FHWA AEGIST: Joe Hausman and Abhishek Bhargava

AEGIST Activities for Development of Complete Streets and for Ensuring Transportation Equity

Complete Streets

Background: Complete Streets

- National Complete Streets Coalition, established in **2005**

- **Complete streets are those that are designed and operated to enable safe access and travel for all users**.
  - Pedestrians
  - Bicyclists
  - Motorists
  - Transit users

  and travelers of all ages and abilities will be able to move along the street network safely.

Complete Street Goals

REDUCE MOTOR VEHICLE-RELATED CRASHES

REDUCE PEDESTRIAN RISK

REDUCE BICYCLIST RISK

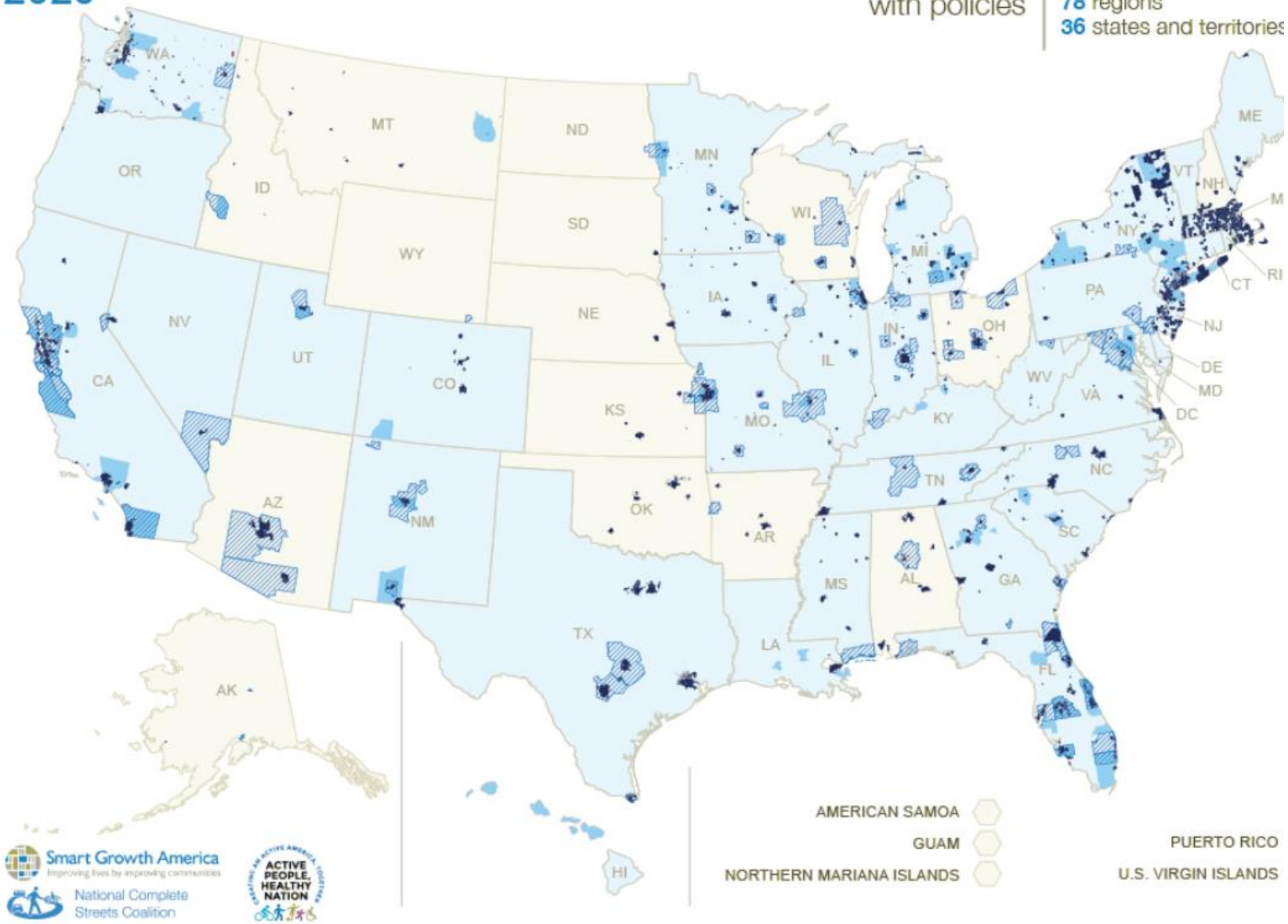
Transportation Equity, Safety and Mobility for all Travelers

Complete Street Features

- Sidewalks
- Bike lanes (or wide paved shoulders)
- Special bus lanes
- Comfortable and accessible Public transportation stops
- Frequent and safe crossing opportunities
- Median islands
- Accessible pedestrian signals
- Curb extensions
- Narrower Travel Lanes
- Roundabouts

and more.

Complete Streets Policy Adoption
2020



Source: https://smartgrowthamerica.org/20-years-1600-complete-streets-policies/

Complete Streets Roadmap
USDOT and Caltrans

- Technology Review and Roadmap for Inventorying Complete Streets for Integration into Pavement Asset Management Systems
  - 7 agencies have Complete Streets performance measures

- Three primary challenges that need to be addressed to develop complete streets and complete roadmap activities:
  - inadequate funding related to organizational structure (25 Agencies)
  - the need for a rating system, and
  - the need for improved data accessibility, collection methods, and management techniques.

- Roadmap for Incorporation of Complete Streets into Asset Management

Complete Street Performance Measures

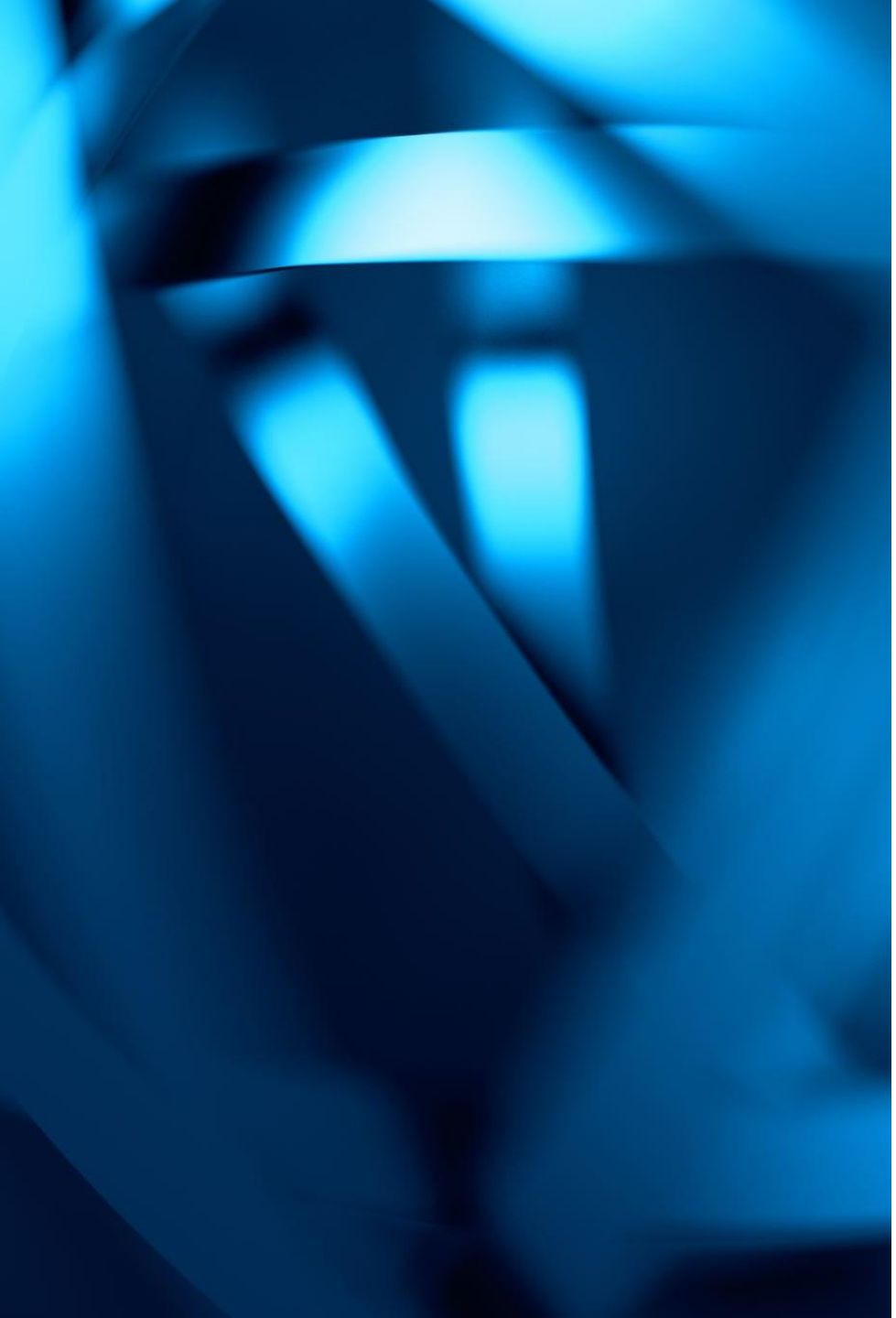
STATE	USAGE	SAFETY	CONDITION	ACCESSIBILITY	NETWORK	OTHER
Iowa	Bike and pedestrian mode share	# of accidents, # of accidents involving children		% of rural and urban network suitable for bike and ped	# of miles of bicycle facility added	% of Transportation Alternatives Program funds used for bike/ped; # of MPOs, counties, and cities adopting Complete Streets policies
Maryland	Vehicle miles travelled, transit ridership	# of fatalities and injuries, perception of safety (general)	Road condition (not bike specific)	% of network with acceptable Level of Traffic Stress score, access to transit, perceptions of connectivity		
Minnesota	% of residents who bike 1x/week, transit ridership	# of fatalities	Ride quality (not bike specific), curb ramp condition	ADA compliance, accessible pedestrian signals installed	Projects addressing bike, ped, transit, and freight needs (one measure each)	

Caltrans

Caltrans issued its initial Compete Streets directive (Deputy Directive 64) in 2008 and updated it in 2014

Caltrans has created a Complete Streets office and is working on developing an asset management plan with performance targets and measures.

Caltrans has Complete Streets associated targets, performance measures, and an asset management plan



AEGIST Activities to Support Complete Streets and Transportation Equity

Data Collection & Modeling with Systems of Record

Optimize Data Collection & Data Modeling Process for Complete Streets Data Inventory by integrating road network and intersection data from a variety of authoritative sources

NG911 and Local Agency Systems

Open Street Maps

Design Systems

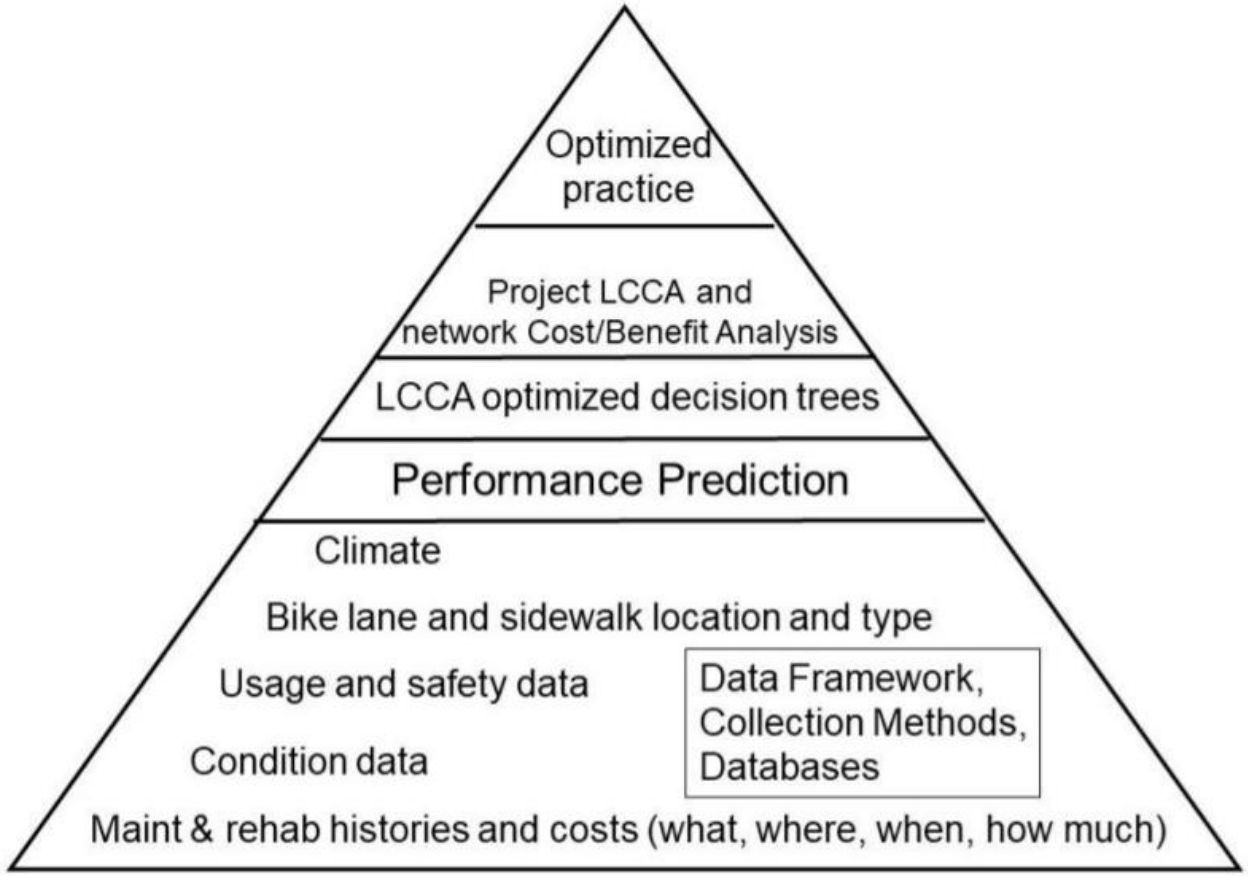
Asset Management Systems

Data Integration, Engineering & Quality

Improve cost-efficiency in Complete Streets Data Integration, Engineering and Data Quality Management across all authoritative sources by Automating Processes associated with Spatial Data Creation and Data Quality Assessment

AEGIST Activities for achieving Goals of Complete Streets and Ensuring Equity in Transportation

- Building the complete streets asset management system using Building Information Modeling (BIM)
- Enabling Complete Streets Data Governance by Deploying Data Governance Framework for BIM



AEGIST Support for Complete Streets & Transportation Equity

Georgia Tech — CREATING THE NEXT

UCPRC — UNIVERSITY of CALIFORNIA Davis • Berkeley | PAVEMENT RESEARCH CENTER

Research Roadmap: Inventorying Complete Streets for Asset Management

Vision: Incorporate Complete Streets into asset management systems to cost-effectively take advantage of the societal, economic, and environmental benefits of active transportation

Concept

Scope: Management of assets for long-term performance of active transportation assets as part of a complete streets network

- C1. Technology Review for Inventorying Complete Streets Assets
- C2. Current Practices and Needs Review for Complete Streets
- C3. County/City Review of Practices and Needs

Research

- R1. Inventorying Bike and Pedestrian (and ADA) Facilities ✓
- R2. Condition Evaluation Rating System of Bike and Ped Facilities
- R3. Long Term Performance and Forecasting for CS Assets ✓
- R4. AV/CV for CS data collection
- R5. Crowdsourcing for CS data collection ✓
- R6. Network Level Measurement of Bike/Ped Counts
- R7. LCCA & Value of Complete Streets Improvements
- R8. Safety Impacts of Complete Streets Implementation ✓
- R9. Pilot Testing/ Feasibility of Technologies for Inventorying Complete Streets Assets ✓

Development

- D1. Guidance for Complete Streets Performance Measures, Targets, and Prioritization ✓
- D2. Database Guidance for Complete Street Assets ✓
- D3. User Interface for Data Input, Analysis, and Presentation
- D4. Optimized Data Collection Methods for Inventorying Complete Streets ✓

Implementation

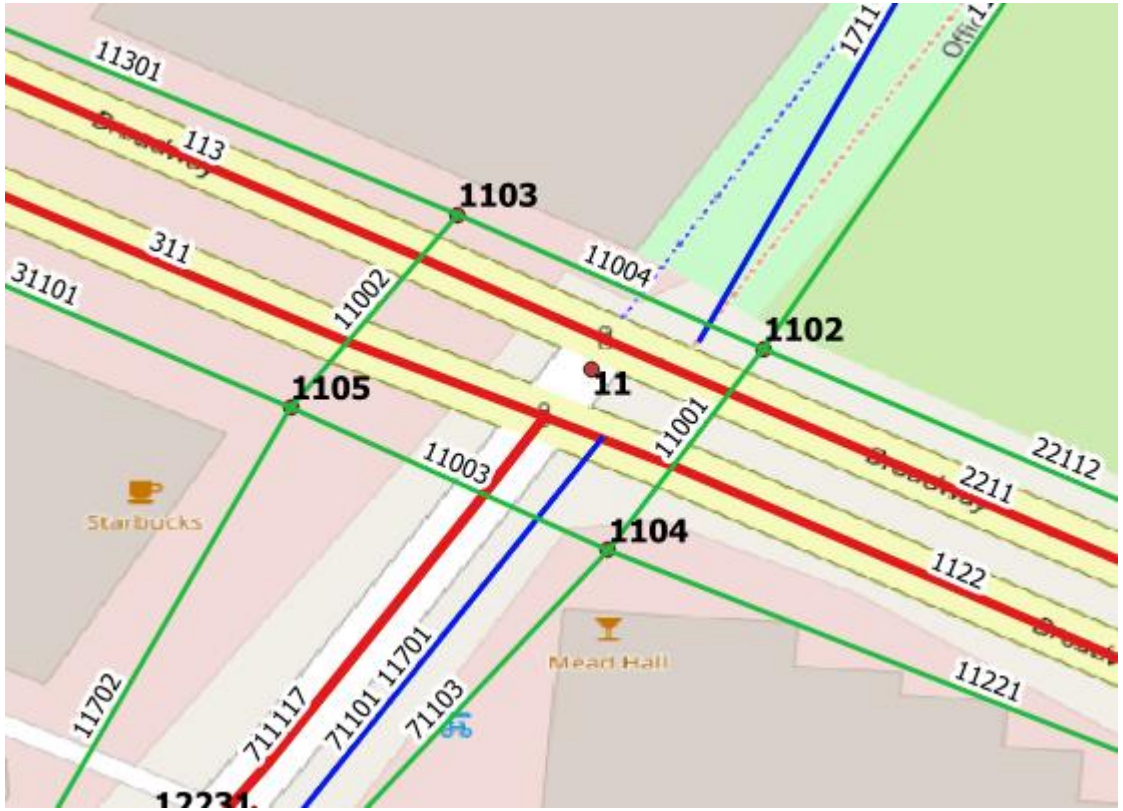
- I1. Best Practices for Organizational Structures to Support CS
- I2. Best Practices to Encourage Interagency Collaboration for CS ✓
- I3. Training for Complete Streets Condition Evaluation and Prioritization
- I4. National Standards for Complete Streets Targets and Data Collection ✓

Current Project

AEGIST Complete Street Activities at PFS States

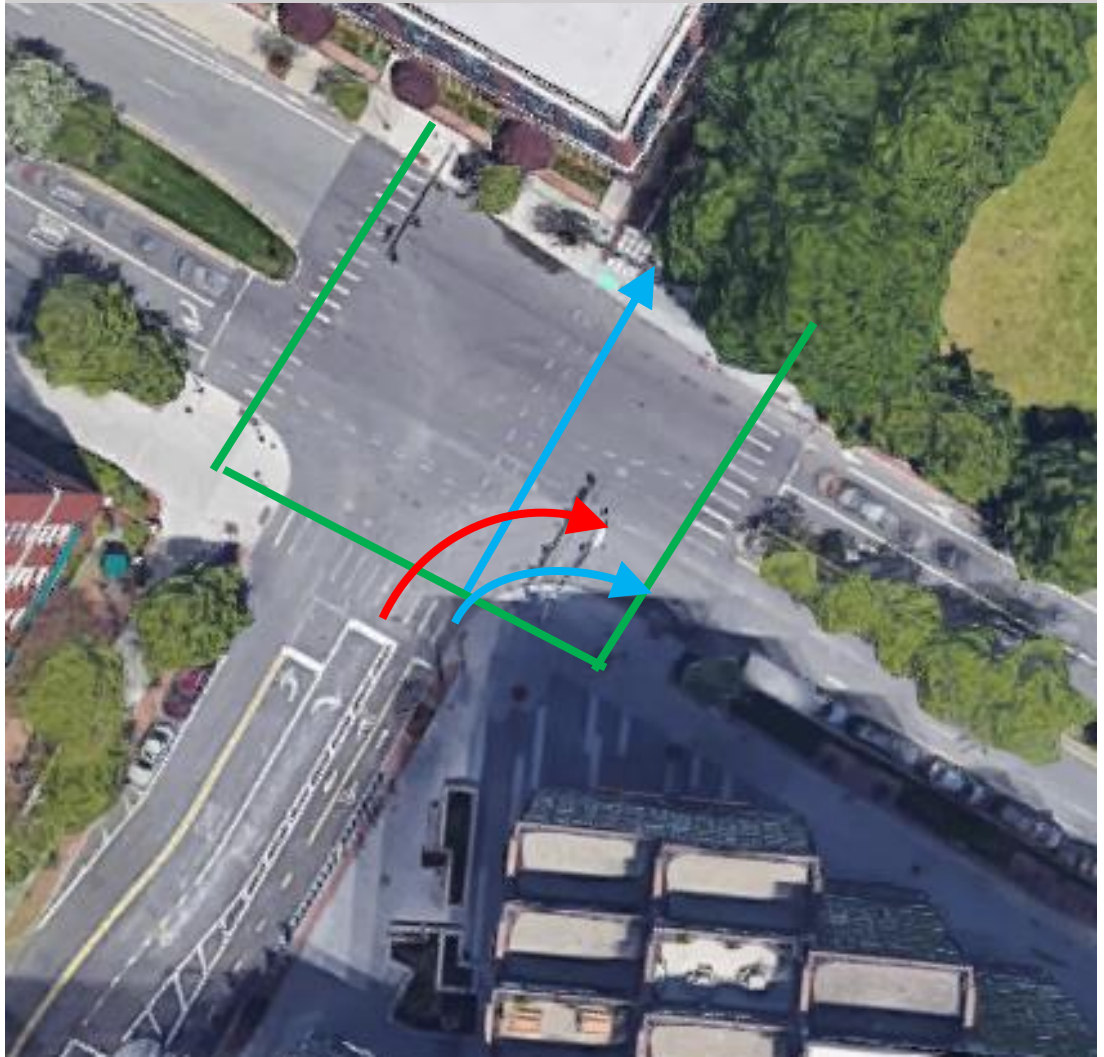
	PA	TN	OH	CT	ID	CA	NC	KS	FL	NM
R1. Inventorying Bike and Pedestrian Facilities			✓							
R3. Long Term Performance and Forecasting for CS Assets	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
R5. Crowdsourcing for CS Data Collection			✓				✓	✓	✓	✓
R8. Safety Impacts of Complete Streets Implementation	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
D1. Guidance for Complete Streets Performance Measures, Targets, Prioritization	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
D2. Database Guidance for Complete Street Assets	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
D4. Optimized Data Collection Methods for Inventorying Complete Streets			✓			✓	✓	✓	✓	✓
I2. Best Practices to Encourage Interagency Collaboration for CS	✓		✓		✓	✓				
I4. National Standards for Complete Streets Targets and Data Collection	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

AEGIST Incorporating GMNS Standard for Modeling Multimodal, MIRE-Compliant Signalized Intersection from ARNOLD and NG911 Roads



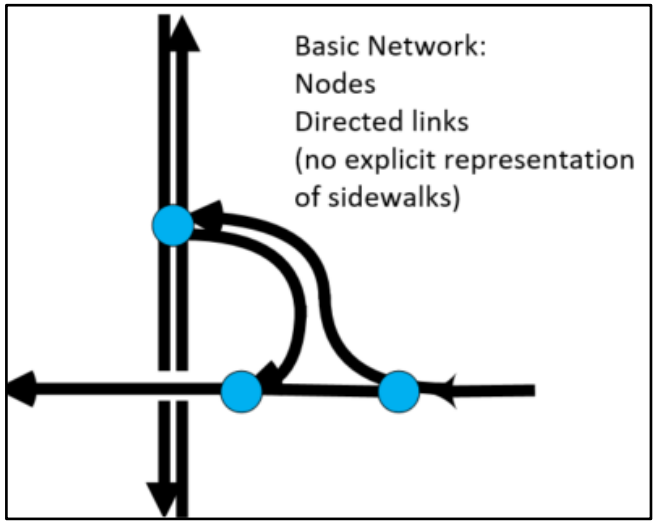
Red: Vehicle links and movements
Blue: Cycle track links and movements
Green: Pedestrian links and crosswalks

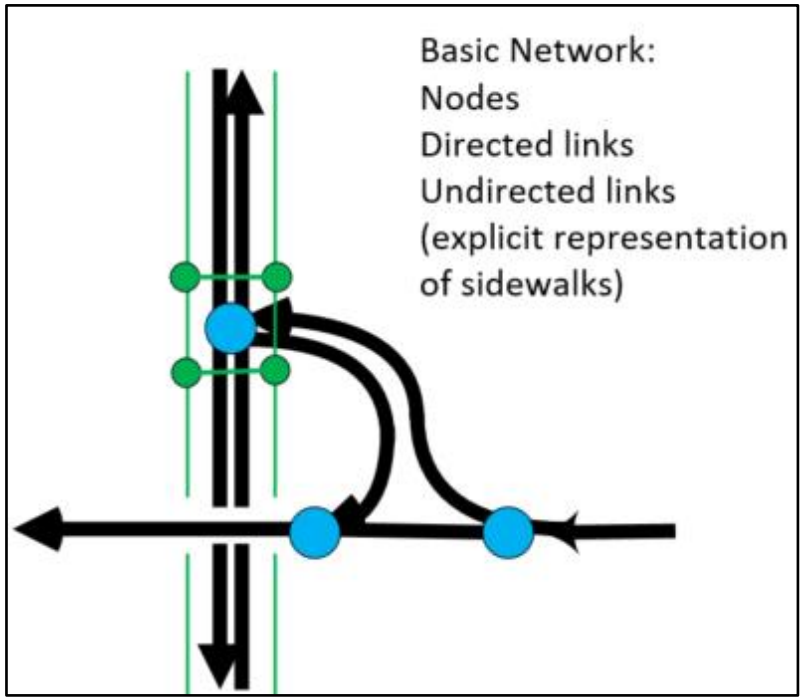
Selected Movements from Ames St.

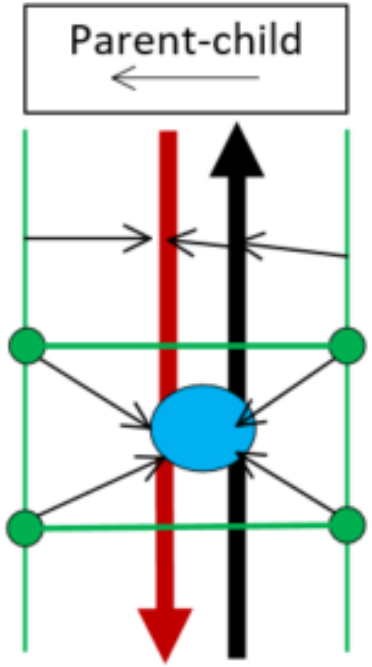


AEGIST Data Model with GMNS Multiresolution Representation

- Link level
- Lane level



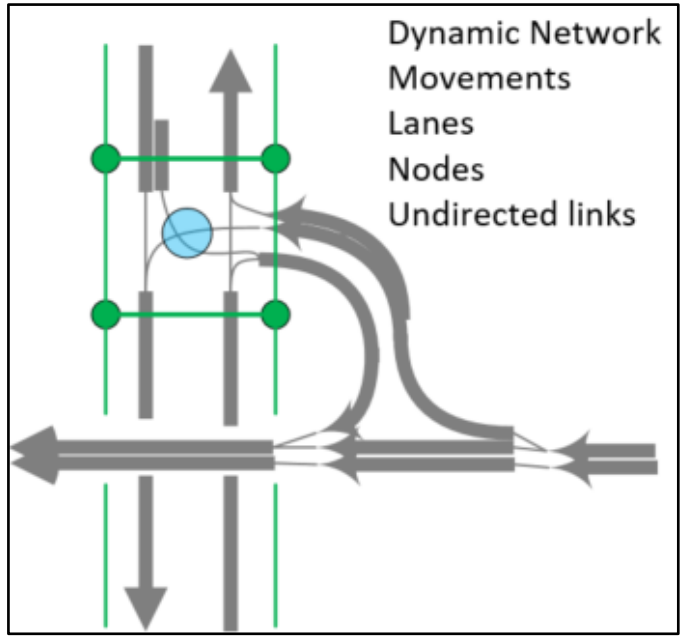




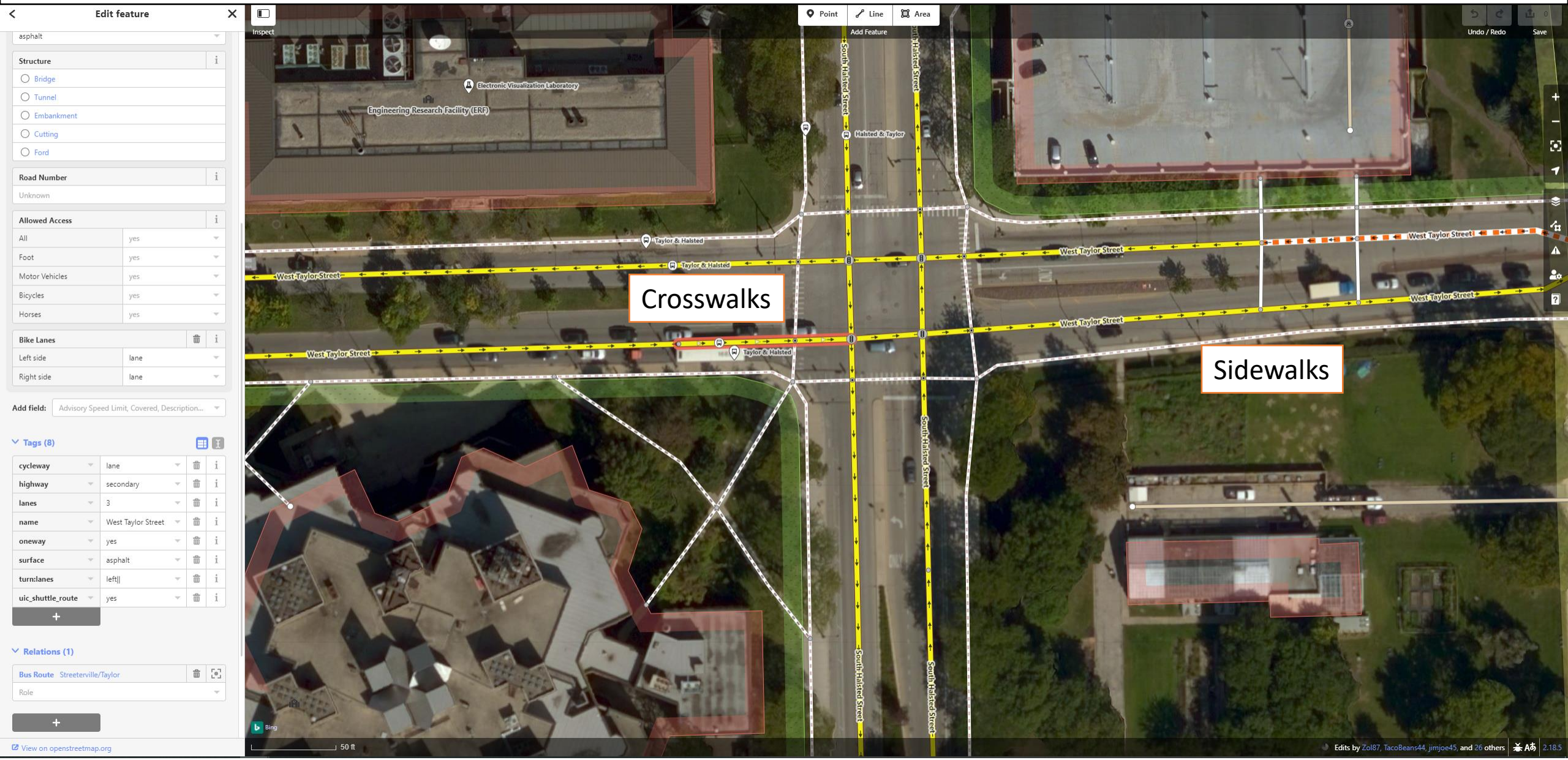
Links may have parent links
- Sidewalks to adjacent roads
- One side of a road to the other

(consider the case where the only link with shapepoints is the red link)

Nodes may have parent nodes
-Associate crosswalk entrances with signals



AEGIST Extracting Sidewalks, Crosswalks, Median Crossovers and Turn Lanes From Open Street Maps for Use in Motorists and Non-Motorist Networks



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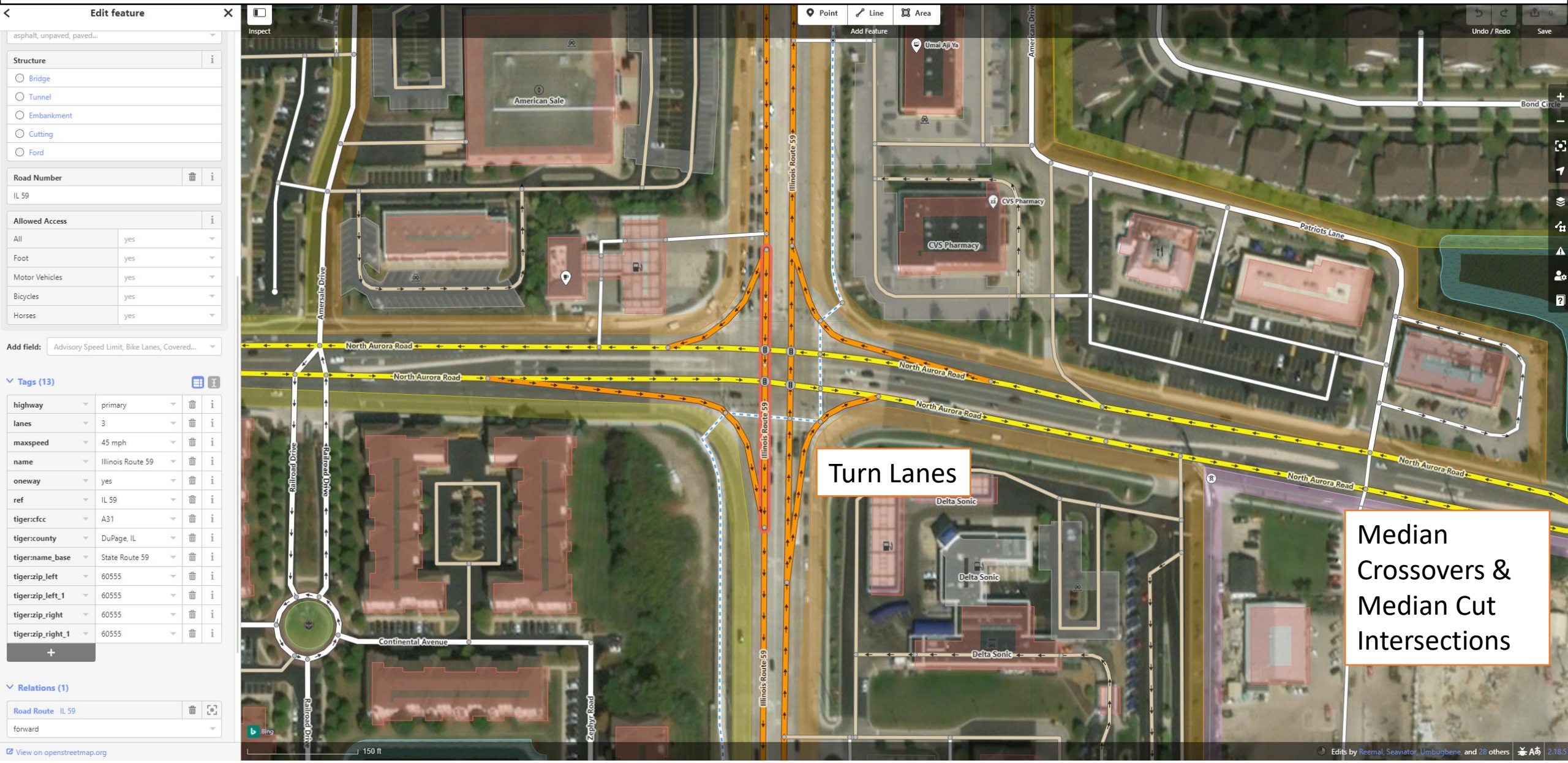
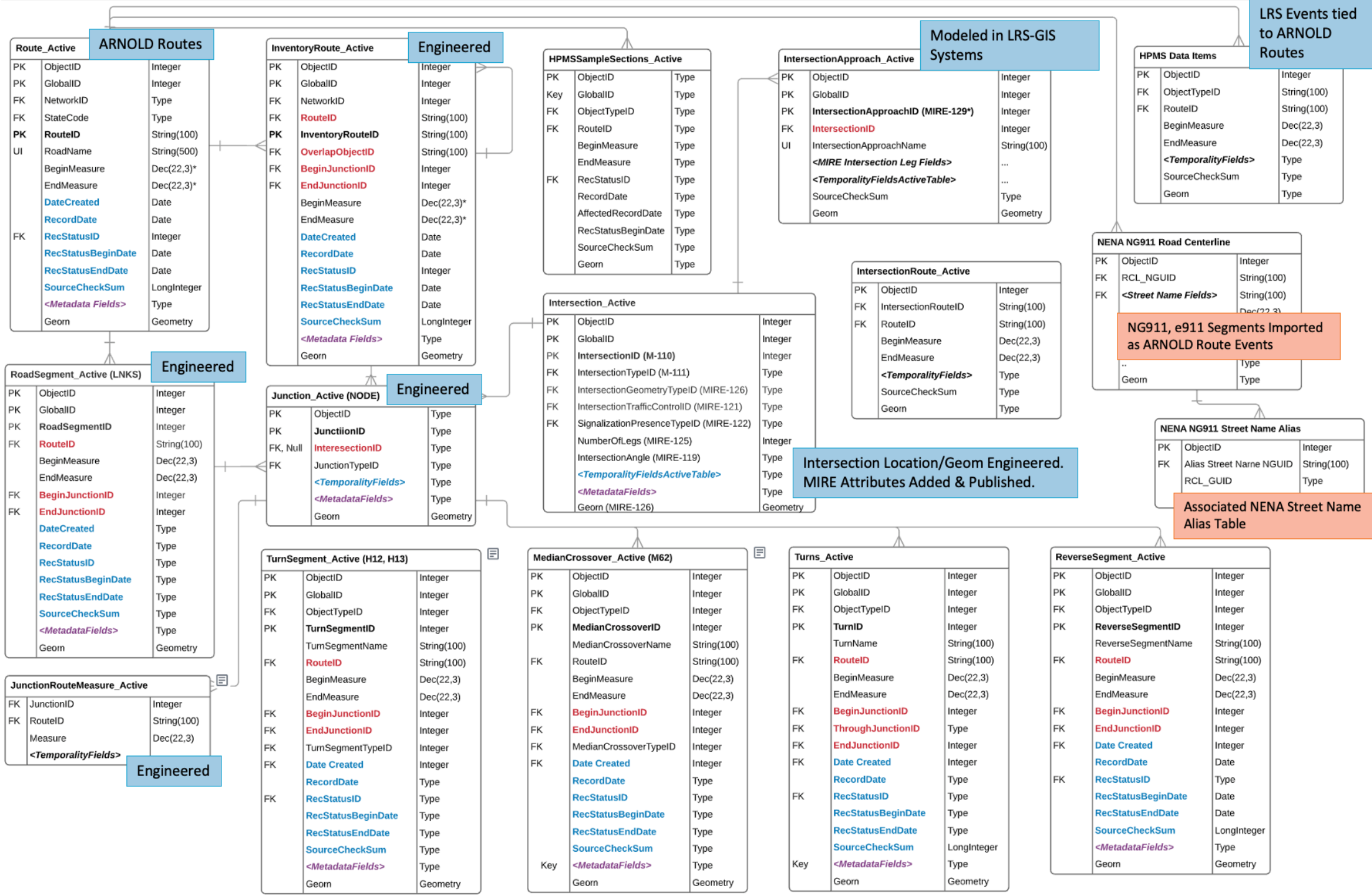
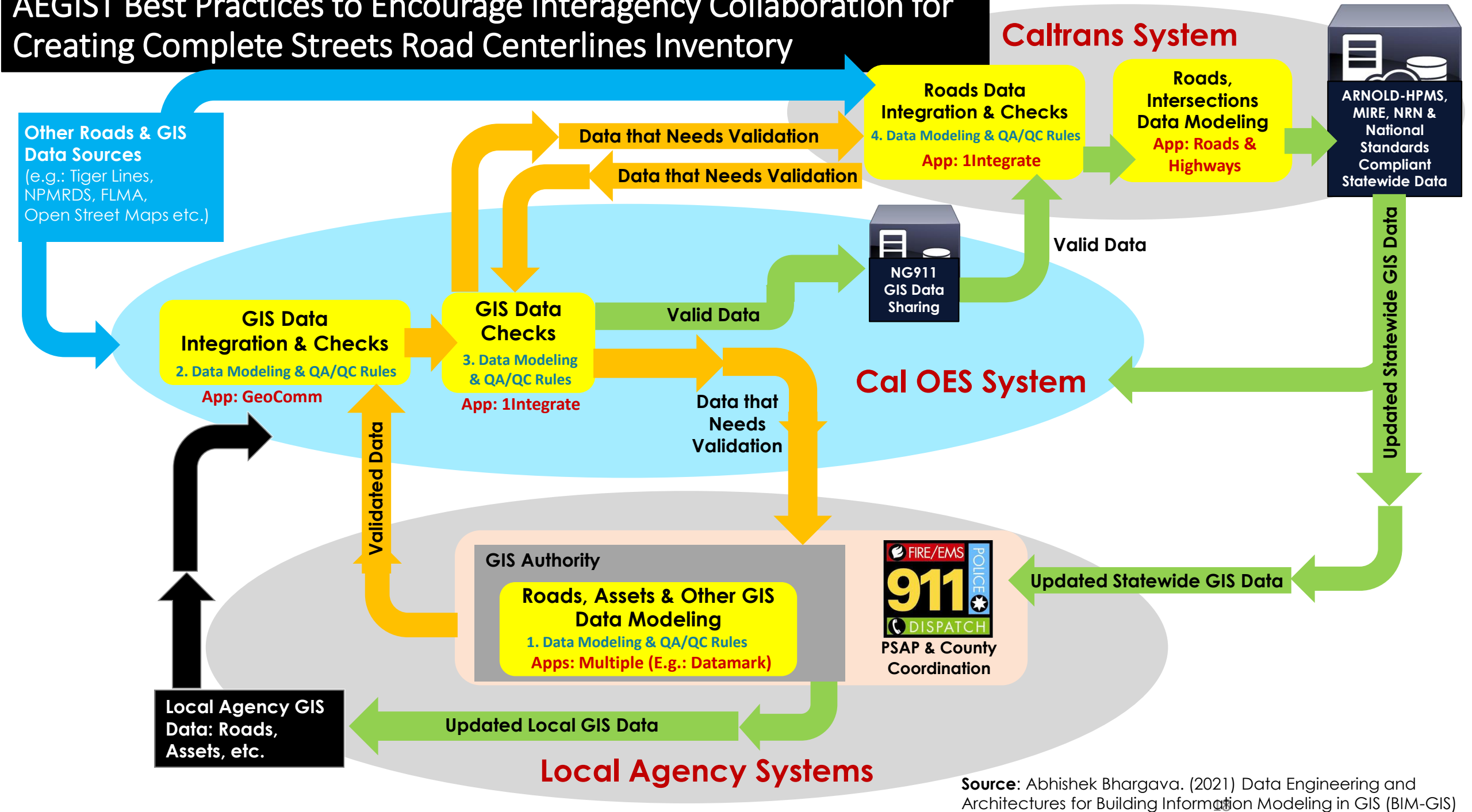


AEGIST Complete Streets Data Modeling Standard

- Motorist Routes
- Pedestrian Trail Routes
- Inventory Routes (HPMS 9: Route Identifications?)
- Junctions
- Intersections
- Road Segments (NG911)
- Turn Segments/Lanes
- Median Crossovers
- Crosswalks
- Sidewalks
- Signals

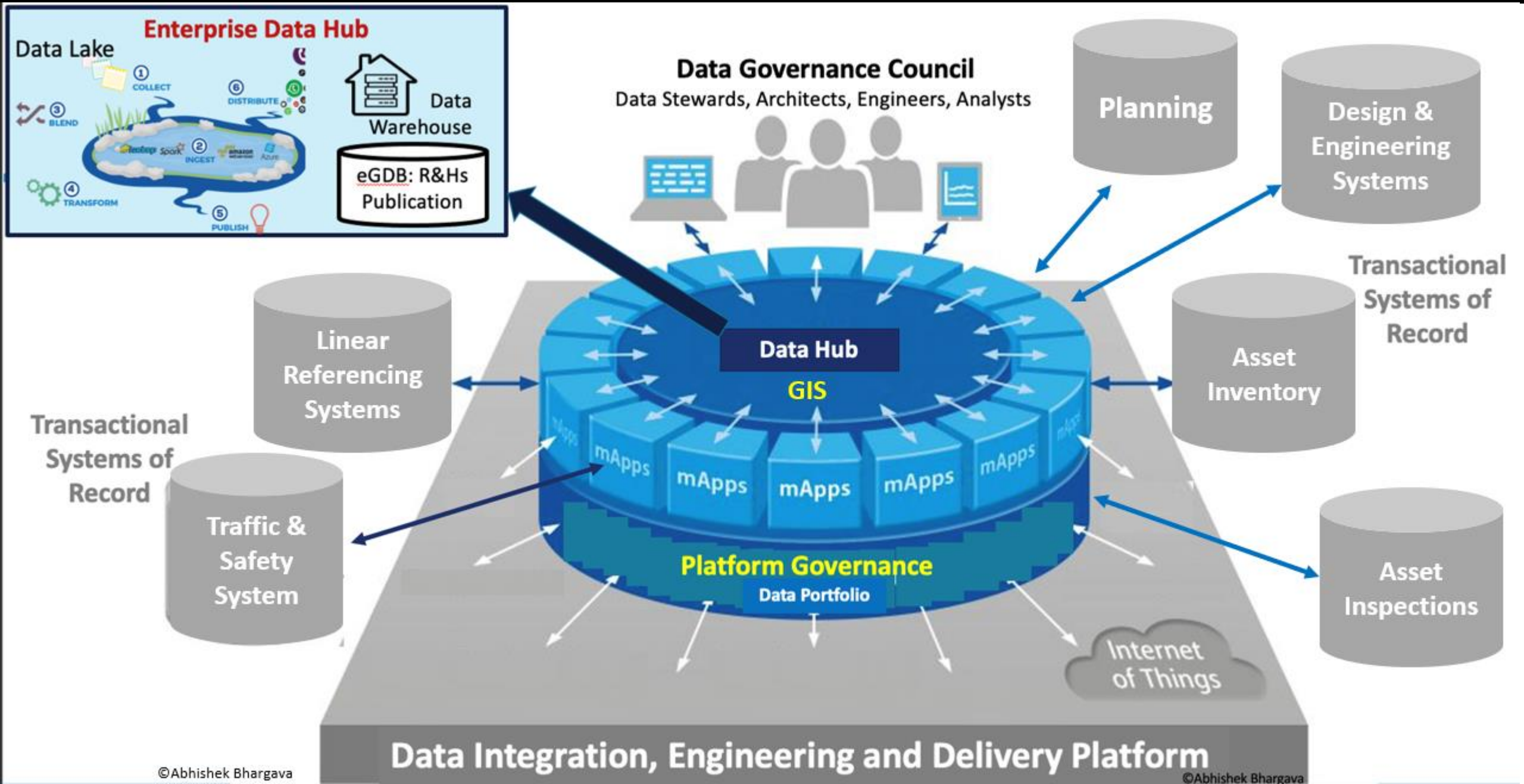


AEGIST Best Practices to Encourage Interagency Collaboration for Creating Complete Streets Road Centerlines Inventory



Source: Abhishek Bhargava. (2021) Data Engineering and Architectures for Building Information Modeling in GIS (BIM-GIS)

AEGIST Database Guidance for Complete Street Assets: Integrating and Engineering Roads, Assets Data for Complete Street Performance Measures Calculation, Performance Forecasting and Life Cycle Analysis



AEGIST Guidance on Governing Complete Streets Data Using Spatial & Linear Referencing Systems

Spatial Data Modeling in
Transactional Systems of Records (SoRs)
and **Spatial Data Engineering** for Publication to
Enterprise Data Warehouses, Databases to support
Spatial Data Analytics and Reporting
Via the Systems of Engagement (SoE)

Ensuring Transportation Equity by Preparing Spatial Transportation Data for Decision Makers across All Asset Life Cycle Phases & Processes

Complete Streets and Spatial Data Modeling

↓

Complete Streets Spatial Data Engineering

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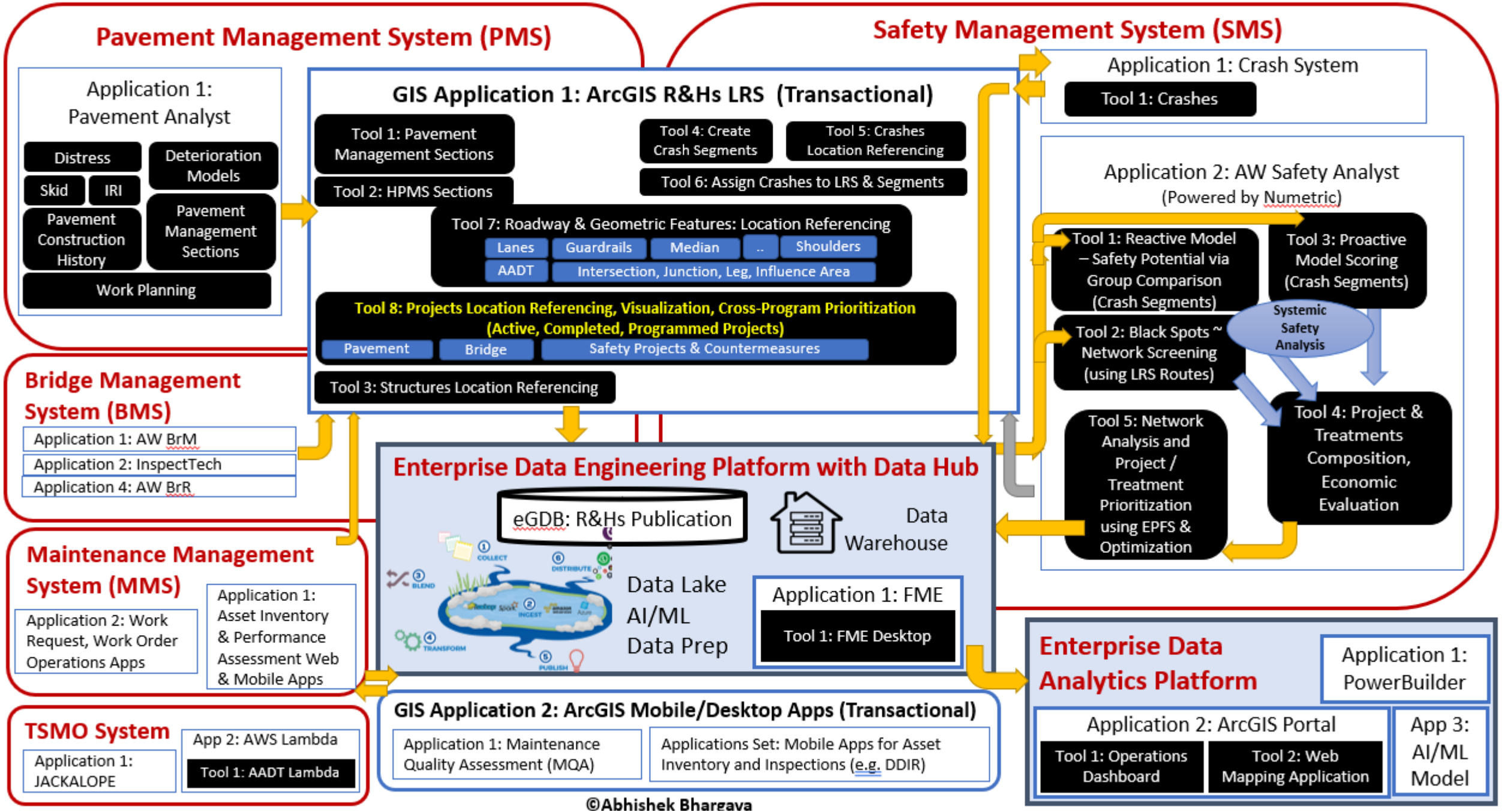
Complete Streets Spatial Data Analytics & Reporting

Complete Streets Inventory and Condition Data Modeling, Integration, Engineering and Analytics using Enterprise GIS



AEGIST Building Information Modeling (BIM) for Complete Streets Asset Inventory, Performance and Projects Data Management and for Supporting the Performance Forecasting and Asset Life Cycle Analysis