance
    - Slower curve speeds
    - Less ability to successfully evade or recover from surprise events
  - Road debris
  - Road closures
  - Sudden bottlenecks

Photos: Neal Hawkins

Background

- Automated transport must be able to sense and appropriately react to these common situations
- Sometimes an ounce of prevention is worth a pound of cure

What can we do to avoid bad driving conditions?

Background

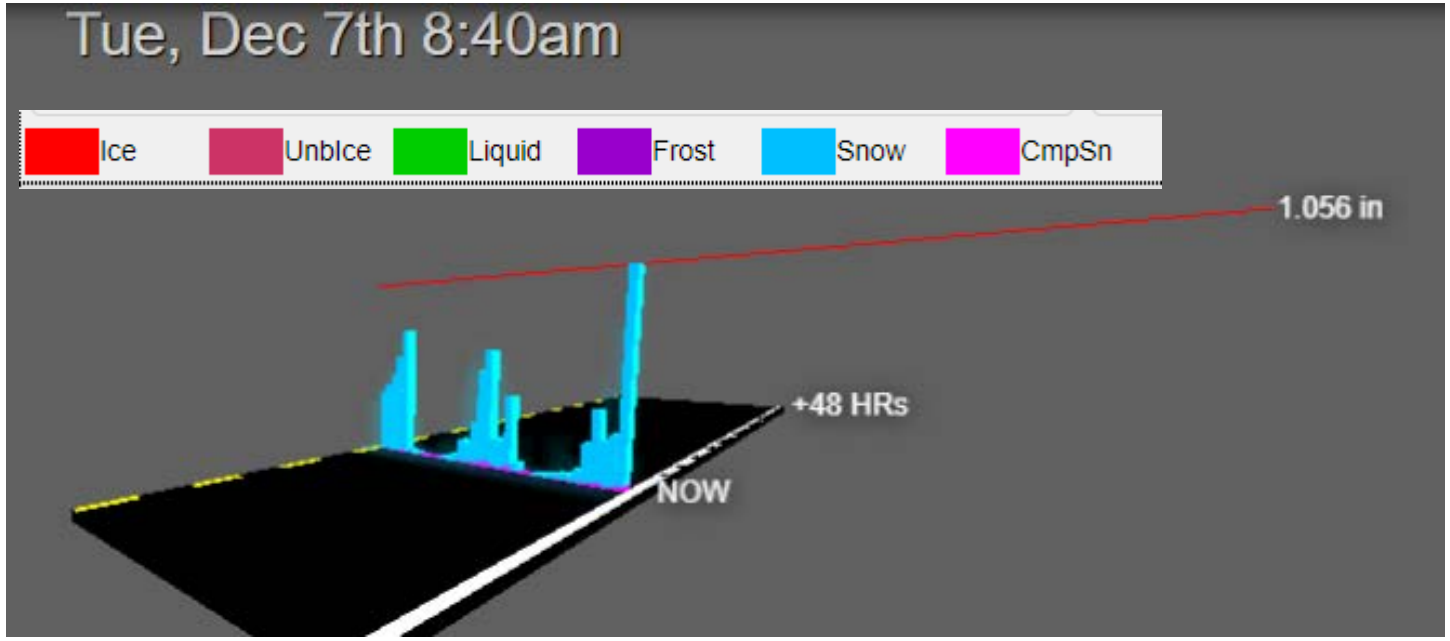
- Connection – learning of a bad area from others
- Forecasting – predicting something that isn't there yet, but will be

The longer the trip, the more important the Forecast element becomes

What Kind of Road Condition Info is Available?

- Many sources provide standard weather info
- Some companies provide pavement-specific impacts of weather
- Currently have DTN ClearPath
  - Hourly, from “current” to 48 hours in the future:
    - Road/bridge temperature
    - Road condition (21 categories)
    - Contaminate coverage % of ice, snow, water
    - Depth of coverage, laterally across the lane and wheel path
    - Estimation of future plowing and treatment, and its assumed impact
    - Friction index
    - “Mobility index”

Air Temp	24 F
Dew Point	12 F
Rel. Humidity	61 %
Visibility	10.00 miles
Winds	S 14 mph G 26
Liquid Rate	0.00 in/hr
Sleet Rate	0.00 in/hr
Snow Rate	0.01 in/hr
	SN
Pavement Temp	22 F
Percent Ice	100 %
Mobility Index	61
Friction Index	32
Mass Index	91
Freeze Point	32 F
Melt Point	32 F
Potential Evaporation	107 Watts/m^2



MDSS Road Alerts

Dry	Not Available		
Damp	Damp Near Freezing	Wet	Wet Near Freezing
Chemically Wet	Lightly Slushy	Slushy	Deep Slush
Dusting of Snow	Lightly Snowcovered	Snowcovered	Deep Snow
Some Risk of Frost	Light Compacted Snow	Compacted Snow	Deep Compacted Snow
Frost Likely	Lightly Icy	Icy	Very Icy

Road Conditions for Travelers

- The core DTN service has been DOT use only
- A new dedicated task is to try putting public-ready condition predictions on 511
  - DTN working with Castle Rock, our 511 vendor
  - Following a protocol pioneered by Minnesota and Wisconsin DOTs
  - Convert the detailed DTN info into familiar “seasonal-partly covered-completely covered” road condition assessments
  - To test functionality in staging 511 first before turning loose to public

Road Condition Forecasts from Weather Provider

Road Condition Forecast Hour 0 (now)

Road Condition Forecasts Hours 1-12

DOT Road Condition Reporting Tool

Current Condition – Segment A

Current Condition – Segment B

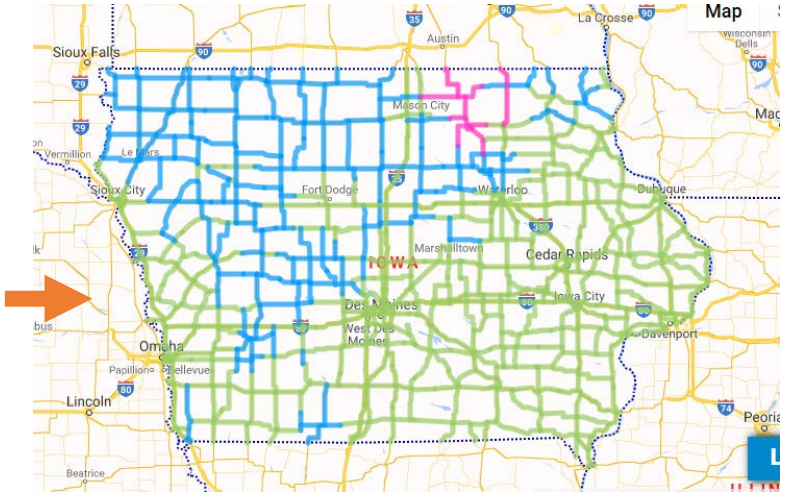
Current Condition – Segment C….

Forecast Hour 0 sets default current condition report. Field staff can override forecast condition assessment for individual segments

Castle Rock 511 Data Translator

Convert Segment Data into Map Layers

511 Travel Information Website



Public-use map showing current conditions

Light slush on roadway.

Updated Today at 8:53 PM CDT

Between US 59; 156th Street (near Currie) and 1st Avenue

There is light slush on the roadway.

Conditions may be worsening soon.

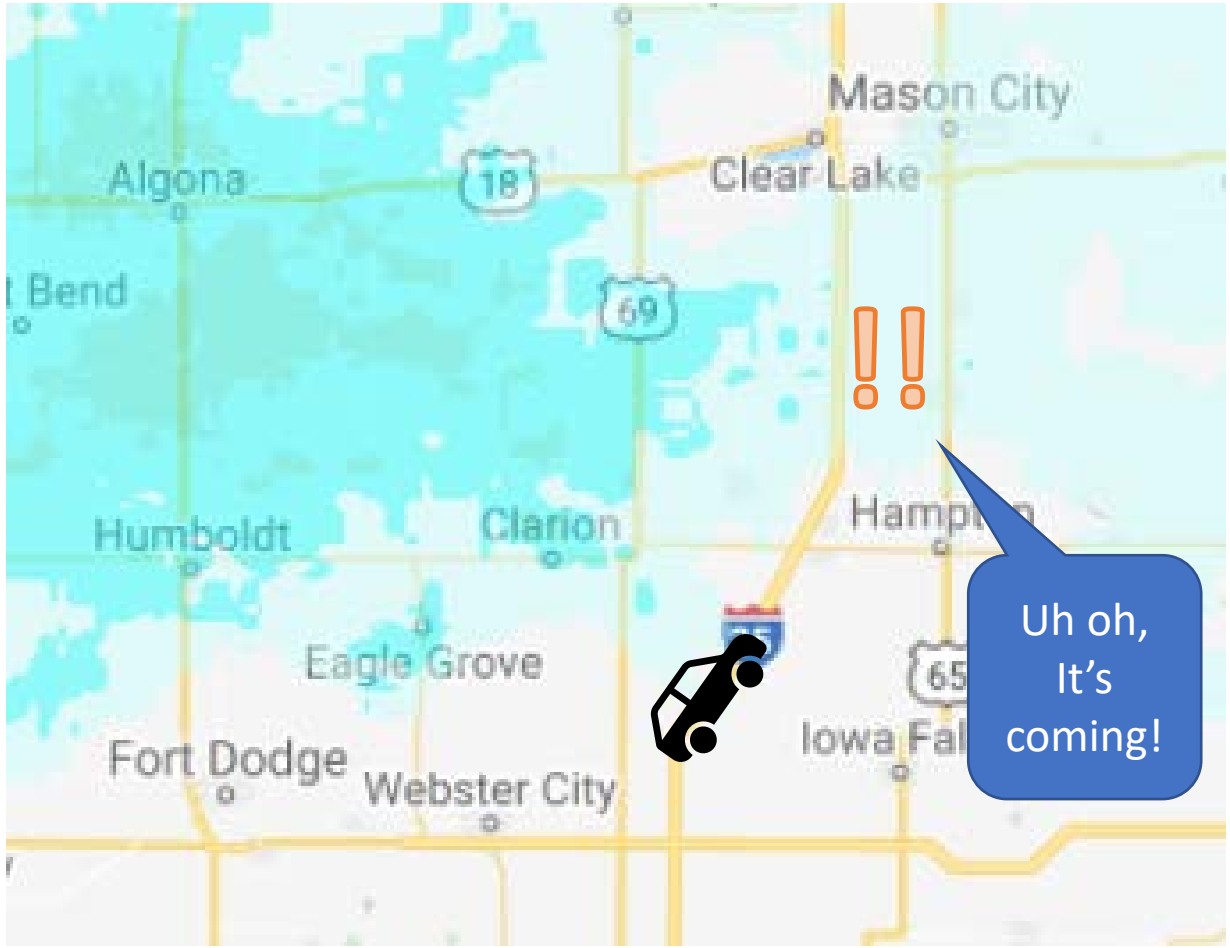
Information regarding expected future travel conditions

Possibilities in the Automated World

- Contracts, plans, and products to date have been DOT and human driver-centered.
- Could AV be a future data customer?

Possibilities in the Automated World

- Could an AV:
  - Interpret forecast friction/depth info and reroute if it is expected to be beyond its abilities?
  - Yield control back to the driver well before encountering bad weather if needed?
    - Very important in bad weather?
    - Time for driver to acclimate?
    - Driver may not want to deal with it either!



Possibilities in the Automated World

- What else with this?
  - Hourly, from “current” to 48 hours in the future:
    - Road/bridge temperature
    - Road condition (21 categories)
    - Contaminate coverage of ice, snow, water%
    - Depth of coverage, laterally across the lane and wheel path
    - Estimation of future plowing and treatment, and its assumed impact
    - Friction index
    - “Mobility index”
- Some of this data already provided in ‘data feed’ products.

Current Limitations

- So far the contract is built around DOT maintenance ops and 511 road condition reporting
- We haven’t tried it yet there either ☺
- Accuracy??
- Is hourly resolution enough?

Comments?

- Tina Greenfield
- Iowa DOT Road Weather Coordinator
- Tina.greenfield@iowadot.us
- 515-357-0965

IR Subcommittee Work Plan & Tactical Actions

IR Subcommittee Tactics Summary

2.1 Tactics Summary Table

	Deliverables	Lead(s)	Resources	Scenarios	Timeline
Assess and Advance AT Readiness	Readiness assessment Incremental readiness improvements	Adam Shell	Funding DOT and University staff time	Specific integration case Robust program	On-going
Implement Pilot Program	(led by Economic Development – refer to that work plan for details)				
Improve Pavement Marking	Phased implementation plan Updated pavement marking policy	Neal Hawkins & Clayton Burke	Staff time for planning Funding needed for equipment and materials	Phased implementation	Refer to DOT marking task force
Build Out Fiber Backbone	Gap identification Expansion plan	ICN or DOT	Short term staff time or consultant support Long term fiber investment	Incremental	On-going
Define Data Systems Architecture	Plan for AT-related data management	DOT (TBD)	Staff time or consultant support	N/A	TBD

INFRASTRUCTURE READINESS WORK PLAN & TACTICAL ACTIONS

AT Readiness

Update on National Guidance and Research – Adam Shell (Iowa DOT)

- ***National Roadway Integration of Automated Driving Systems Concept of Operations***
- 2021 FHWA Policy Symposium - Understanding Current and Emerging Planning and Policy Needs for Connected and Automated Vehicles (December 14th & 15th)
- Enterprise Pooled Fund Study – Understanding Infrastructure Impacts Based on AV Demonstrations

NATIONAL ROADWAY INTEGRATION OF AUTOMATED DRIVING SYSTEMS CONCEPT OF OPERATIONS

Purpose: present a shared future vision of how ADS can safely, equitably, and efficiently be integrated with the overall transportation system.

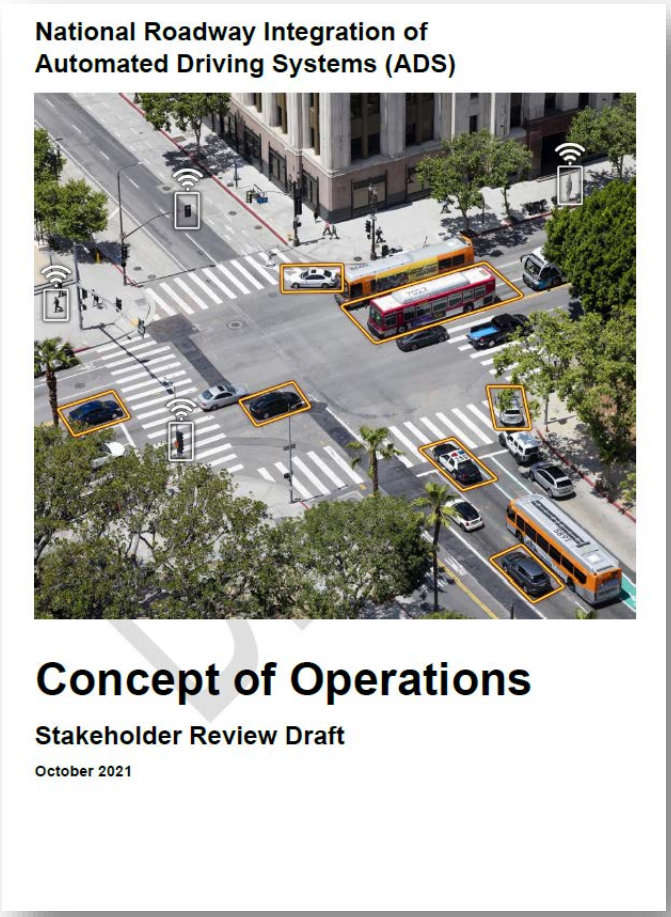
ADS ConOps Goals

- Identify how ADS technology could manifest on public roads
- Identify the interactions between the physical, digital, operational layers of transportation system and ADS-equipped vehicles
- Establish a framework for identifying, assessing, planning, and implementing actions to ready the roadway for ADS

Continued Engagement by FHWA with various partners (e.g., other US DOT agencies, state DOTs, industry)

- Draft Review on October 20th & 21st

Anticipated publication of Summer 2022



INFRASTRUCTURE READINESS WORK PLAN & TACTICAL ACTIONS

AT Readiness

Update on National Guidance and Research – Adam Shell (Iowa DOT)

- National Roadway Integration of Automated Driving Systems Concept of Operations
- **2021 FHWA Policy Symposium - Understanding Current and Emerging Planning and Policy Needs for Connected and Automated Vehicles (December 14th & 15th)**
- Enterprise Pooled Fund Study – Understanding Infrastructure Impacts Based on AV Demonstrations

2021 FHWA POLICY SYMPOSIUM - UNDERSTANDING CURRENT AND EMERGING PLANNING AND POLICY NEEDS FOR CAVS (DECEMBER 14TH & 15TH, 2021)

Day 1 (December 14) Draft Agenda

12:00	Symposium Series Introduction	Heather Rose (FHWA) and Symposium Planning Team
12:10	Welcome & Introductory Remarks	Randall (Keith) Benjamin II, FHWA Associate Administrator for Highway Policy and External Affairs
12:30	Opening Presentation: Taking Stock and Setting the Stage of CAV Planning and Policy (15-20 min presentation/ QnA to follow)	Tom Bamonte (NCTCOG)
1:00	Interactive Facilitated Discussion: *Where are we now with CAVs? What do we know today about deployment trajectories, hypothesized impacts? How do CAVs/emerging trends support us in achieving public agency goals?*	All. Mural Board Activity.
2:00	Break	
2:15	Issues and Considerations for CAV Planning	Elise Feldpausch, Michigan DOT Amy Kessler, North Central RPO Dr. Siva Srinivasan, University of Florida Virginia Reeder, TETC
3:15	QnA/Open Discussion	
3:45	Wrap Up and Day 2 Overview	

Day 2 (December 15) Draft Agenda

12:00	Welcome, Takeaways from Day 1 and Expectations for Day 2	Heather Rose (FHWA) and Symposium Planning Team
12:30	Opening Presentation: Understanding the impact of CAV deployment trajectories on travel behavior, access, and equity	Dr. Kara Kockelman, University of Texas
1:00	Ongoing Tools, Resources, Initiatives for CAV Policy, Planning, Decision Making: Panel Discussion	Matt Hardy, AASHTO Kristen White, ITSA Jeremy Raw, FHWA John Corbin, FHWA Ben Hawkinson, FHWA Adam Shell, Iowa DOT
2:00	Round-Robin Discussion: Other activities, tools, and resources	All
2:30	Break	
2:45	Interactive Facilitated Discussion: *The Next 5 years: Policy and Planning Needs to support safe, equitable and efficient deployment of CAVs*	All. Mural Board Activity
3:45	Symposium Wrap-Up, Findings, Closing Remarks	Heather Rose, FHWA Randall (Keith) Benjamin II, FHWA

INFRASTRUCTURE READINESS WORK PLAN & TACTICAL ACTIONS

AT Readiness

Update on National Guidance and Research – Adam Shell (Iowa DOT)

- National Roadway Integration of Automated Driving Systems Concept of Operations
- 2021 FHWA Policy Symposium - Understanding Current and Emerging Planning and Policy Needs for Connected and Automated Vehicles (December 14th & 15th)
- **Enterprise Pooled Fund Study – Understanding Infrastructure Impacts Based on AV Demonstrations**

EVALUATING NEW TECHNOLOGIES FOR ROADS PROGRAM INITIATIVES IN SAFETY AND EFFICIENCY

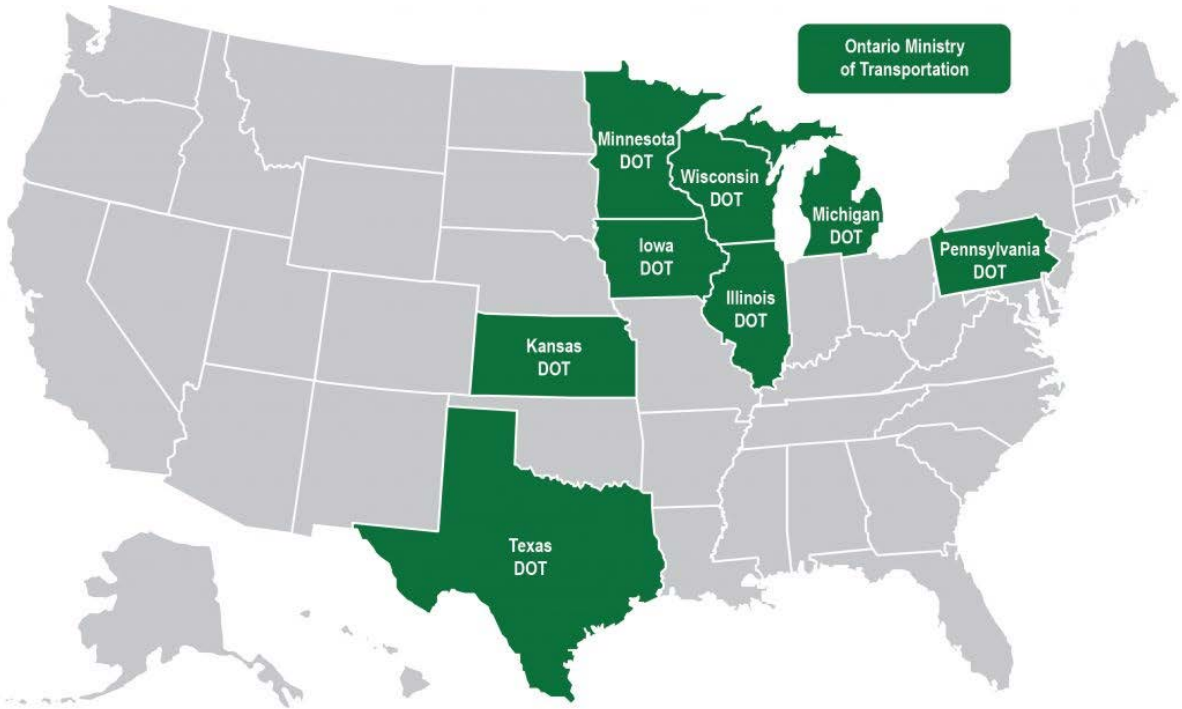
NATIONAL POOLDED FUND STUDY

Led by Michigan DOT

Purpose: committed to continuing innovation in highway operations and intelligent transportation systems (ITS) through research and technology transfer.

Website: https://enterprise.prog.org/#

ENTERPRISE Membership



EVALUATING NEW TECHNOLOGIES FOR ROADS PROGRAM INITIATIVES IN SAFETY AND EFFICIENCY

Project Overview

Infrastructure Impacts from AV Shuttles

- Signage
- Charging Stations and/or Secure Parking Areas
- Vegetation Management
- Road or Sidewalk Changes / Maintenance
- Operational Changes for Weather & Road Conditions

Website

- https://enterprise.prog.org/projects/best-practices-in-future-proofing-for-emerging-technologies/
- Report not yet published

INFRASTRUCTURE READINESS WORK PLAN & TACTICAL ACTIONS

AT Readiness

Work Zone Data Collection Toolchain – Skylar Knickerbocker (ISU)

US DOT Toolchain Testing in Iowa

IOWA DOT
SMARTER | SIMPLER | CUSTOMER DRIVEN

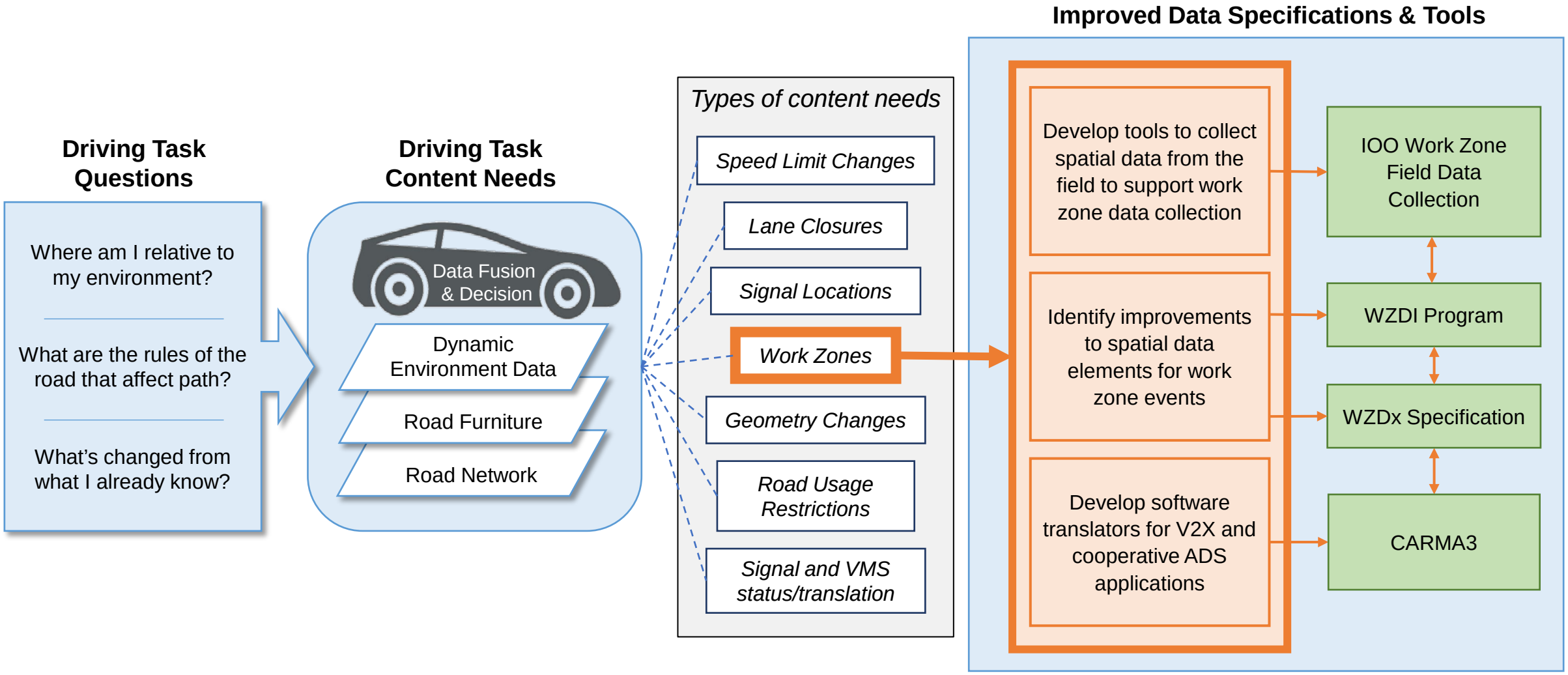
Skylar Knickerbocker

IOWA STATE UNIVERSITY
Institute for Transportation

Developing tools to support WZDx use as part of V2X Mapping Project

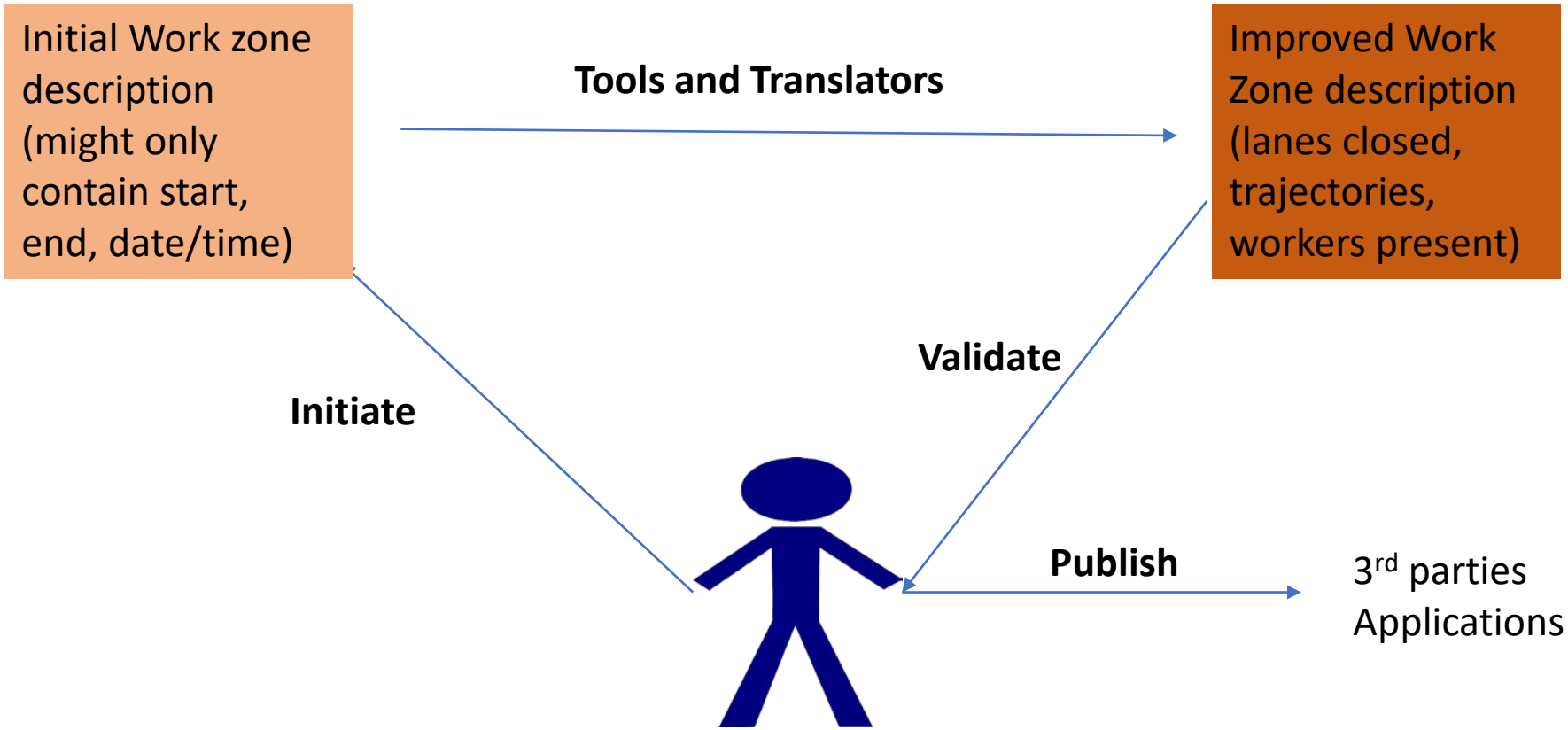
*Slides from US DOT Presentation
By Tony English

Utilizing Common Work Zone Event Data



*Slides from US DOT Presentation
By Tony English

Focus of this toolset



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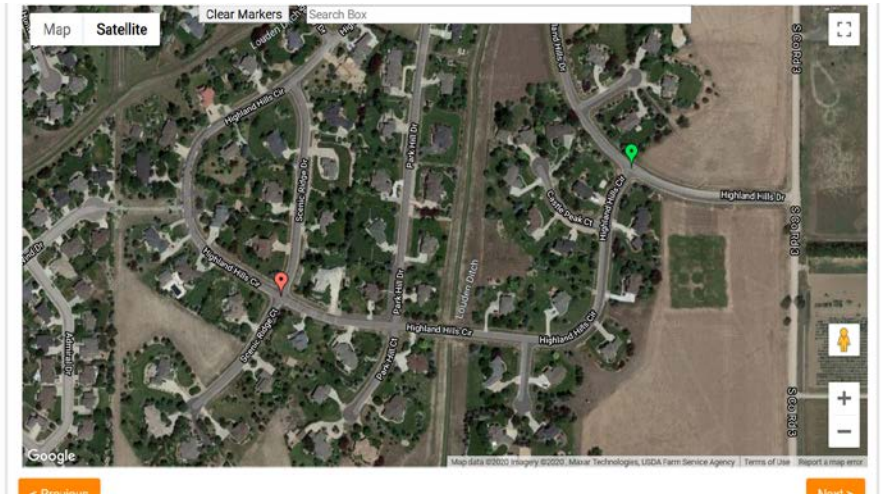
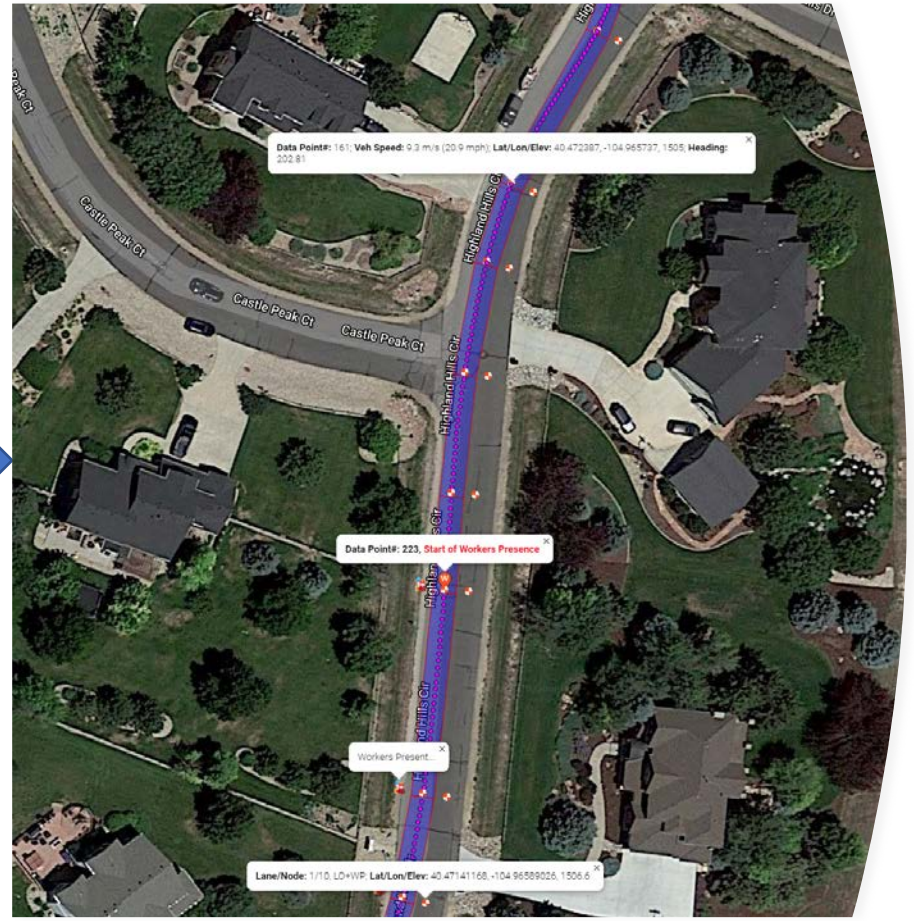
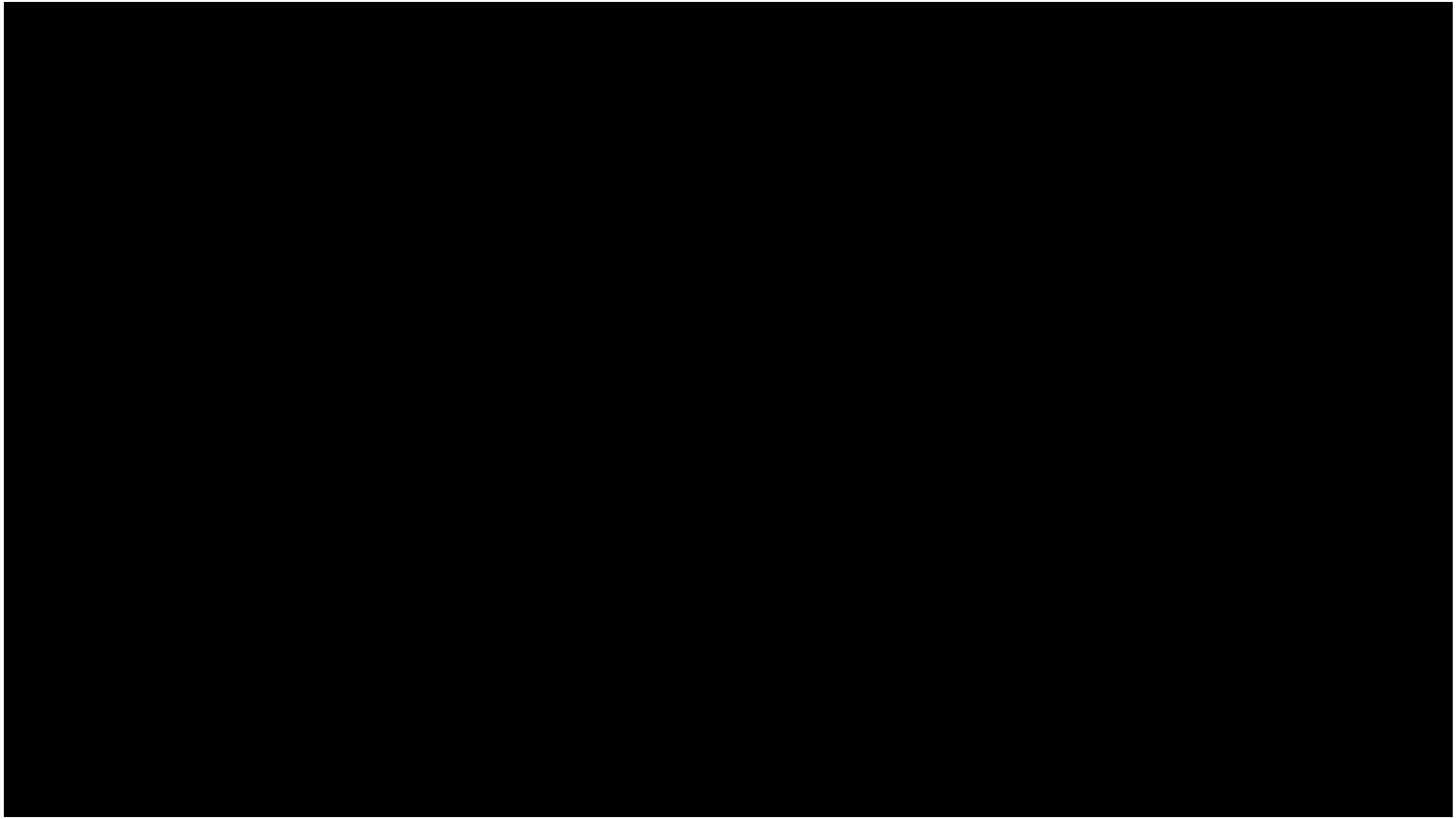
By Tony English

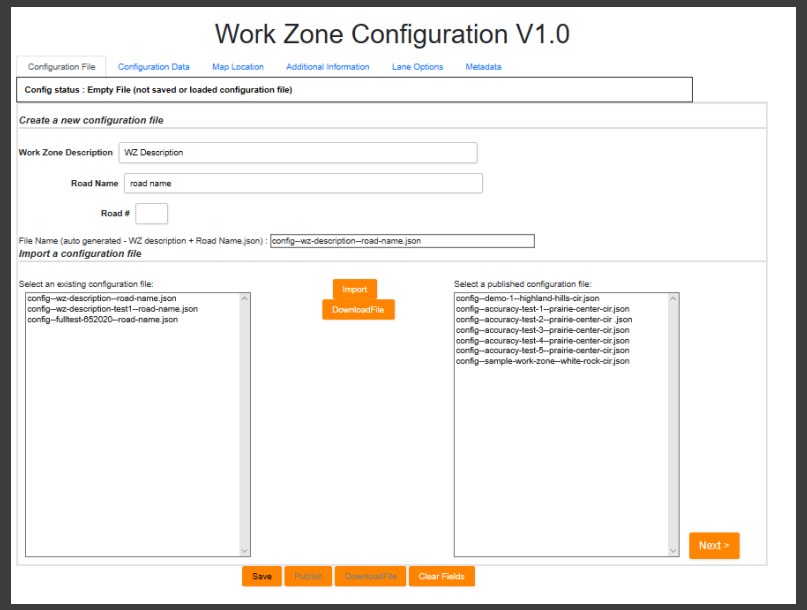
Enabling IOOs to collect WZDx in greater precision and detail

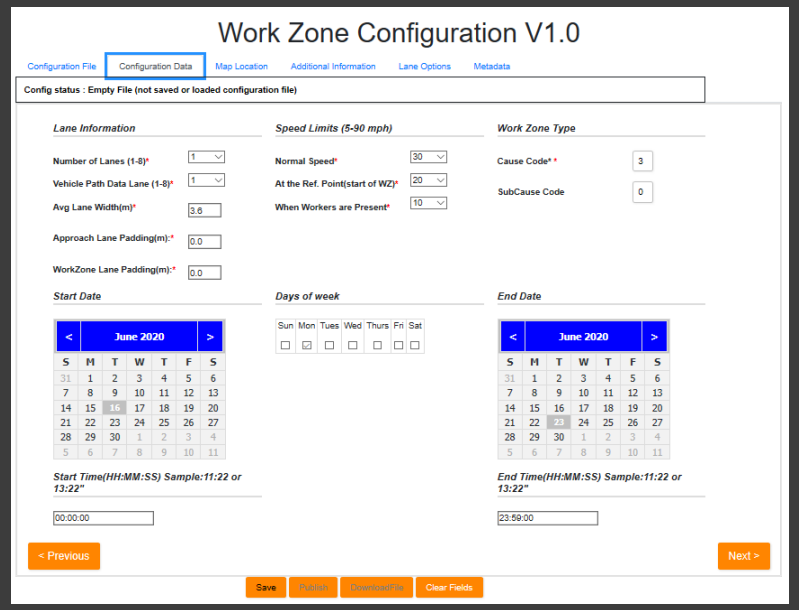


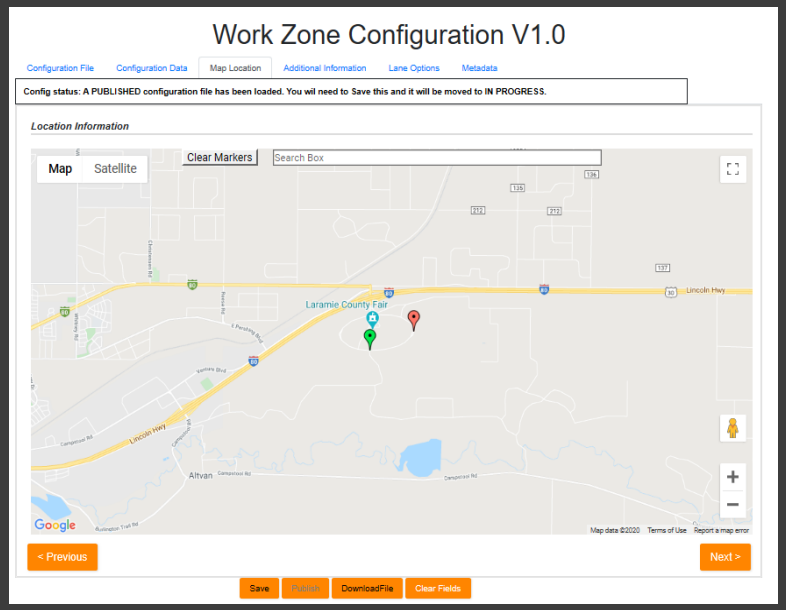


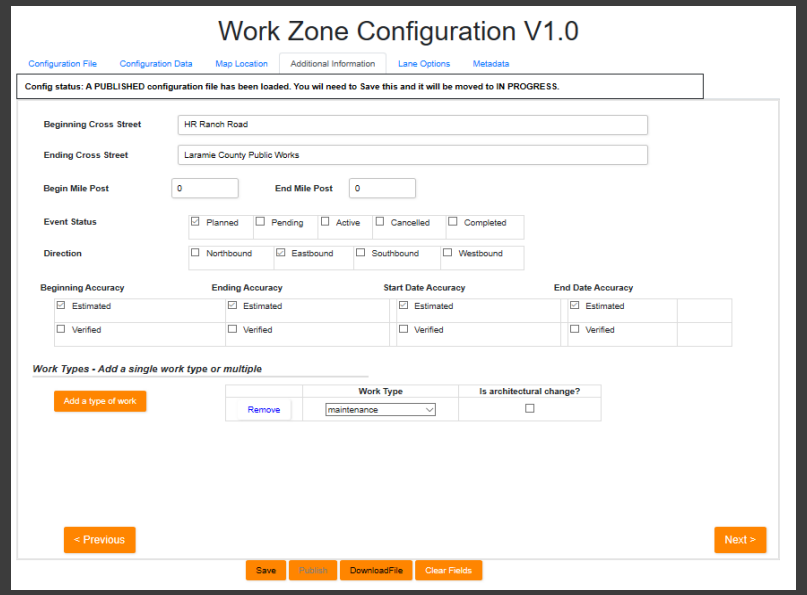
High Level Overview https://youtu.be/dS9fsHgpEro

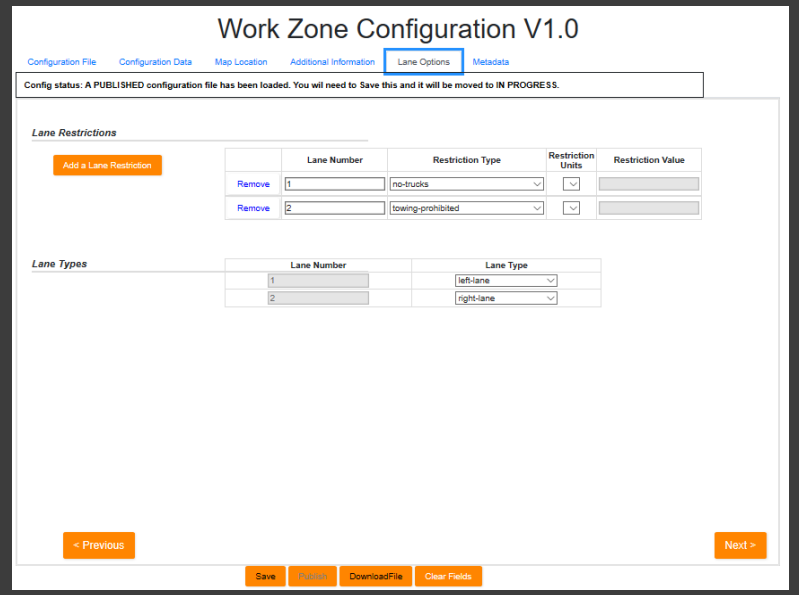


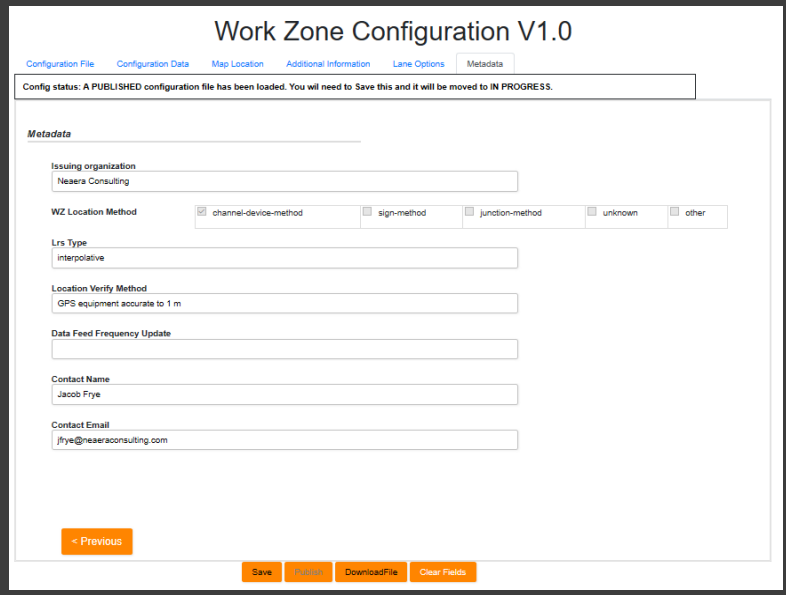












*Slides from US DOT Presentation
By Tony English

TMC Operator/IOOs enter basic information about work zone

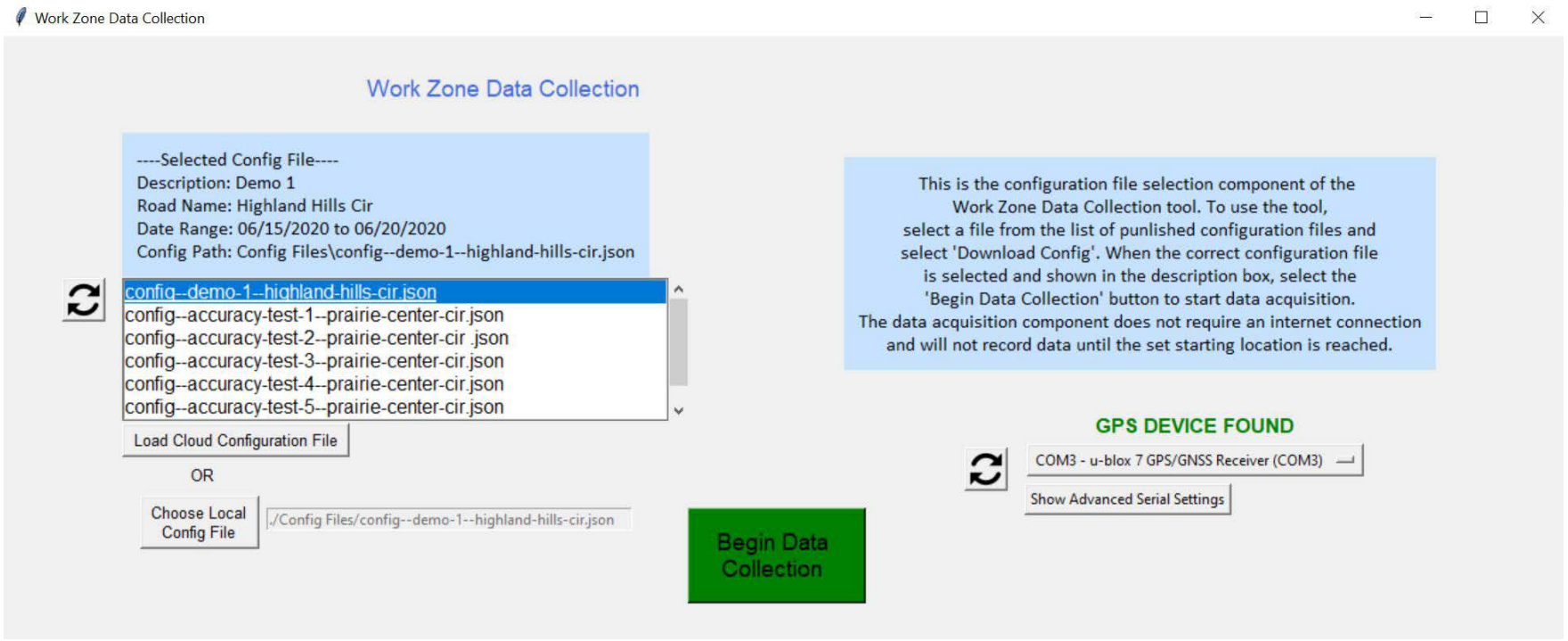
CTRE Feedback

- Data inputs mirror the WZDx. Generating the configuration file would be simple without any additional tools at this point.

- Effort would only be in creating the configuration file from the data in ATMS


```
{
  "DateCreated": "2021-03-16T04:21:30Z",
  "FeedInfoID": "4181dd55-36ce-4cf6-afd8-ce4abbf041fa",
  "GeneralInfo": {
    "Description": "Iowa State Test",
    "RoadName": "Airport Rd",
    "RoadNumber": "",
    "Direction": "eastbound",
    "BeginningCrossStreet": "South Loop Drive",
    "EndingCrossStreet": "South Loop Drive",
    "BeginningMilePost": 0,
    "EndingMilePost": 0,
    "EventStatus": "planned"
  },
  "TypesOfWork": [],
  "LaneInfo": {
    "NumberOfLanes": 2,
    "AverageLaneWidth": 3.6,
    "ApproachLanePadding": 0.0,
    "WorkzoneLanePadding": 0.0,
    "VehiclePathDataLane": 2,
    "Lanes": [
      {
        "LaneNumber": 1,
        "LaneType": "left-lane",
        "LaneRestrictions": []
      },
      {
        "LaneNumber": 2,
        "LaneType": "right-lane",
        "LaneRestrictions": []
      }
    ]
  },
  "SpeedLimits": {
    "NormalSpeed": 45,
    "ReferencePointSpeed": 35,
    "WorkersPresentSpeed": 25
```

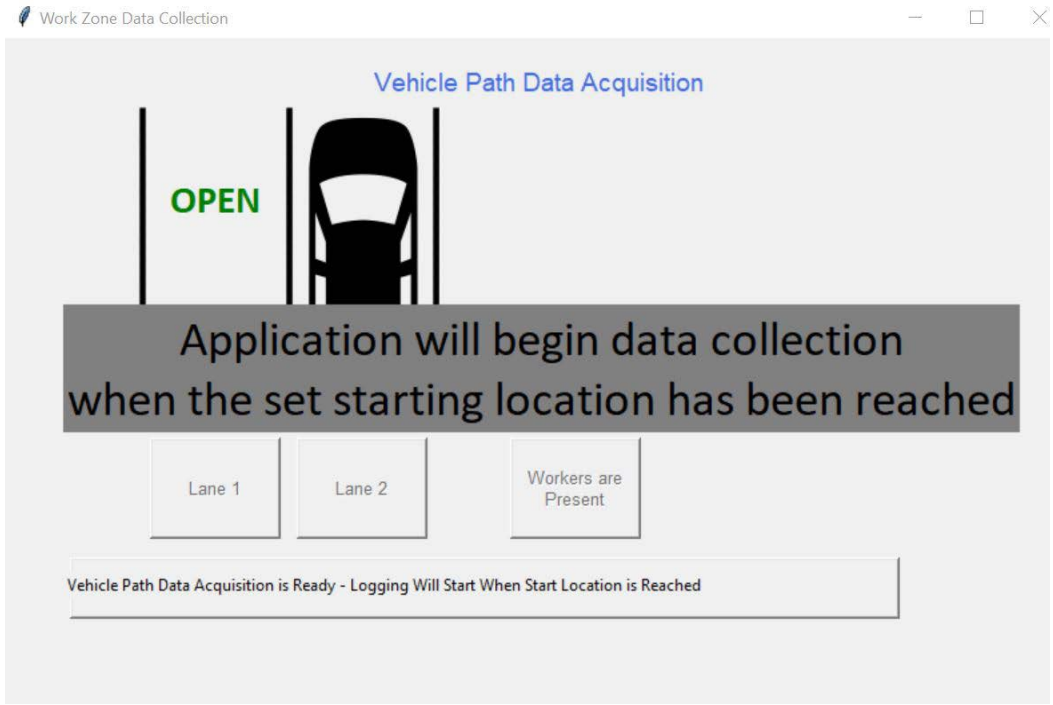

Sample Config

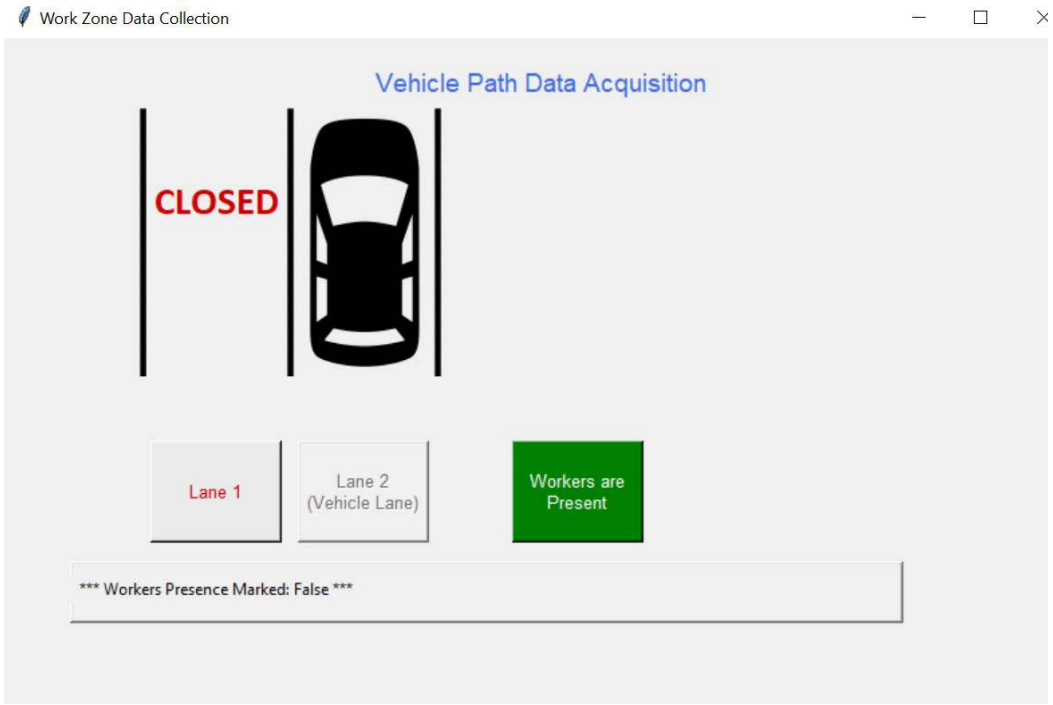


Field Data Collection Tool (Persona: Work Zone Manager)

*Slides from US DOT Presentation By Tony English

- Field vehicle receives information (via cloud, via RSU)
- Download published configuration files
- Automatically detect GPS device

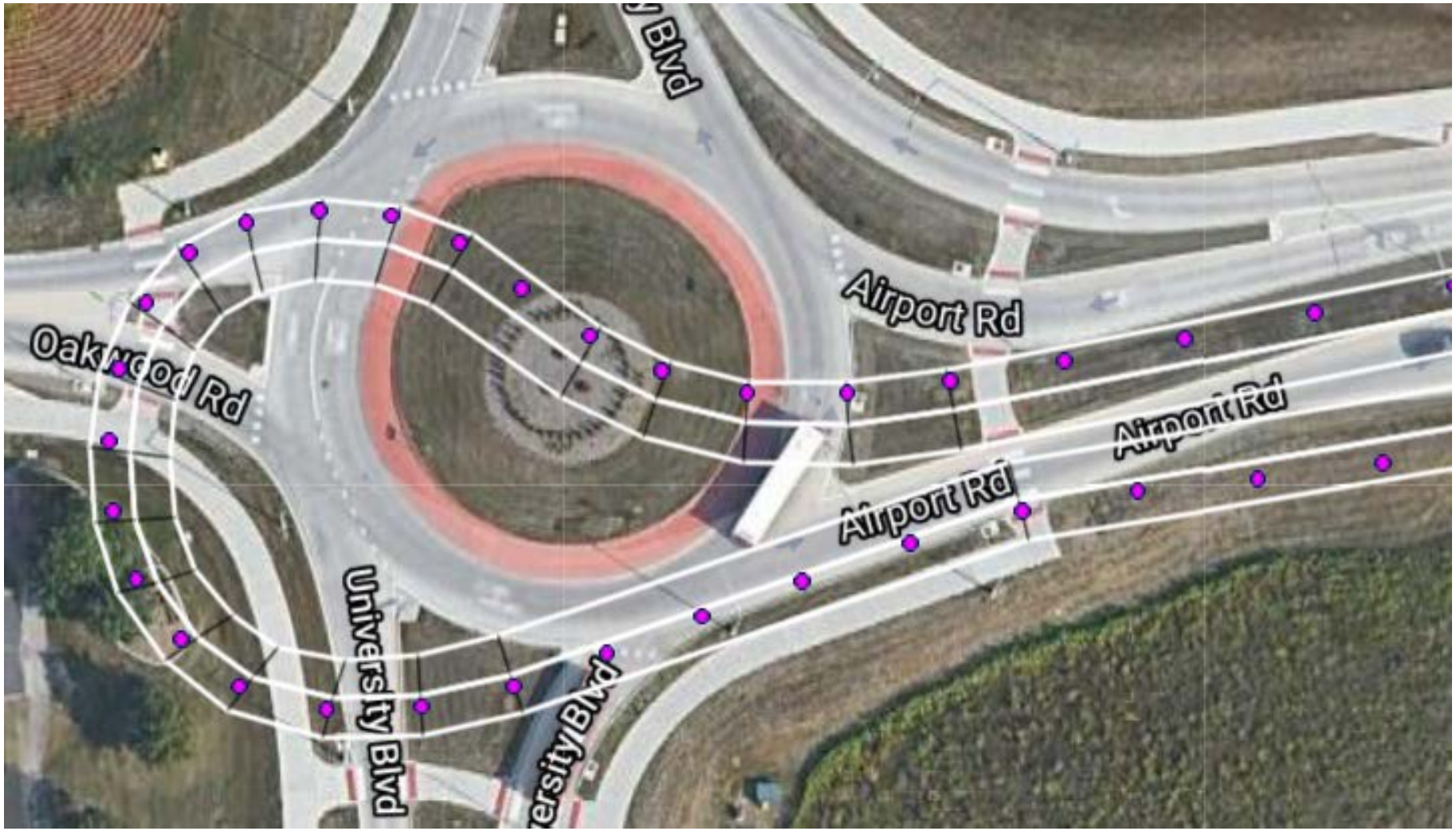


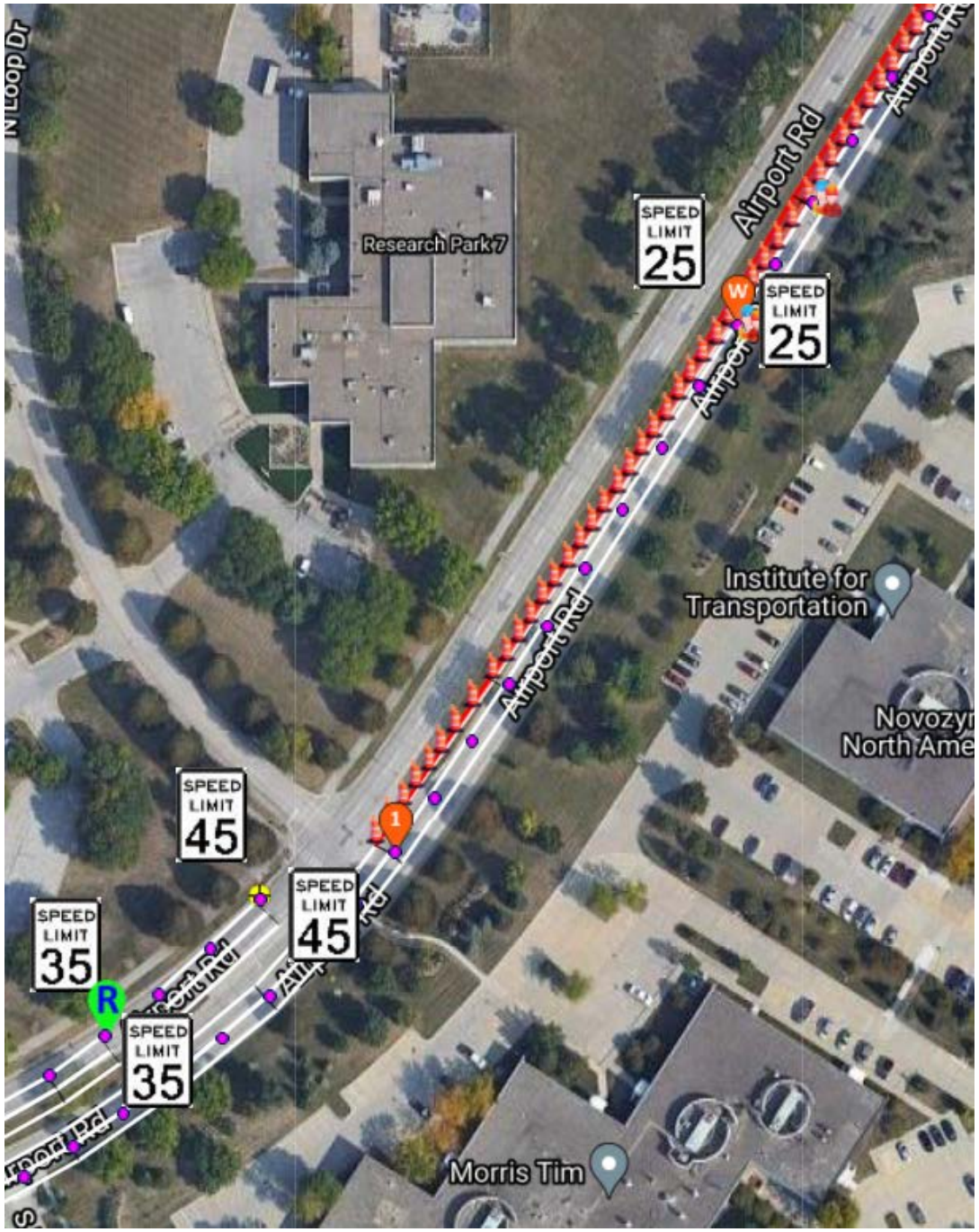


Field Data Collection Tool

- Data collection automatically starts/ends when set starting/ending locations are reached
- User interface to select current state of road/work zone

*Slides from US DOT Presentation
By Tony English


Airport Rd
Airport Rd
Airport Rd
University Blvd



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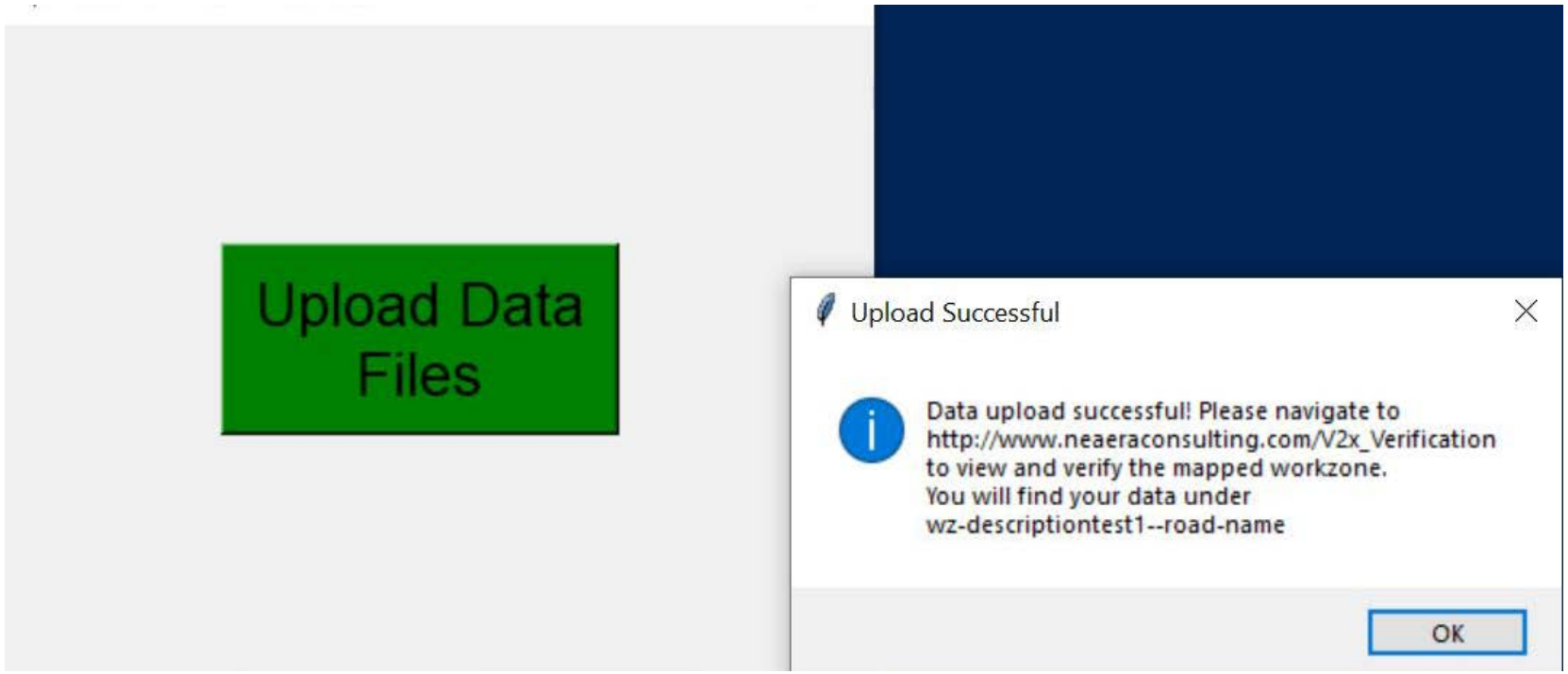
CTRE Feedback on Tool

- Tool requires external GPS (but mobile app does appear possible)
- The automatic collection doesn't factor in directionality (can start data collection in opposite direction)
- The tool isn't intuitive at end of collection
  - Data collection will just end and no confirmation files actually saved or not
  - Data collection will end at end point even if work zone has not been closed
  - If tool misses the end point, no way to end data collection without force closing the application. (The data does appear to still record)

Output File

Data is condensed to show all markers

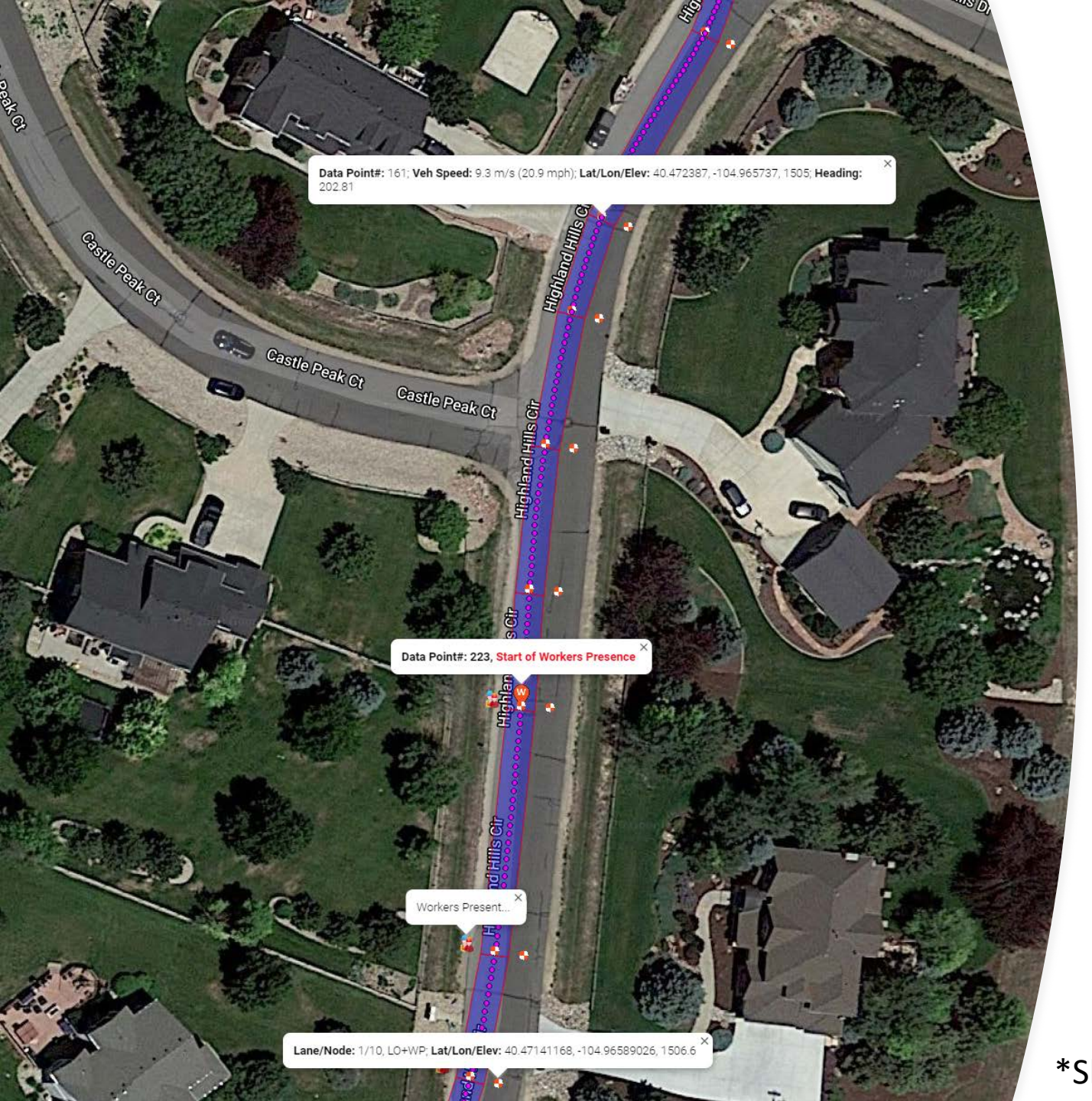
GPS Date & Time	# of Sats	HDOP	Latitude	Longitude	Altitude(m)	Speed(m/s)	Heading(Deg)	Marker	Value
2021/03/24-20:06:10:00	8	1	41.99810667	-93.636565	244.8	14.85715556	221.46	Data Log	TRUE
2021/03/24-20:06:11:00	8	1	41.99810667	-93.636565	244.5	14.85715556	221.46		
2021/03/24-20:07:09:00	8	1	41.99810167	-93.63631	241.7	14.18323333	41.47		
2021/03/24-20:07:10:00	8	1	41.998205	-93.6362	241.6	14.52791111	36.9	LC	1
2021/03/24-20:07:11:00	8	1	41.99831333	-93.636095	241.5	14.816	34.24		
2021/03/24-20:07:17:00	8	1	41.99901833	-93.63547833	240.5	15.93234444	32.61		
2021/03/24-20:07:18:00	8	1	41.99914167	-93.63537333	240.5	15.98378889	32.64		
2021/03/24-20:07:19:00	8	1	41.99926333	-93.63527333	240.2	16.03523333	32.34	WP	TRUE
2021/03/24-20:07:20:00	8	1	41.99938667	-93.63517167	240	16.04037778	32.32		
2021/03/24-20:07:27:00	8	1	42.00023833	-93.634385	239.9	15.86032222	43.36		
2021/03/24-20:07:28:00	8	1	42.00034	-93.63424	240.5	16.03008889	47.9		
2021/03/24-20:07:29:00	8	1	42.00043333	-93.63408667	241.1	16.14841111	51.21	WP	FALSE
2021/03/24-20:07:30:00	8	1	42.00052167	-93.63392833	241.2	16.05581111	54.8		
2021/03/24-20:07:35:00	8	1	42.00084167	-93.63302667	242	16.61655556	74.63		
2021/03/24-20:07:36:00	8	1	42.00087667	-93.63282667	242.2	16.7143	78.75		
2021/03/24-20:07:37:00	8	1	42.0009	-93.63262333	242.1	16.83776667	83.23		
2021/03/24-20:07:37:00	8	1	42.00091167	-93.63242	242.1	16.8995	86.71	Data Log	FALSE



Field Data Collection Tool (Upload)

*Slides from US DOT Presentation By Tony English

- When the work zone has been mapped, the path history data is compressed/reduced and messages are created (WZDx and RSM) automatically
- RSM (XML) Message is converted into binary (UPER) automatically
- Messages and path data are zipped and uploaded to the back-office



Received information is used to generate a work zone with new geospatial details in the back office (cloud) for validation

- Overlay WZ Map information
  - Work zone data points
  - Compressed data points (updated to use breadcrumb from SAE J2945/1 spec)
  - Worker presence
  - Lane closures
  - Approximate lane locations
- TMC Operator verifies accuracy of recorded work zone
- TMC Operator publish verified work zones available for
  - 3rd party (SDX, WZDx, WAZE, HERE)
  - 511
  - CARMA and other cooperative automation applications

*Slides from US DOT Presentation By Tony English

Choose a work zone and specify messages to download

demo-test-1-north--i-25
iowa-state-test--airport-rd
iowa-test--us-30
iowa-test--us69

Description: Iowa test
Road Name: US69
Start Date: 2021-03-22T00:00:00Z
End Date: 2021-04-02T23:56:00Z

- [ ] Work Zone Data Exchange message (WZDx), type = geojson
- [ ] XML Roadside Safety Message (RSM), type = xml
- [ ] Binary Roadside Safety Message (RSM), type = uper

Download Work Zone Data

CTRE General Notes

- Additional manual work at this point
  - Requires driving through work zone to update data
- With current tool, need two people to avoid distracted driving
- Latency in updating the data will exist
  - How quickly does this need to be completed
- US DOT is working on additional systems to automate worker presence, work zone location, reading signs

CTRE General Notes – Considerations

- Provides another method of collecting better work zone data

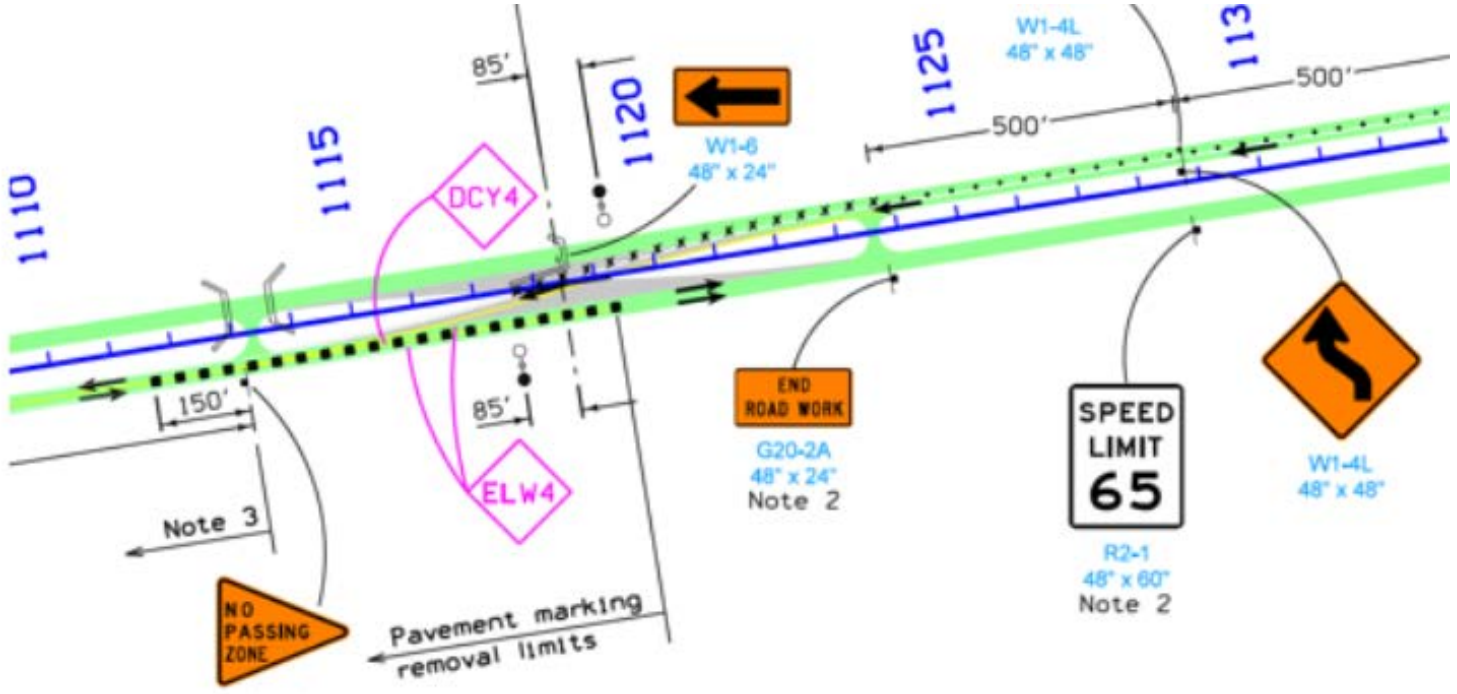
- Another tool in the toolbox to collect better data
  - Using connected devices should result in quicker updates and less additional work but can't get lane changes.
  - Major issue though is collecting location where no equipment is installed (end of work zone, minor work zones with no arrow board, flagger, etc). This is likely also an issue with this tool since these work zones are less severe (see potential use cases)

- For verification, how often would you need to drive through since this is only a spot verification (i.e. only represents a moment in time). No way to track if work zone moves or ends.

Use Cases

- Work zones where alignment differs from existing or locations with shifts
  - No discussion to date on what WZDx lines are (actual travel path or impacted travel path)

- Longer duration work zones with minimal phases



RSU Test- InTrans parking lot

Create the path file

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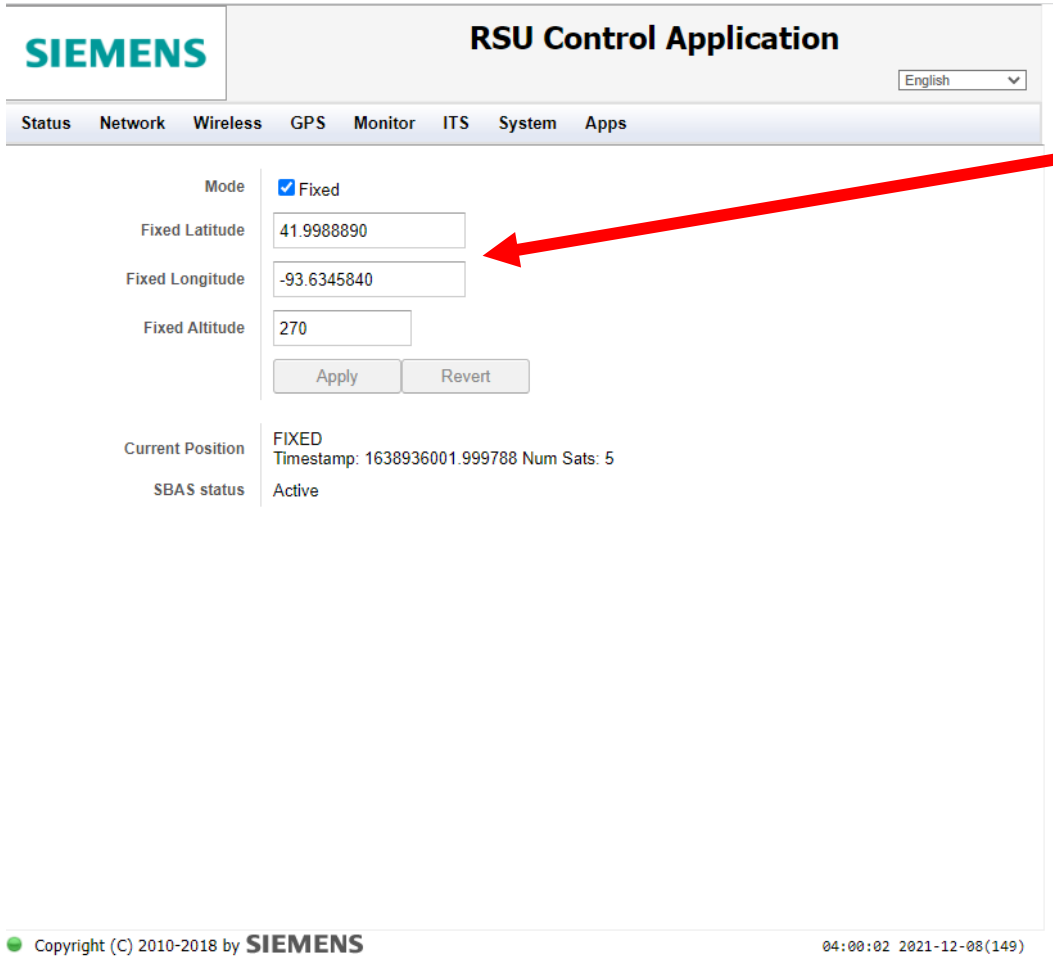
RSU Test- InTrans parking lot

Deploy RSU along Airport Rd



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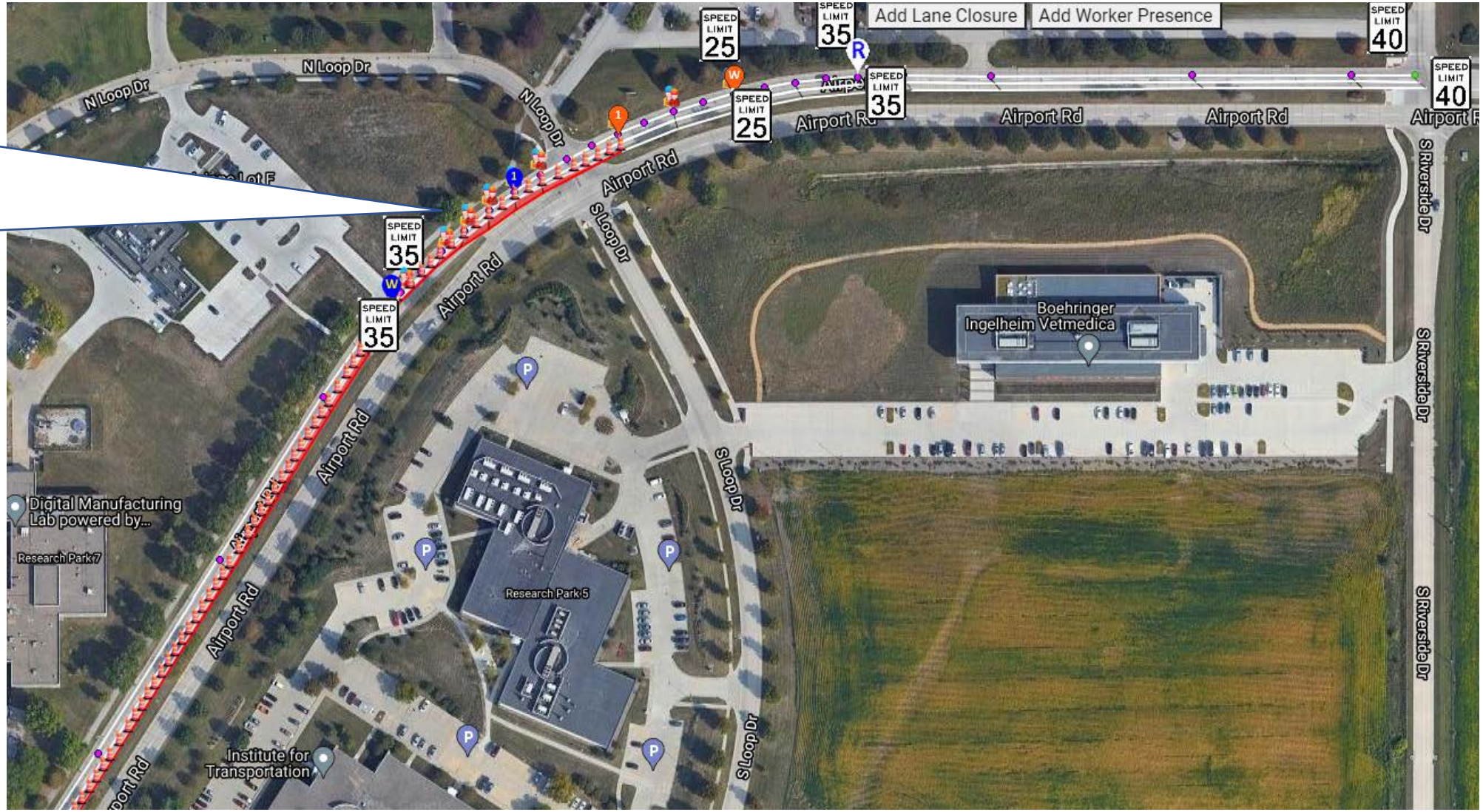
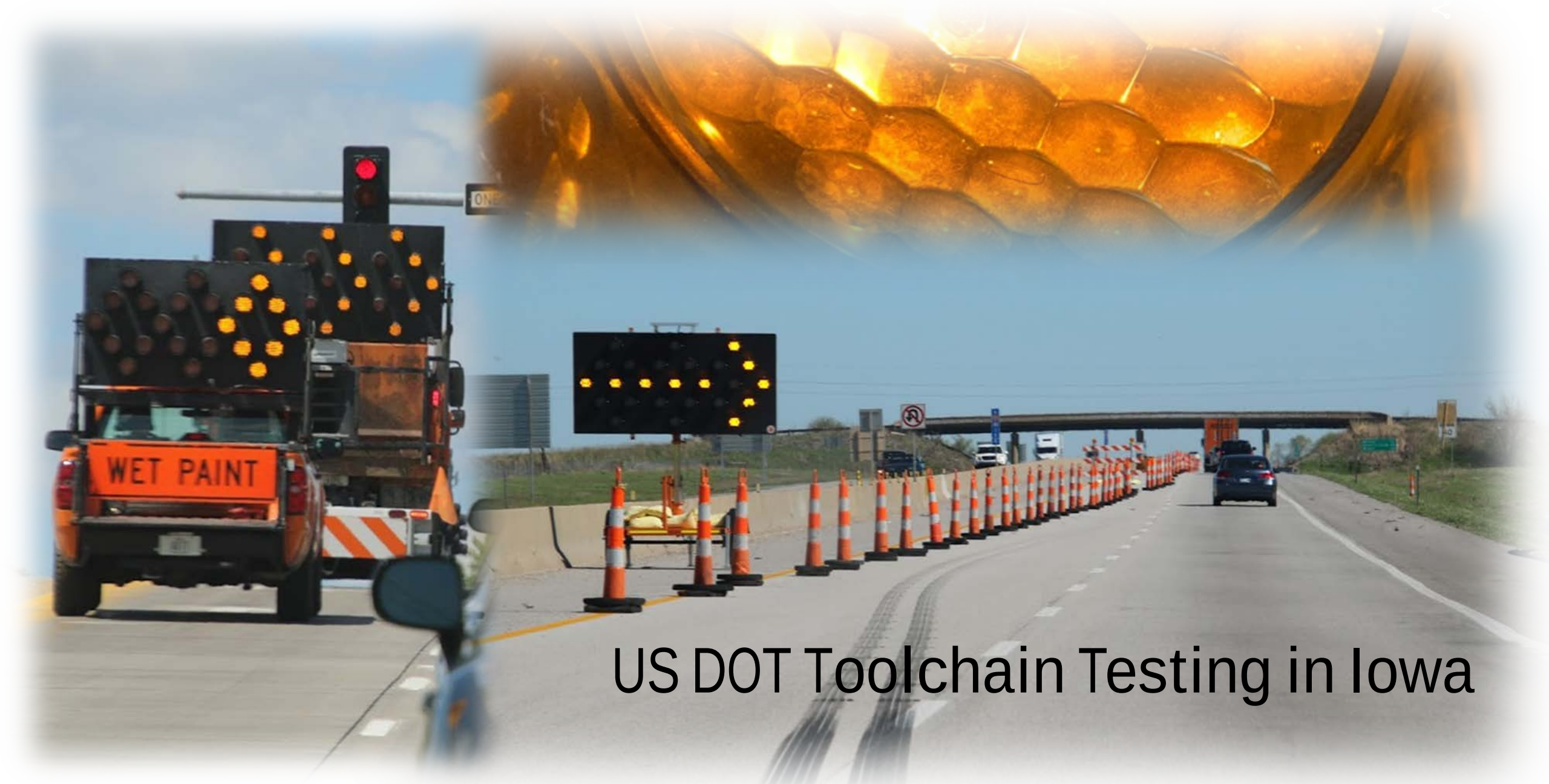
Create path file by LRS

Can also show the information for lane closure or worker present





US DOT Toolchain Testing in Iowa

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Skylar Knickerbocker (sknick@iastate.edu)

IOWA STATE UNIVERSITY
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OPEN DISCUSSION

Bipartisan Infrastructure Law* TSMO Funding Opportunities

*** also known as Infrastructure Investment and Jobs Act (IIJA)**

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2021 Infrastructure Investment and Jobs Act (IIJA) HR 3684

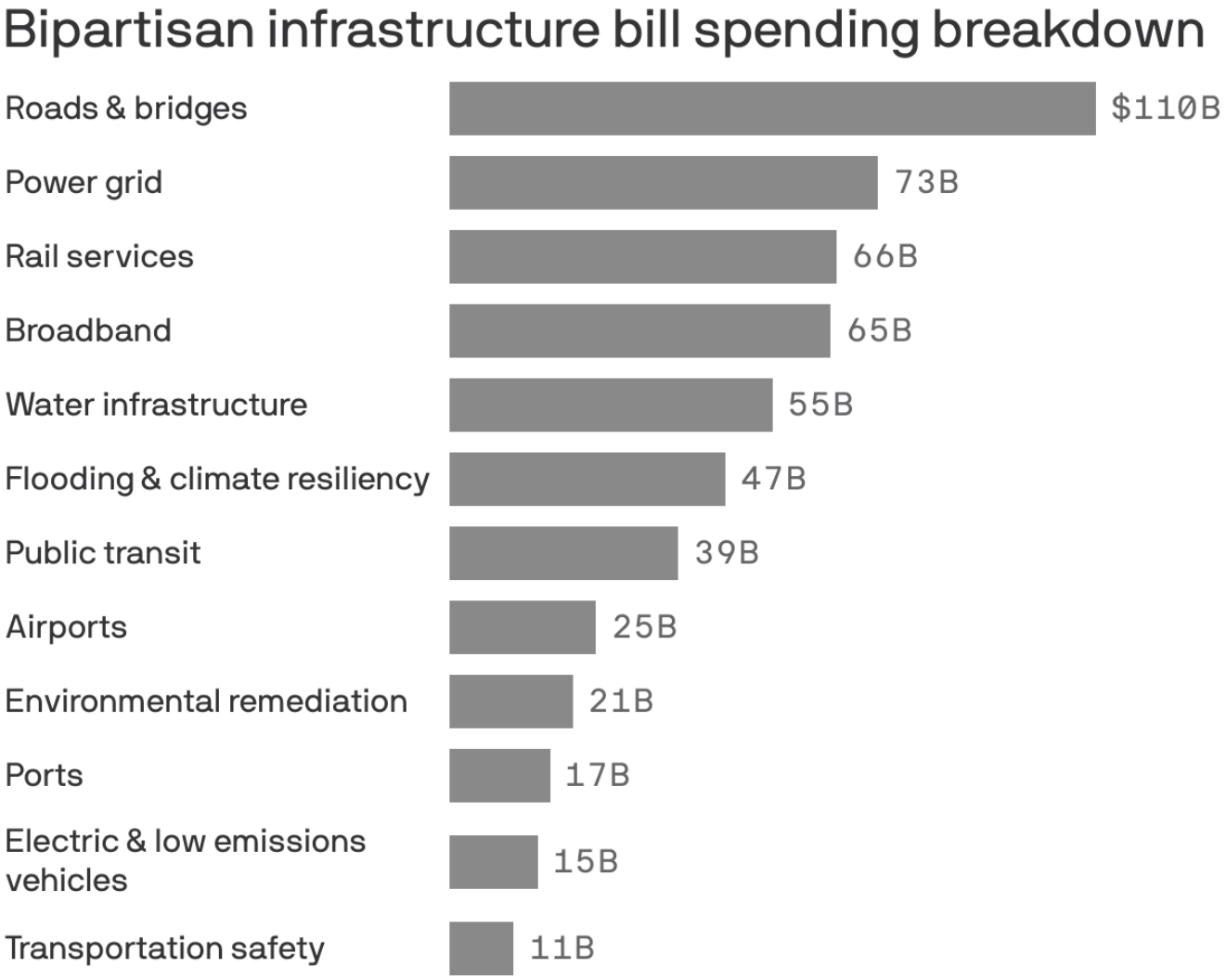
IIJA at a Glance

US Overview

5-Year Bill Signed Nov. 15, 2021

$1.2 Trillion Total

39% of overall funds will be awarded on a competitive basis



IIJA at a Glance

Iowa Overview

- **49% increase** in federal-aid highway and bridge funding
  - $2.6B (2016 – 2020 FAST Act)
  - $3.8B (2022 – 2026 IIJA)
- **$3.4B** for federal-aid highway programs
- **$432M** for bridge replacements & repairs
- **$305M** for public transportation
- **$83M** to reduce emissions
- **$94M** to improve resiliency
- **$26M** in highway safety programs
- **$35.9M** for CMV safety efforts
- **$51M** in EV Charging Infrastructure

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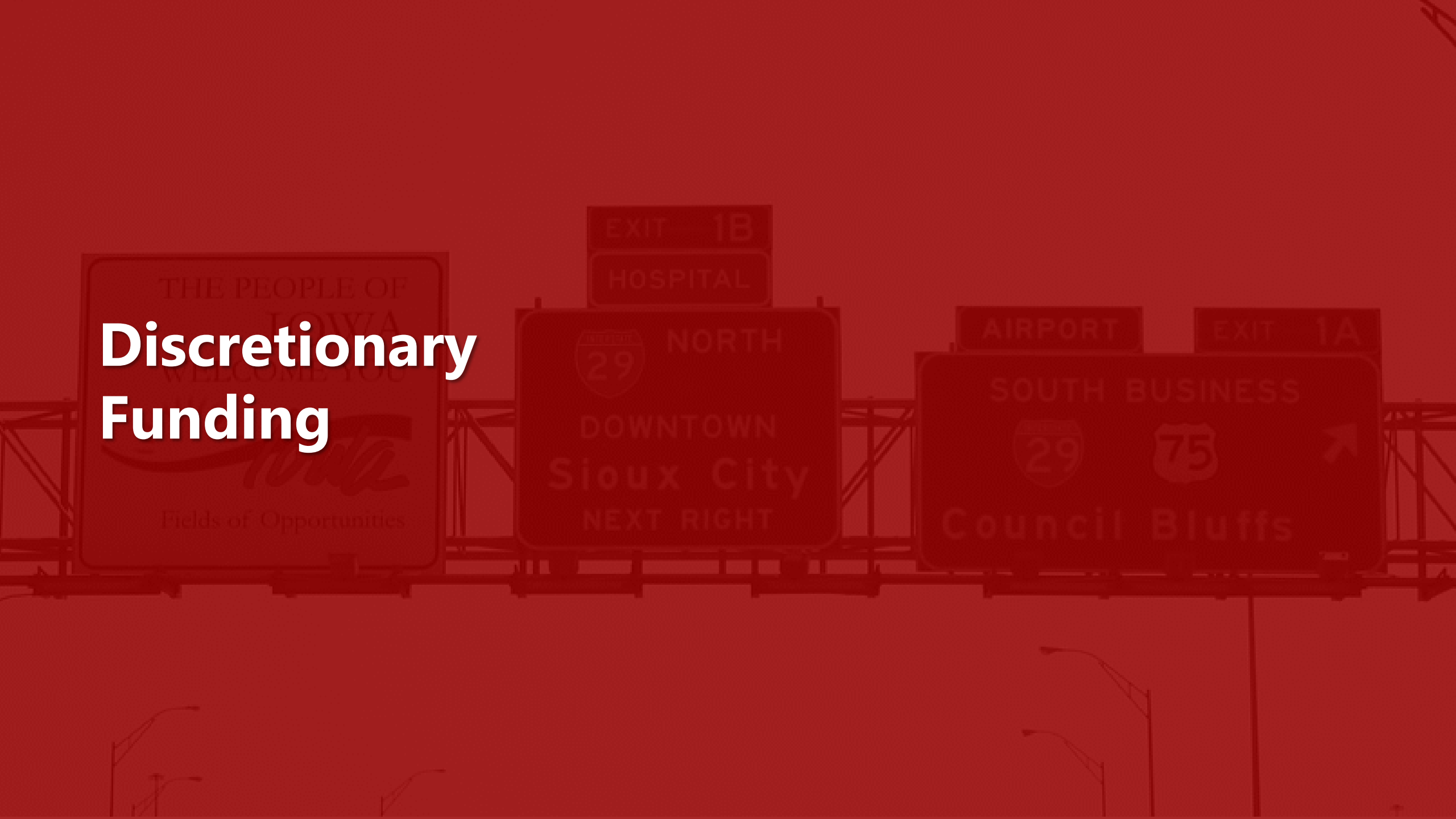

Discretionary Funding

Discretionary Funding Overview

US Overview

$150B in discretionary grant programs

- Railway-Highway Grade Crossings
- **INFRA**
- Bridge Discretionary Grant Program
- Wildlife Crossings Pilot Program
- **Charging and Fueling Infrastructure** Congestion Relief Program
- **PROTECT**
- Healthy Streets
- Reconnecting Communities
- Megaprojects
- **RAISE**
- Culvert Removal, Replacement, and Restoration
- Safe Streets and Roads for All
- **SMART**
- **Advanced Transportation Technologies and Innovative Mobility Deployment Program (ATTIMD)**
- Several Transit related opportunities

INFRA Discretionary Grant Program

- Provides Federal financial assistance to highway and freight projects of national or regional significance
- $8 billion
- Increased cap on multimodal projects to 30% of program funds

TSMO Opportunities
ICM Strategies, especially those that knock down equity barriers, connects all users, and/or reduce green house gases, Freight movement improvements

Primary Selection Criteria

Support for National or Regional Economic Vitality

Climate Change and Env. Justice Impacts

Racial Equity and Barriers to Opportunity

Leveraging of Federal Funding

Potential for Innovation

Performance and Accountability

Secondary Selection Criteria

Includes improvements for multimodal non-motorized users

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Charging and Fueling Infrastructure Program

- Deploy EV charging and hydrogen/propane/natural gas fueling infrastructure along designated alternative fuel corridors and in communities
- $2.5 billion
- Set-aside (50%) to install EV charging and alt. fueling infrastructure on public roads or in other publicly accessible locations, such as parking facilities at public buildings, schools, and parks

TSMO Opportunities

Leverage ITS Maintenance to support 5-years of fed-supported O&M

Primary Selection Criteria

TBD

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PROTECT

- Increase resilience of the transportation system
- $7.3B in formula funding nationally
- $1.4B in competitive planning grants nationally
- Higher Fed. share if State develops a resilience improvement plan and incorporates into its LRTP

TSMO Opportunities

Emergency mgmt., planning for physical and cyber infrastructure hardening, Operational Tech. network hardening & resiliency

Primary Selection Criteria

TBD

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RAISE Discretionary Grant Program

- Invest in national infrastructure projects that result in good-paying jobs, improve safety, apply transformative technology, and explicitly address climate change and racial equity.
- $7.5 billion over 5 years
- Provisions for RAISE have doubled

TSMO Opportunities
ICM Strategies, especially those that introduce new technologies through innovative partnerships

Primary Selection Criteria

Safety

Environmental Sustainability

Quality of Life

Economic Competitiveness

State of Good Repair

Secondary Selection Criteria

Partnership

Innovation

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Strengthening Mobility and Revolutionizing Transportation (SMART)

- Focus on advanced smart city or community technologies and systems to improve transportation safety and efficiency
- $7.3B in formula funding nationally
- $1.4B in competitive planning grants nationally

TSMO Opportunities

Partner with metro area transit agencies to integrate trip planning across modes, work with local agencies for signal system modernization

Primary Selection Criteria

State of public transportation/transit system

Population density and transit need

Use of advanced data, tech, and apps

Secondary Selection Criteria

Scalability/repeatability

Encourages public/private data sharing

Promote skilled workforce

Promote cybersecurity

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Advanced Transportation Technologies and Innovative Mobility Deployment Program (ATTIMD)

- Former Advanced Transportation and Congestion Management Technologies Deployment Program (ATCMTD)
- $300M
- Focuses on deployment and operation of technologies – 20% dedicated to rural projects

Primary Selection Criteria

TBD

TSMO Opportunities

ICM Applications, Rural TIM Data Sharing Pilot, Freight Technology Demonstration

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Resources

- **FHWA BIL website:** https://www.fhwa.dot.gov/bipartisan-infrastructure-law/
- **USDOT BIL Iowa Fact Sheet:** https://www.transportation.gov/sites/dot.gov/files/2021-11/Bipartisan_Infrastructure_Law_Iowa.pdf
- **AASHTO Analysis of BIL:** https://policy.transportation.org/wp-content/uploads/sites/59/2021/09/2021-09-15-AASHTO-Comprehensive-Analysis-of-IIJA-FINAL.pdf

Notable AT-Readiness Sections of the IIJA

- SEC. 11302. Work zone process reviews
- SEC. 11303. Transportation management plans
- SEC. 11304. Intelligent transportation systems
- SEC. 11135. Updates to Manual on Uniform Traffic Control Devices
- SEC. 11504. Study of impacts on roads from self-driving vehicles
- SEC. 11510. Cybersecurity tool; cyber coordinator
- SEC. 13005. Emerging technology research pilot program
- SEC. 13006. Research and technology development and deployment
- SEC. 24213. New Car Assessment Program
- SEC. 24219. Research on connected vehicle technology
- SEC. 25001. Intelligent Transportation Systems Program Advisory Committee
- SEC. 25002. Smart Community Resource Center
- SEC. 25008. Coordination on emerging transportation technology
- SEC. 25020. Transportation workforce development
- SEC. 60102. Grants for broadband deployment

INFORMATION AND KEY UPCOMING DATES

Economic Development Subcommittee Meeting – Wednesday, January 5 from 1-2 pm

- *ITS Labor and Workforce Readiness (draft title) – Emily Lawless and Tara Reels (Volpe Center)*

Policy & Legislation Subcommittee Meeting – Wednesday, January 19 from 1-2 pm

- *Austin, TX PDD Deployment Experience – Alex Payson (City of Austin, TX)*

Public Safety & Enforcement Subcommittee Meeting – Tuesday, January 25 from 1-2 pm

- *Preparing Law Enforcement, First Responders, and Crash Investigators for Automated Vehicle Technology – Tammy Trimble (Virginia Tech Transportation Institute)*

AT Council Meeting – Aiming for a February or March 2022 meeting

THANK YOU