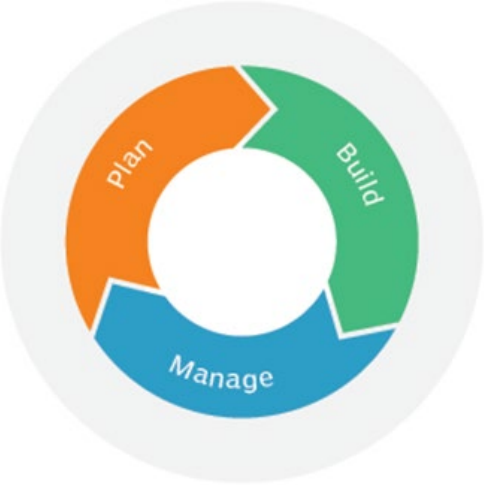
One Network for Ohio

Statewide and MPO Network
Database and Management

Problem Statement

- Simplify the network building process to support multiple geographic scales of modeling and tools
  - Statewide
  - MPO
  - Project Applications of TDM
- Create vertical integration with data sources
  - Project databases
  - MPO <-> Statewide Models
  - Centerline / Route Data
- Saves Time
- Reduces Error

Network Lifecycle Management



Plan, build and manage (PBM)

Plan

- How code and manage highway projects?
- Who maintains attributes?

Build

- Combine information maintained by the State and MPOs

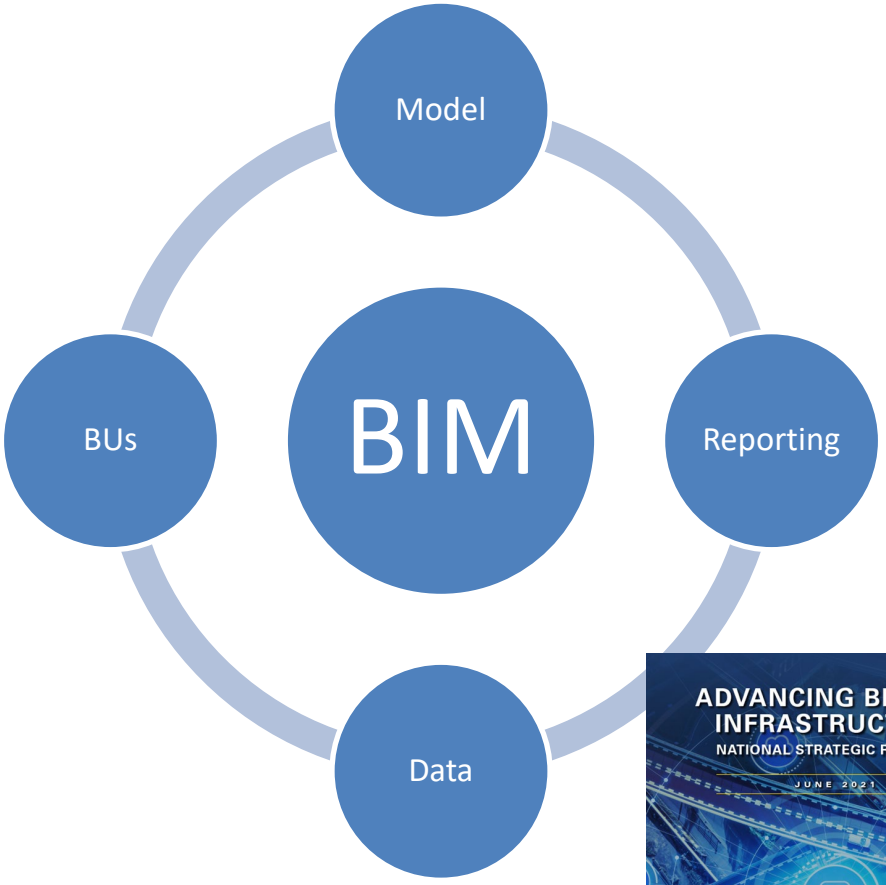
Manage

- Create networks to be used by the Statewide and Regional Models

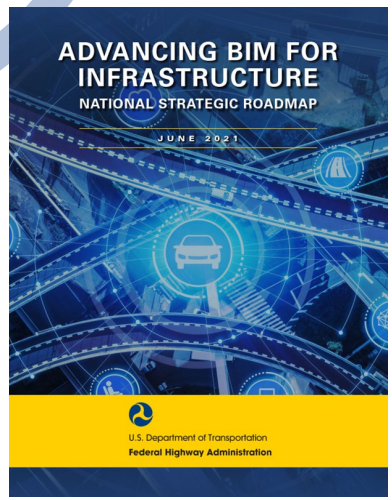
Centralize Network Database: Plan, Build and Manage

Network Model Life Cycles				
Plan	Network Needs			
	Geographic Resolution			
	Geographic Representation			
Build	Attribute Development	✓	✓	✓
	Geographic Coding			
	Modal Networks			
Manage	Project Coding			
	Scenario Development			
	Attribute Changes			

BIM – Connecting the Pieces

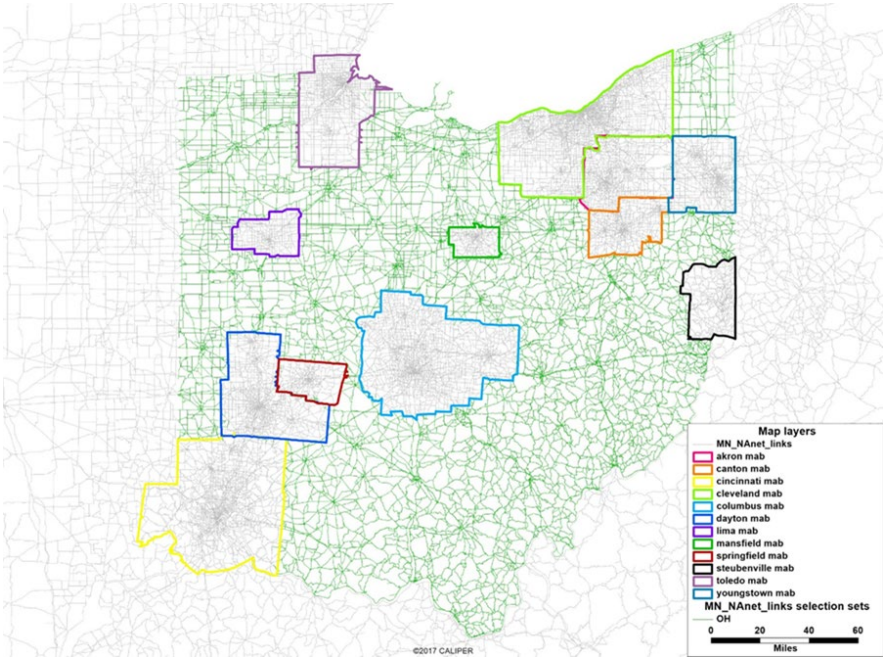


- Building Information Modeling (BIM)
  - Creating a linkage between Models and Stakeholders
  - Liberates data from siloed systems and makes it easier for automated processes to generate asset information and distribute it to anyone who needs it when they need it.



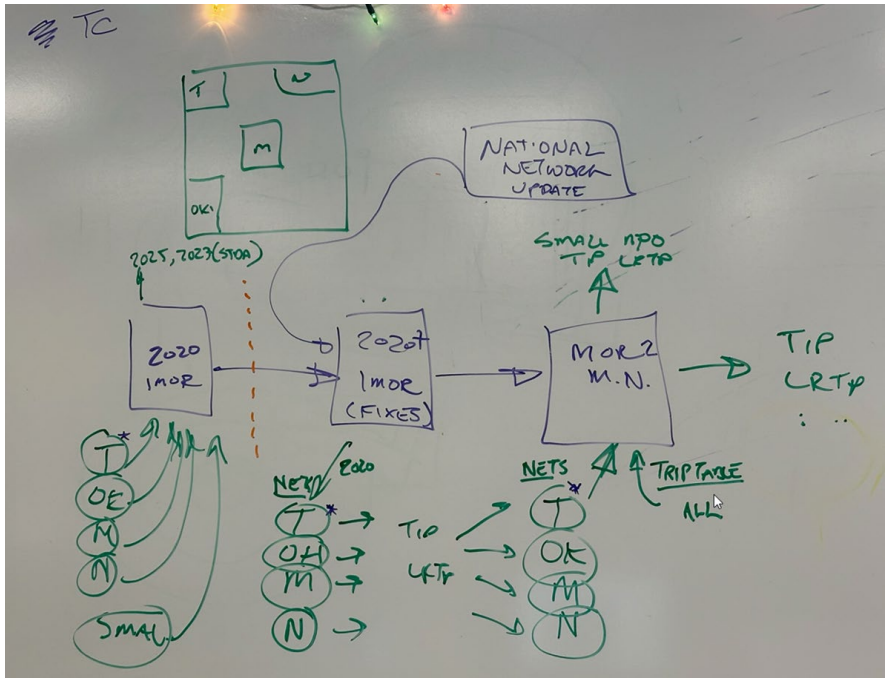
Ohio Statewide Network Database

- Considerations & Suitability
  - Staffing: MPOs have limited resources to support model maintenance
  - ODOT maintains a consistent network data dictionary across models (MPOs & SWM)
  - Centralized support of MPO models

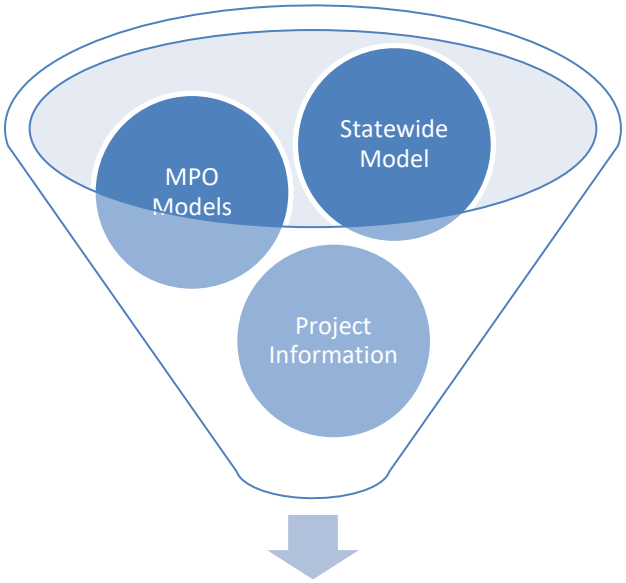


Ohio Statewide Network Database

- Decision: create a single network data model
- Need to 2020 base network
  - Incorporate latest MPO networks
  - Statewide Network
  - National Network
- Corrections / Updates / Consolidation
- Network Management Tools



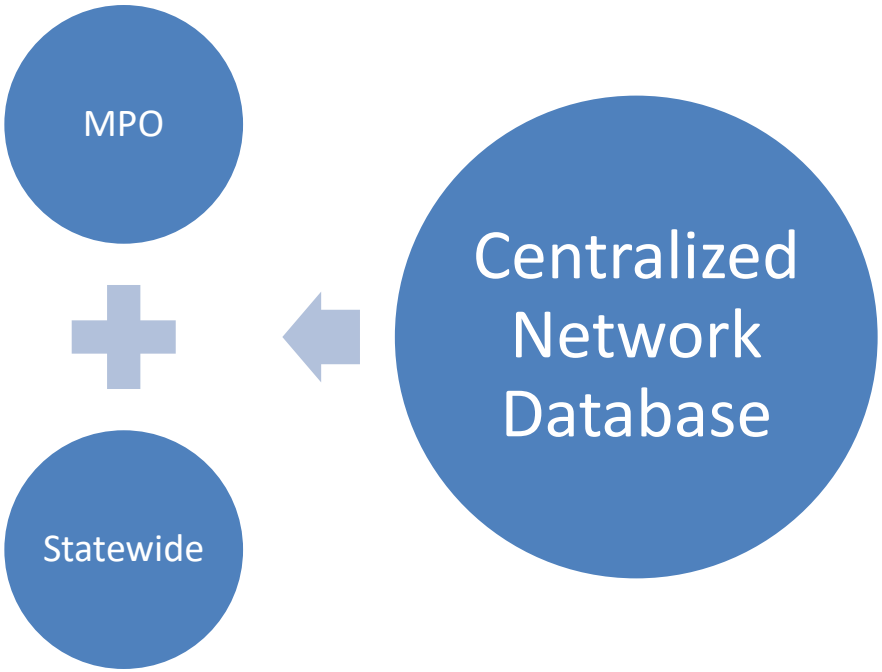
Centralized Network Database



Centralized Network Database

- Developed from best information at the time
  - MPO Networks
  - Statewide Model
  - Project Definitions
  - True Source of Attributes

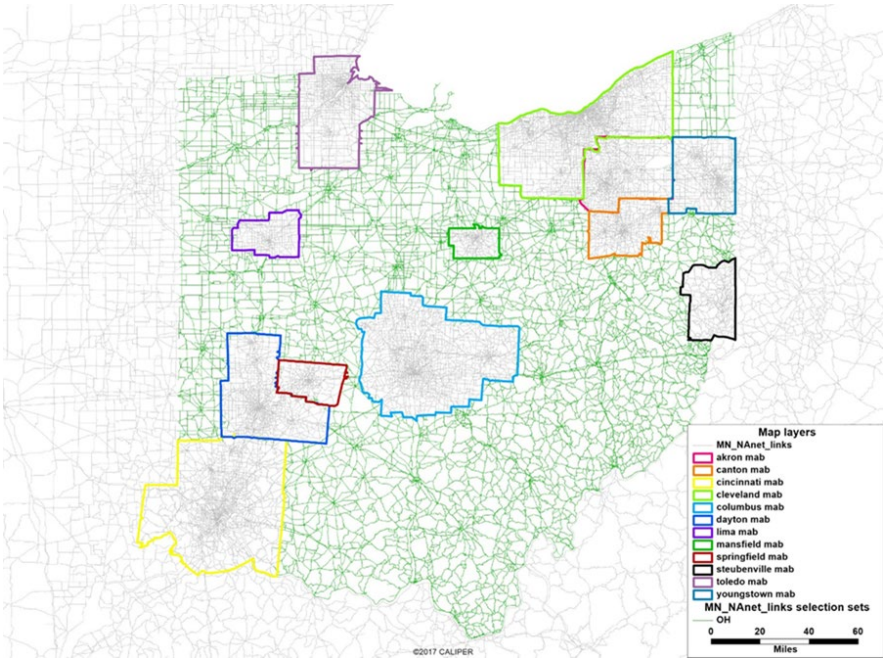
Centralized Network Database



- Create networks for all users
  - MPO networks
  - Statewide Model
  - Regional Models (Multiple Regions)
  - Multiresolution Networks
  - Multimodal

Ohio: Importance of MPO Networks

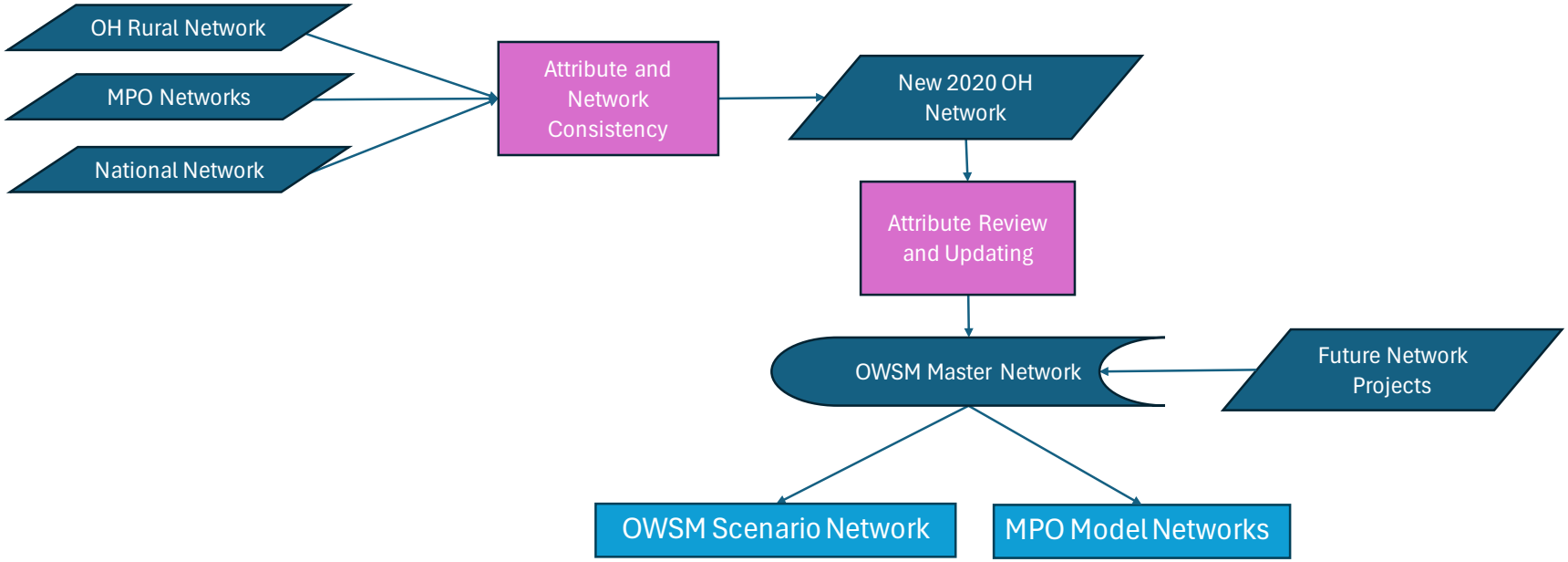
- Local knowledge
- Detail to support the MPO tools
  - Ohio Medium Small (OMS) Models
  - 3C Models
  - Traffic Forecasting



Ohio: Network Attributes

N	REQ	FILL REQD	AGENCY	USE	TOD override	OBJECT	FIELDNAME	FIELDNAME (TransCAD)	DTYPE	DESCRPTION	TRANSCAD Master	SWM	AMATS	BHJ	CCSTCC	EASTGT	ERPC	LACRPC	MORPC	MVRPC	NOACA	OKI	RCRPC	SCATS	TMACOG	Column1	Column2
1	Y	Y		CORE		LINK	A		num	A Node Number		X	X	X	X	X	X	X	X	X	X	X	X	X	X	
2	Y	Y		CORE		LINK	B		num	B Node Number		X	X	X	X	X	X	X	X	X	X	X	X	X	X	
3	Y	N		INFO		LINK	RTENAME		txt	Denotes the name of the roadway in the model	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
4	Y	N		INFO		LINK	RTENUMB		txt	Denotes the route number of the roadway	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
5	Y	Y		CORE		LINK	DIST	Length	num	Distance (miles to 4 decimal places)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
6	Y	Y		CORE		LINK	POSTSPD		num	Posted speed limit (mph)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
7	Y	Y		CORE	1	LINK	SPDMOD	AB/BA_SPDMOD	num	Positive or negative modification to the free flow speed (mph) for ALL vehicles - daily	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
8	Y	Y		CORE	2	LINK	SPDMOD_TK	AB/BA_SPDMTK	num	Positive or negative modification to the free flow speed (mph) for trucks - daily - This is applied in **ADDITION** to the spdmod field.	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
9	Y	Y		CORE		LINK	SCRN_PEN		num	Screen line penalty in minutes - only used in distribution	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
10	Y	Y		CORE		LINK	FACTYPE		num	Operational class or modified functional class 10 - Freeway 11 - Turnpike 20 - Expressway 30 - Ramp - note speed override of 35 mph 31 - Freeway to Freeway Ramp (optional) - uses postspd instead of 35 mph 32 - Exit Ramp (optional) 33 - Entrance Ramp (optional) 34 - Turnpike Toll Plaza (optional) 40 - Major Road (Arterial) 50 - Minor Road (Collector) 60 - Local 61 - Centroid Connector stub links needed for signals (optional) 62 - Other local road links treated like cent.conn. (optional) 65 - MPO Transit Access 70 - Centroid Connector 71 - External Connector (optional) 80 -Walk/TrailOperational class or modified functional class	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
11	Y	Y		CORE	3	LINK	LANES	AB/BA_LANES	num	Number of mid link through lanes (daily)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
12	Y	Y		CORE		LINK	WIDTH	AB/BA_WIDTH	num	Directional roadway width mid link	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
13	Y	Y		CORE		LINK	TURNLANE	AB/BA_TURNLANE	txt	Turn lanes, 2 possible formats: AB where A=exclusive left turn lanes, B=exclusive right turn lanes ABCDE where A=exclusive left, B=shared left-through, C=through For T Intersection, only use 2 digit-AB format. D=shared through-right, E=exclusive right Note that when using 5 digit format, PARKING is not subtracted from through lanes.	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	

Single Network Data Model



System Design Considerations

- Software Environment
  - User Experience of Staff
  - Native Understanding of Model Networks
  - GIS Environment
  - Custom Tool Development
  - Enterprise Environment

TransCAD
Transportation Planning Software

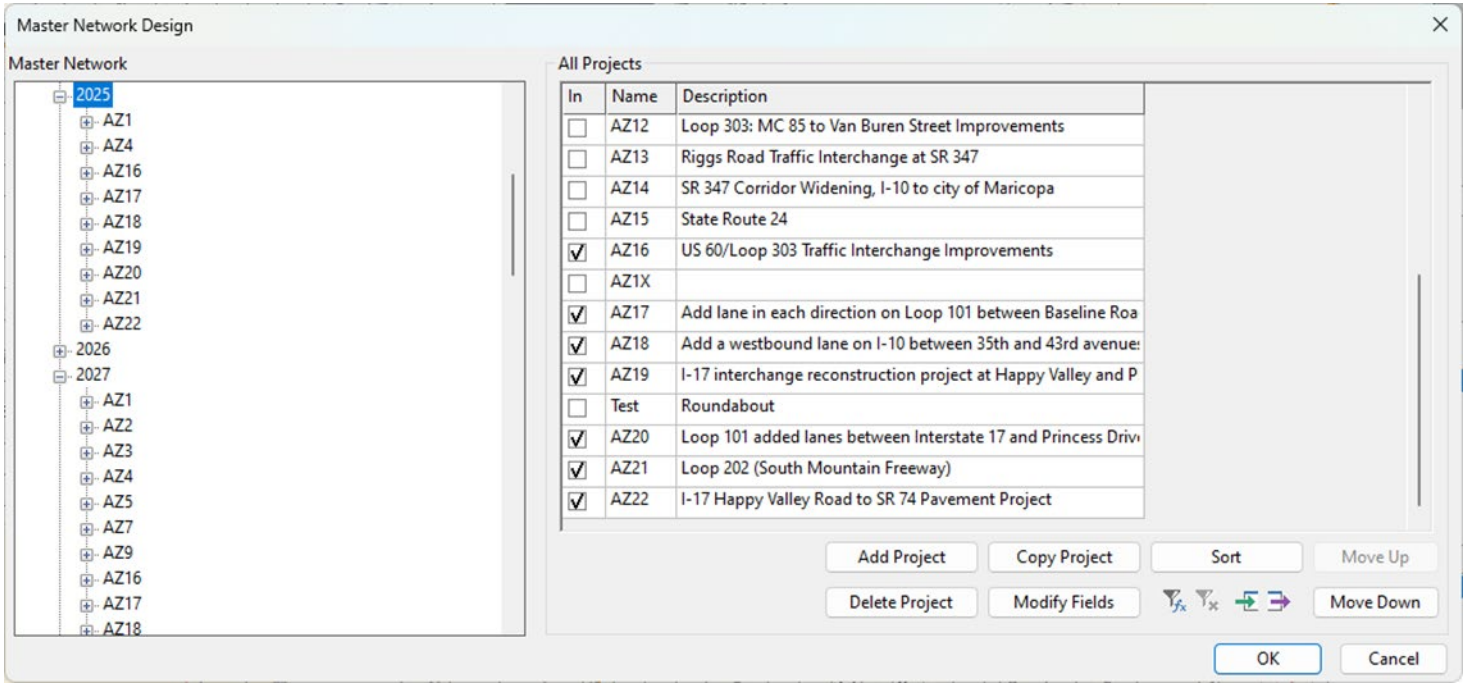
ArcGIS Pro

	Experience	Model Platform	GIS
TransCAD			
ArcGIS Pro			
OpenPaths			

WRA

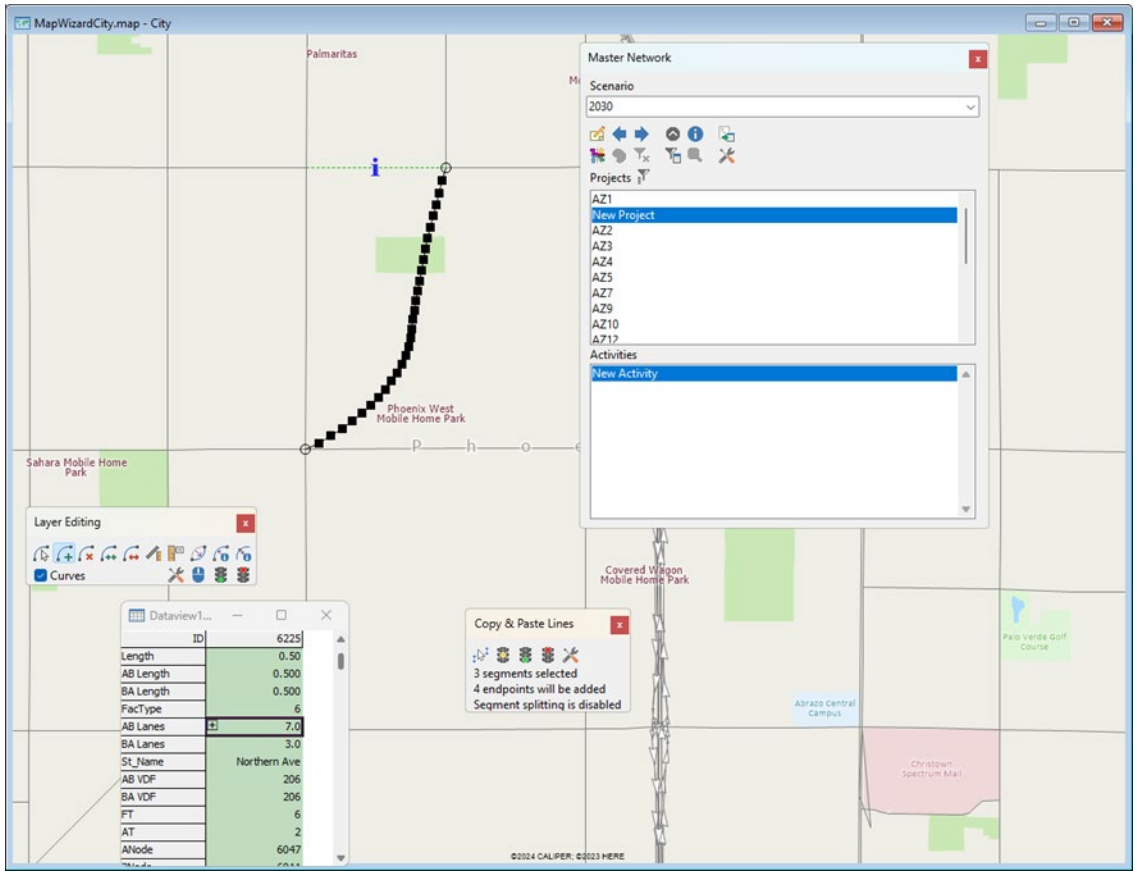
Design Manager

- Create or import scenarios and attach dates and times
- Create or import projects and descriptions and attach projects to scenarios



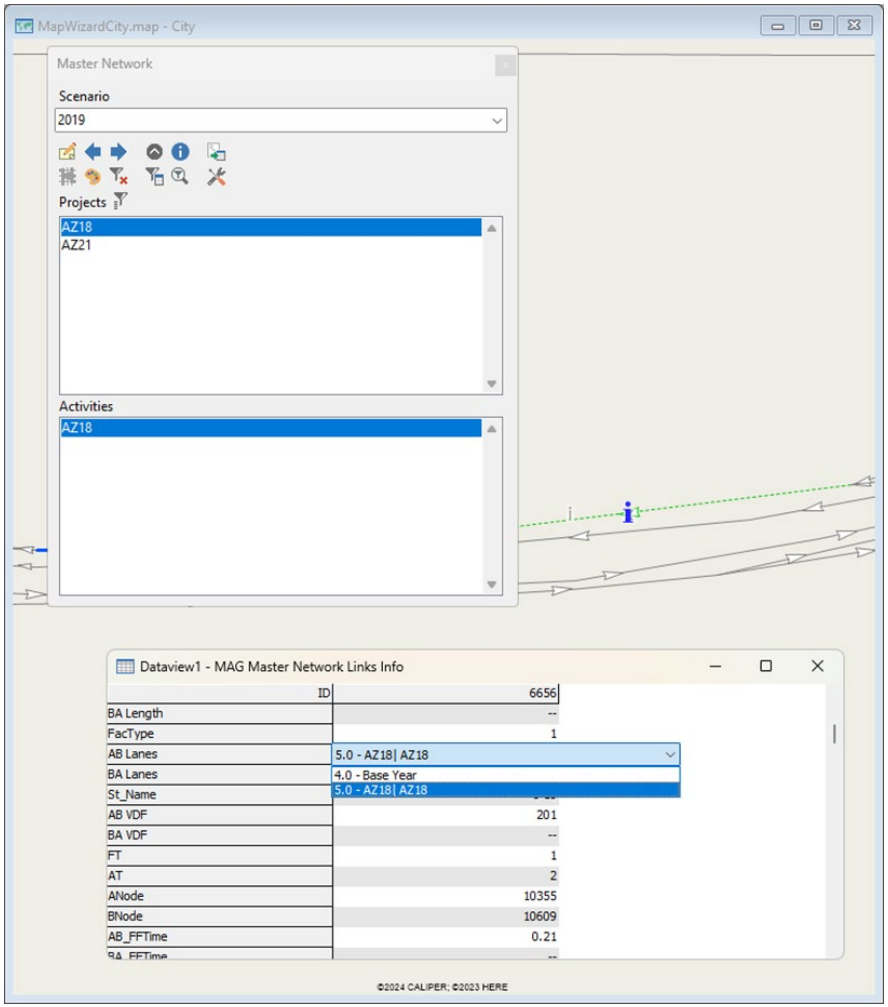
Editing

- Use regular TransCAD editing tools (line edit, copy/paste links, info) to perform master network edits



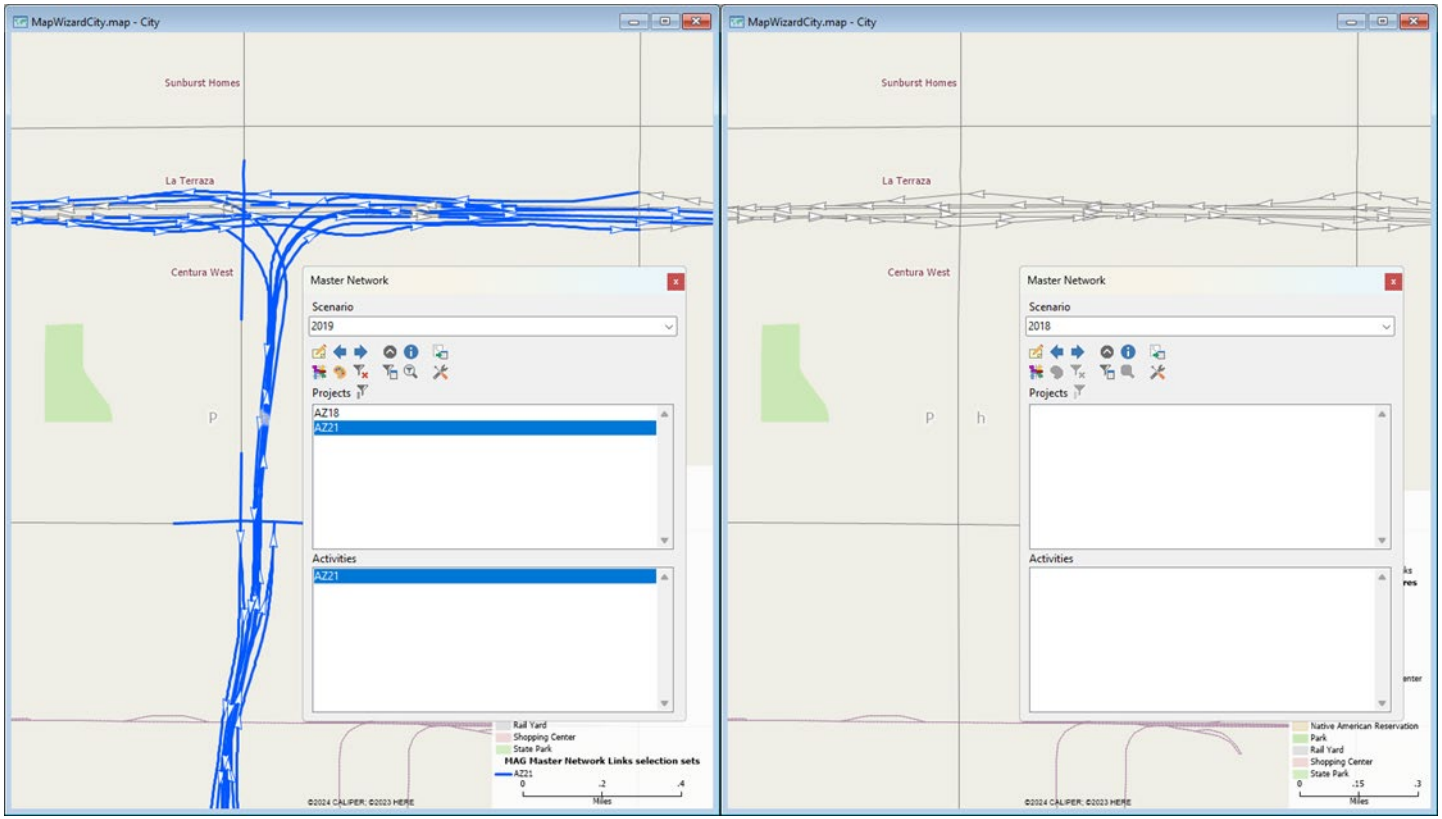
Attribute Change

- Attribute edits are stored within the project and are active only if the project is associated with a scenario.
- Tools show differences between project and non-project attributes



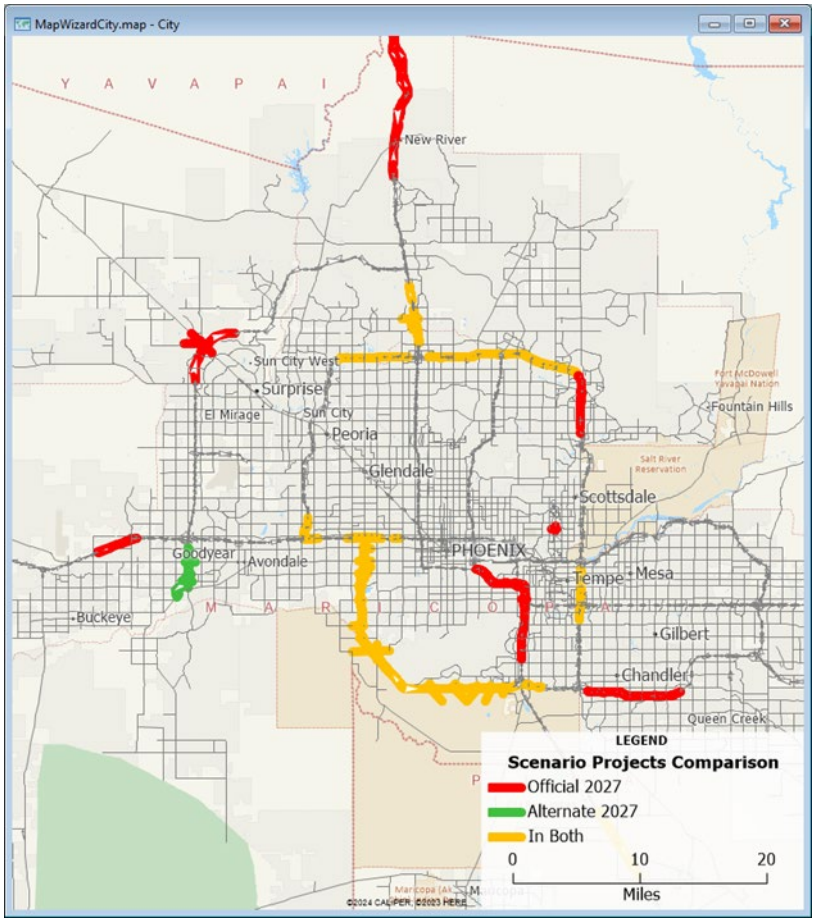
Geographic Edits

- Geographic edits are tied to the project and displayed only in scenarios that include the project

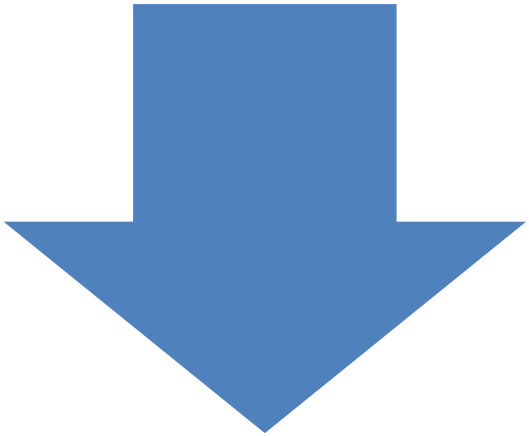


Utilities

- Display the differences between two scenarios

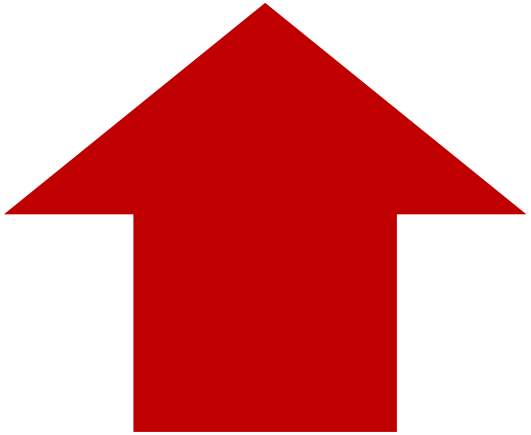


Conclusion



Benefits

Challenges



Benefits of a Centralized Network Database

- Cost: reduce costs in managing multiple versions of the same geography
- Accurate: rely upon consistent data source to establish truth in data
- Scalability: support of multiresolution modeling
- Project Coding: consistent representation of projects across jurisdictions
- Flexibility: able to support different attributes based on geography from single data source
- Staffing: able to support jurisdictions with minimal support
- Standardization: promote a standard network definition
- Prioritization: simplify coding of networks for project prioritization (consistent E+C)
- Accuracy: updates of attributes are applied universally
- Flexibility: able to support creating regional and multiregional models

Challenges of a Centralized Network Database

- User Needs: Meeting all user needs and use cases
- Ownership: Who will own the network
- Truth in Data: What will be the data sources defined as truth
- Attributes: Establishment of a consistent attribute scheme. Will everyone get on board?
- Software Solution: What software can be used to meet the specifications of a common editing environment
- Resolution: How manage different resolution of models (what links to include)
- Centroid Connectors: will connectors suit multiple model needs
- Validation Overrides: changes required to support validation are they appropriate to other uses
- Software: what if different agencies diverge in software
- Unknowns: ??

Questions?

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