JOINT FLORIDA
Model Task Force & Transportation
Data and Analytics Workshop

FTO FORECASTING & TRENDS OFFICE
FDOT TDA TRANSPORTATION DATA & ANALYTICS

Florida Statewide Model
Strategic Intermodal System

(FLSWM) – (SIS) Prioritization and Integration

FLSWM – SIS Prioritization and Integration

Support SIS Work Program Process

- Additional information for the SIS project ranking process
  - Measures of Effectiveness (MOE) Reporting
- Add travel demand estimates to SIS Work Program projects
  - Plots of Network Differences
  - Plots of Model Volumes
- Analyze project phasing
  - Definition of project phasing

FLSWM – SIS Prioritization and Integration - Data Sources

Data Sources:

- Florida Statewide Model Master Network (Cube format)
  - Network used for statewide traffic forecasts
  - TrueShape shapefile
- Strategic Intermodal System Plans and Project Shapefiles
  - Inventory of SIS facilities and future year plans
- Roadway Characteristics Inventory (RCI)
  - Maintained inventory of all State and Federal roadway Systems

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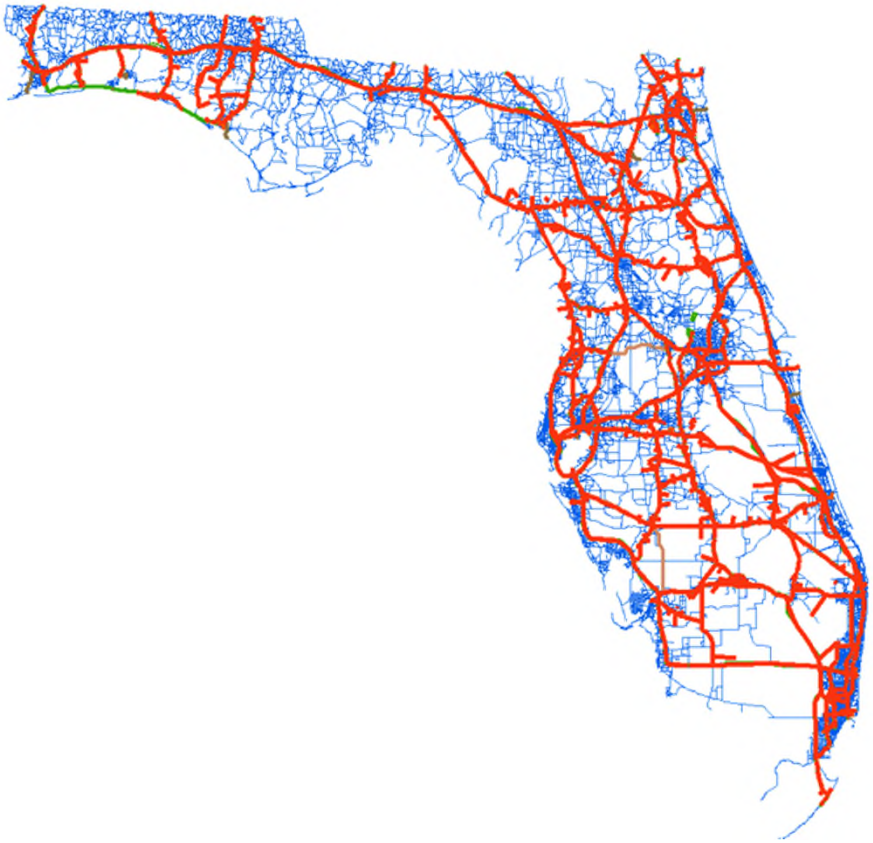
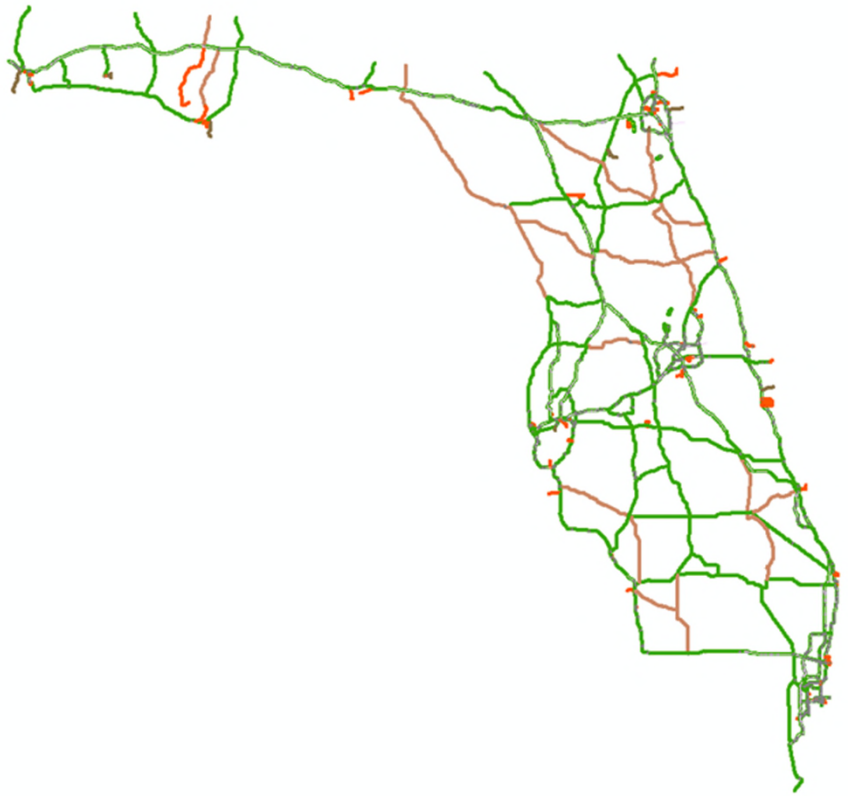
FLSWM – SIS Prioritization and Integration - Data Sources

- Florida Statewide Model Master Network
  - ~15,900 links in FLSWM with SIS / RCI reference
  - ~12,340 directional miles for SIS network represented



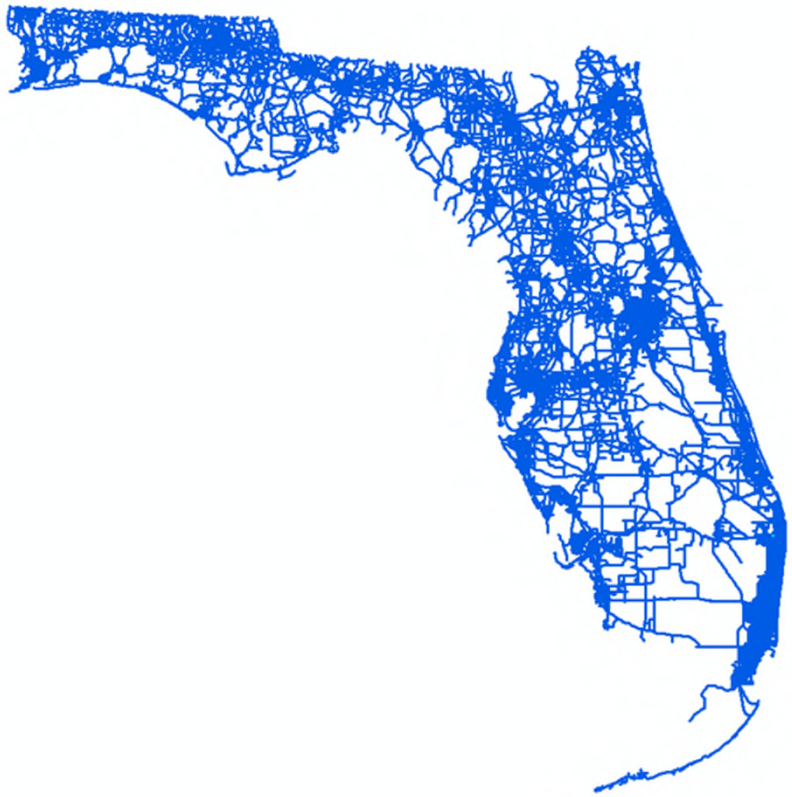
FLSWM – SIS Prioritization and Integration - Data Sources

- Strategic Intermodal System Shapefile
  - ~4,150 links with RCI reference
  - ~7,990 centerline miles identified as SIS facilities



FLSWM – SIS Prioritization and Integration - Data Sources

- Roadway Characteristics Inventory (RCI)
  - ~15,700 Roadway Segmental Routes with mile measurements
  - ~40,700 Centerline miles (except freeways and tollways with dual-lines represented)
  - ~7,820 Centerline miles identified in RCI as SIS facilities



FLSWM – SIS Prioritization and Integration

Methodology to Apply the FLSWM for SIS Work Program Analyses

- First Approach
  - Linking the RCI with FLSWM network links
    - Match the FLSWM network links to the RCI shapefile/database using the “Roadway ID”
    - Hard to verify all links and Route IDs
- Second Approach
  - Create a new FLSWM network from the RCI GIS/database files
    - Use existing data source for modeling purposes
    - Add additional minor roadways without attribution in RCI
    - Add/adjust centroids and connectors from existing FLSWM network

- RCI = data source is extensive and updated regularly

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FLSWM – SIS Prioritization and Integration

Role and Use of FLSWM

- Provide Performance Comparison of System Networks or Projects
  - Base year network
  - Base year and future year SE data
  - A list of SIS projects
- Performance Measures Based on Model Runs
  - Single project run
  - A group of projects run
- Analysis of Travel Characteristics and Modes
  - Identify modes other than highway if necessary (airport, seaport, military, industrial warehouse)

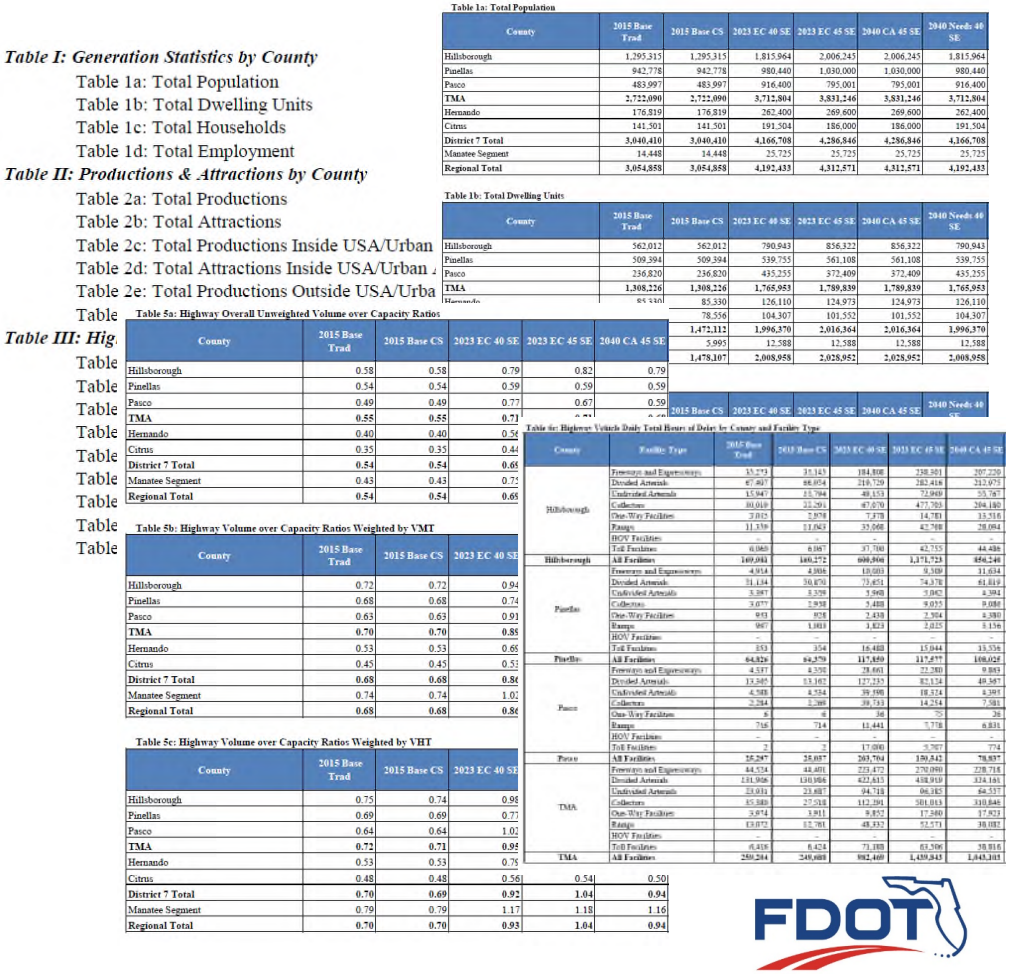

Table I: Generation Statistics by County
Table 1a: Total Population
Table 1b: Total Dwelling Units
Table 1c: Total Households
Table 1d: Total Employment
Table II: Productions & Attractions by County
Table 2a: Total Productions
Table 2b: Total Attractions
Table 2c: Total Productions Inside USA/Urban
Table 2d: Total Attractions Inside USA/Urban
Table 2e: Total Productions Outside USA/Urba
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Table 1a: Total Population

County	2015 Base Trad	2015 Base CS	2023 EC 40 SE	2023 EC 45 SE	2040 CA 45 SE	2040 Needs 40 SE
Hillsborough	1,295,315	1,295,315	1,815,964	2,006,245	2,006,245	1,815,964
Pinellas	942,778	942,778	980,440	1,030,000	1,030,000	980,440
Pasco	483,997	483,997	916,400	795,001	795,001	916,400
TMA	**2,722,090**	**2,722,090**	**3,712,804**	**3,831,246**	**3,831,246**	**3,712,804**
Hernando	176,819	176,819	262,400	269,600	269,600	262,400
Citrus	141,501	141,501	191,504	186,000	186,000	191,504
District 7 Total	**3,040,410**	**3,040,410**	**4,166,708**	**4,286,846**	**4,286,846**	**4,166,708**
Manatee Segment	14,448	14,448	25,725	25,725	25,725	25,725
Regional Total	**3,054,858**	**3,054,858**	**4,192,433**	**4,312,571**	**4,312,571**	**4,192,433**

Table 1b: Total Dwelling Units

County	2015 Base Trad	2015 Base CS	2023 EC 40 SE	2023 EC 45 SE	2040 CA 45 SE	2040 Needs 40 SE
Hillsborough	562,012	562,012	790,943	856,322	856,322	790,943
Pinellas	509,394	509,394	539,755	561,108	561,108	539,755
Pasco	236,820	236,820	435,255	372,409	372,409	435,255
TMA	**1,308,226**	**1,308,226**	**1,765,953**	**1,789,839**	**1,789,839**	**1,765,953**
		85,330	126,110	124,973	124,973	126,110
		78,556	104,307	101,552	101,552	104,307
		1,472,112	**1,996,370**	**2,016,364**	**2,016,364**	**1,996,370**
		5,995	12,588	12,588	12,588	12,588
		1,478,107	2,008,958	2,028,952	2,028,952	2,008,958

Table 5a: Highway Overall Unweighted Volume over Capacity Ratios

County	2015 Base Trad	2015 Base CS	2023 EC 40 SE	2023 EC 45 SE	2040 CA 45 SE
Hillsborough	0.58	0.58	0.79	0.82	0.79
Pinellas	0.54	0.54	0.59	0.59	0.59
Pasco	0.49	0.49	0.77	0.67	0.59
TMA	**0.55**	**0.55**	**0.71**		
Hernando	0.40	0.40	0.56		
Citrus	0.35	0.35	0.44		
District 7 Total	**0.54**	**0.54**	**0.65**		
Manatee Segment	0.43	0.43	0.75		
Regional Total	**0.54**	**0.54**	**0.65**		

Table 5b: Highway Volume over Capacity Ratios Weighted by VMT

County	2015 Base Trad	2015 Base CS	2023 EC 40 SE
Hillsborough	0.72	0.72	0.94
Pinellas	0.68	0.68	0.74
Pasco	0.63	0.63	0.91
TMA	**0.70**	**0.70**	**0.85**
Hernando	0.53	0.53	0.65
Citrus	0.45	0.45	0.53
District 7 Total	**0.68**	**0.68**	**0.86**
Manatee Segment	0.74	0.74	1.02
Regional Total	**0.68**	**0.68**	**0.86**

Table 5c: Highway Volume over Capacity Ratios Weighted by VHT

County	2015 Base Trad	2015 Base CS	2023 EC 40 SE		
Hillsborough	0.75	0.74	0.98		
Pinellas	0.69	0.69	0.77		
Pasco	0.64	0.64	1.02		
TMA	**0.72**	**0.71**	**0.95**		
Hernando	0.53	0.53	0.75		
Citrus	0.48	0.48	0.56	0.54	0.50
District 7 Total	**0.70**	**0.69**	**0.92**	**1.04**	**0.94**
Manatee Segment	0.79	0.79	1.17	1.18	1.16
Regional Total	**0.70**	**0.70**	**0.93**	**1.04**	**0.94**

Table 5c: Highway Vehicle Daily Total Hours of Delay by County and Facility Type

County	Facility Type	2015 Base Trad	2015 Base CS	2023 EC 40 SE	2023 EC 45 SE	2040 CA 45 SE
Hillsborough	Freeways and Expressways	35,273	35,143	184,808	238,501	207,220
	Divided Arterials	67,497	66,054	219,729	282,418	212,975
	Undivided Arterials	15,947	15,794	48,153	72,949	55,787
	Collectors	80,019	22,291	67,070	477,703	204,180
	One-Way Facilities	2,025	2,974	7,378	14,781	13,516
	Ramps	11,339	11,043	35,068	42,708	28,084
	HOV Facilities	–	–	–	–	–
	Toll Facilities	6,065	6,067	37,700	42,755	44,486
Hillsborough	**All Facilities**	**169,081**	**160,272**	**600,906**	**1,171,723**	**856,246**
Pinellas	Freeways and Expressways	4,914	4,906	18,083	9,309	11,634
	Divided Arterials	31,134	30,870	73,451	74,378	61,819
	Undivided Arterials	3,387	3,379	5,968	5,042	4,394
	Collectors	3,077	2,938	5,488	9,055	9,088
	One-Way Facilities	913	908	2,438	2,504	2,380
	Ramps	987	1,003	1,823	2,025	5,176
	HOV Facilities	–	–	–	–	–
	Toll Facilities	353	354	16,488	15,044	13,556
Pinellas	**All Facilities**	**64,826**	**64,370**	**117,459**	**117,477**	**108,026**
Pasco	Freeways and Expressways	4,577	4,570	28,661	22,780	9,893
	Divided Arterials	13,505	13,167	127,233	82,174	49,567
	Undivided Arterials	4,588	4,554	39,598	18,324	8,395
	Collectors	2,284	2,289	39,733	14,254	7,581
	One-Way Facilities	8	8	36	75	26
	Ramps	716	714	11,441	7,778	6,831
	HOV Facilities	–	–	–	–	–
	Toll Facilities	2	2	17,080	5,707	774
Pasco	**All Facilities**	**25,287**	**25,037**	**263,764**	**150,842**	**78,837**
TMA	Freeways and Expressways	44,524	44,401	223,472	270,090	228,718
	Divided Arterials	131,926	130,956	422,833	438,910	324,181
	Undivided Arterials	23,031	23,087	94,718	96,185	64,537
	Collectors	85,380	27,918	112,291	501,013	310,846
	One-Way Facilities	3,074	3,911	9,857	17,340	17,923
	Ramps	13,072	12,781	48,332	52,571	38,082
	HOV Facilities	–	–	–	–	–
	Toll Facilities	6,418	6,424	73,188	63,506	38,816
TMA	**All Facilities**	**260,284**	**249,088**	**982,460**	**1,439,843**	**1,043,103**

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FLSWM – SIS Prioritization and Integration - Next Steps

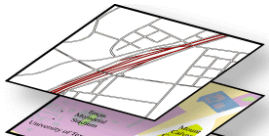
Create an automated process to develop an SIS network from RCI information

- Accuracy and consistency
  - Networks and shapes
  - Roadway characteristics and features
  - Data sources

Automate Network Creation

RCI Conversion Synopsis

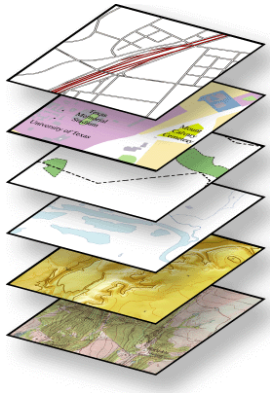
RCI GIS Layers



RCI Routes

RCI Basemap Arcs

RCI Data Layers



RCI Routes

SIS References

Functional Class

Number of Lanes

Speed

Road Type

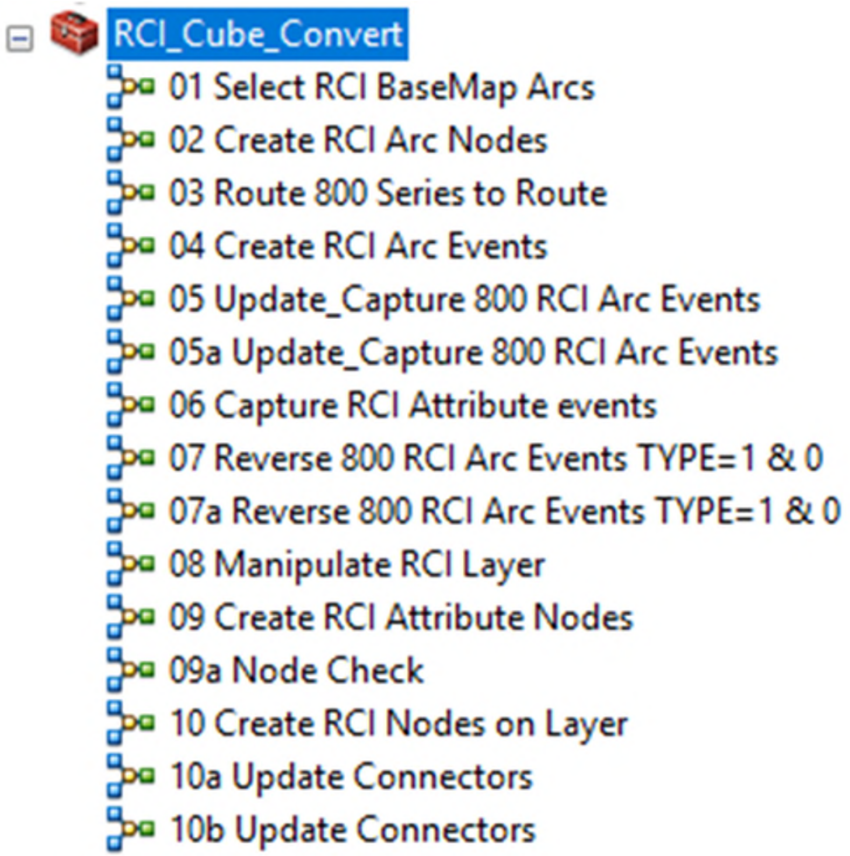
Prod	Pats	Days	aND	aOT	aPD	aPH	aSP	aSW	cDrug
A06Z	16	533	271	474		1,994	283	209	12,837
C08Z	38	38							81
D11Z	26	29							358
D13Z	21	21							2
D40Z	134	144				3		36	690
D67Z	21	41	4	29		12	12	9	637
E02C	27	43	1			3			100
F06A	30	240		115		662		18	1,247
F15Z	39	87		6		23		5	2,071
F42B	43	91	2						409
F74Z	72	110	23	11		48		16	1,516
G07B	22	60				9		5	74
G08Z	23	48	13			66		42	409
G09Z	26	38				7			70
G44C	168	168							70
G45B	179	179				5			84
G67B	64	142	6	55		44	18	9	1,858
H04B	27	47				25			228
I13C	29	118	3	78		208		12	213
I18Z	30	57	42	18		73		7	180
I23Z	17	25				11		2	7
I26Z	47	71				33		17	1,965
I69C	10	15		5		2			13,770
J11Z	51	194		79		127		26	193

Consolidated Layers

Roadway and Node Layers

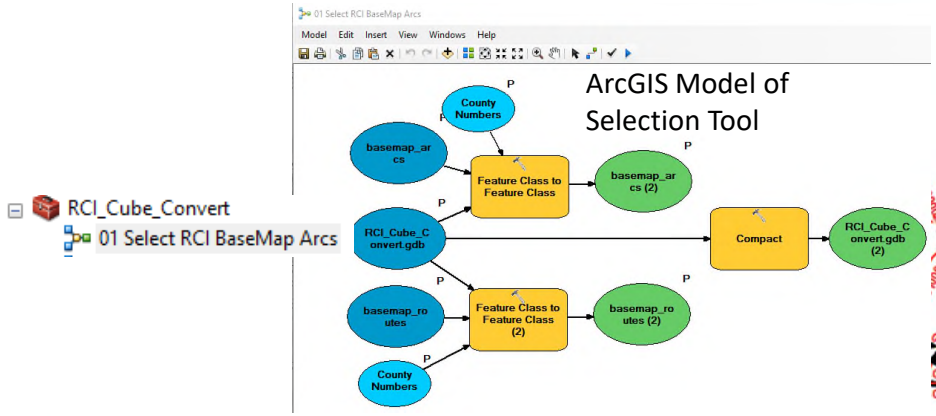
RCI Base Map Automation to CUBE Tools

- Tools to convert RCI attribute layers to a combined GIS layer ready to use as a Cube Network

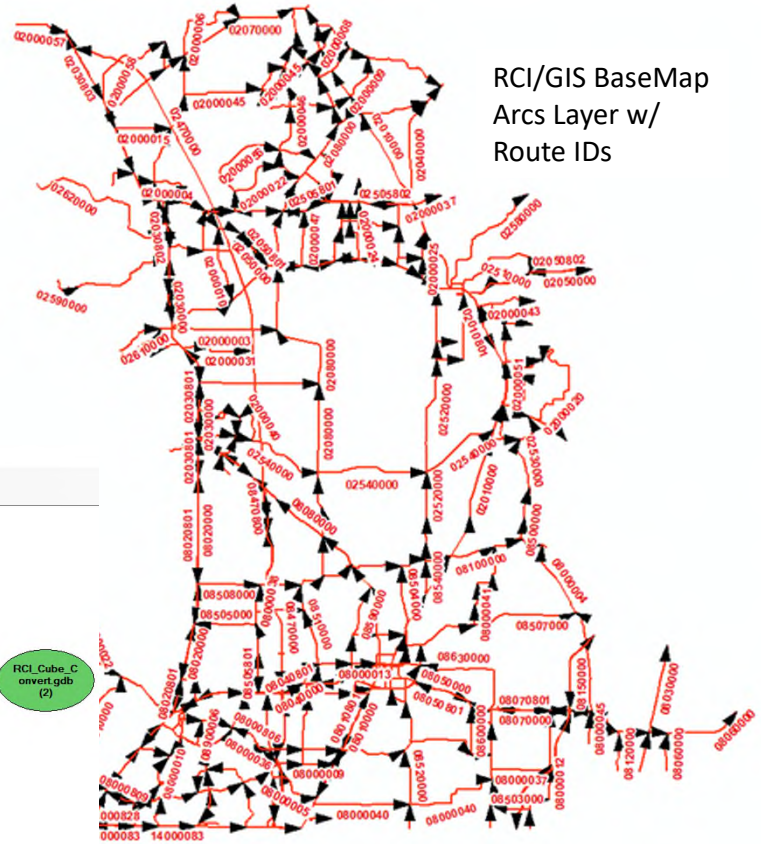


RCI Base Map Automation to CUBE Tools

- Proof of Concept demo, sub-select RCI Basemap Routes and Arcs
  - Tool could be used to select any sub-selection of counties within the State (e.g. Districts by County)
  - For Demo, Hernando & Citrus Counties were selected



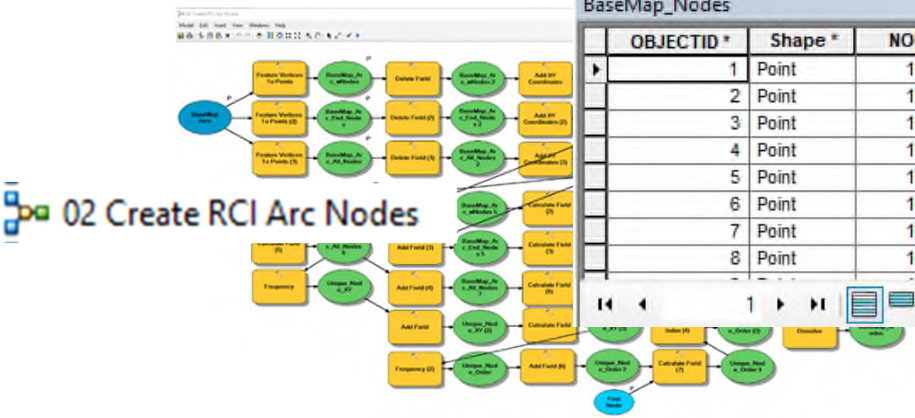
ArcGIS Model of Selection Tool



RCI/GIS BaseMap Arcs Layer w/ Route IDs

RCI Base Map Automation to CUBE Tools

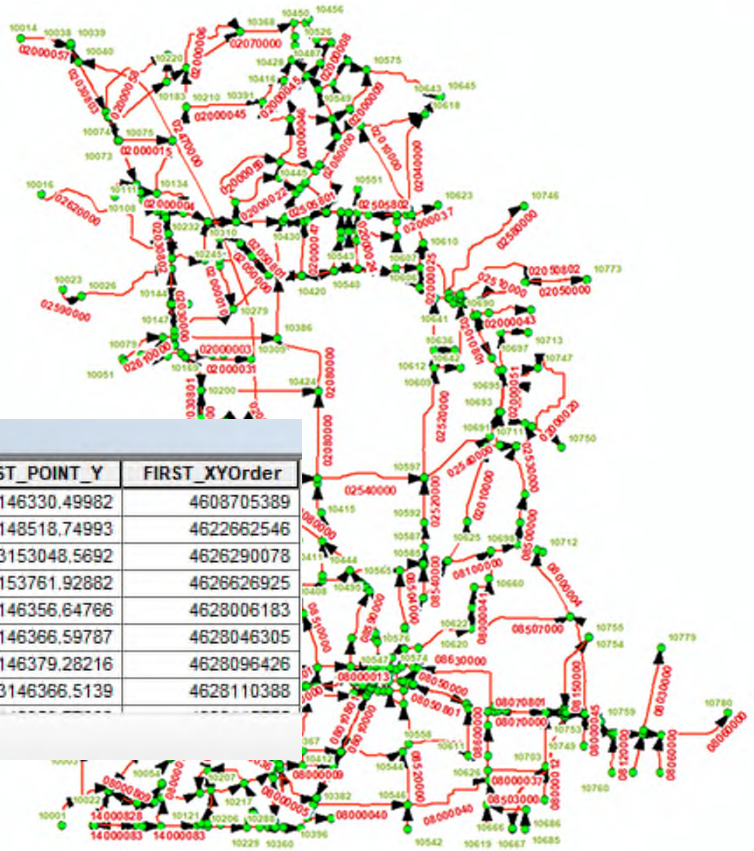
- Tool developed to create node features for Basemap Arcs
  - Redundant nodes are removed
- Preserves RCI Basemap intersections and points of connectivity



BaseMap_Nodes

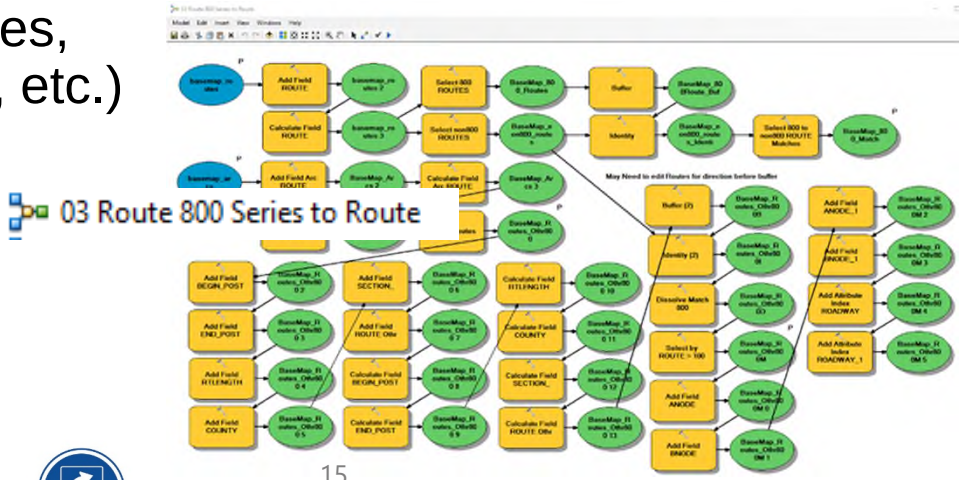
OBJECTID *	Shape *	NODE	FIRST_POINT_X	FIRST_POINT_Y	FIRST_XYOrder
1	Point	10001	336760.59376	3146330.49982	4608705389
2	Point	10002	338464.74993	3148518.74993	4622662546
3	Point	10003	338538.69207	3153048.5692	4626290078
4	Point	10004	338518.27722	3153761.92882	4626626925
5	Point	10005	339394.7713	3146356.64766	4628006183
6	Point	10006	339399.31991	3146366.59787	4628046305
7	Point	10007	339404.97853	3146379.28216	4628096426
8	Point	10008	339408.06589	3146366.5139	4628110388

1 (0 out of 780 Selected)

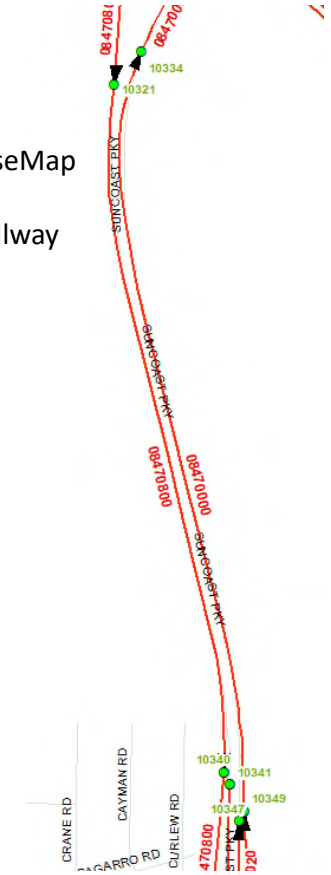


RCI Base Map Automation to CUBE Tools

- RCI attribute layers are oriented and stored in a Centerline format
- Tool developed to analyze RCI / GIS routes layer relationships to process divided roadways and reverse Arc connections based on traffic flow (e.g. interstates, tollways, major arterials, etc.)



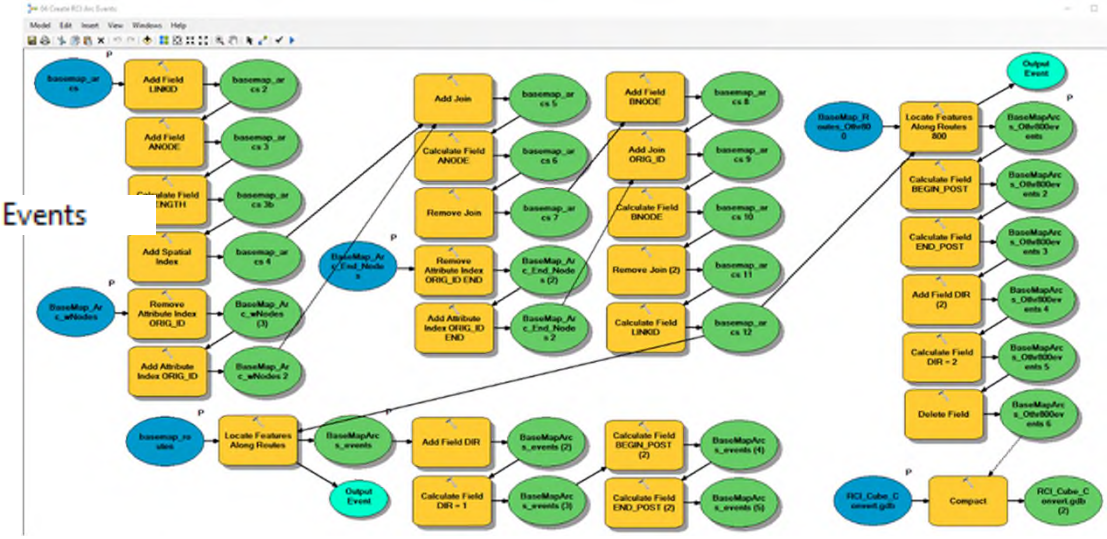
RCI GIS BaseMap Arcs Layer Divided Tollway example



RCI Base Map Automation to CUBE Tools

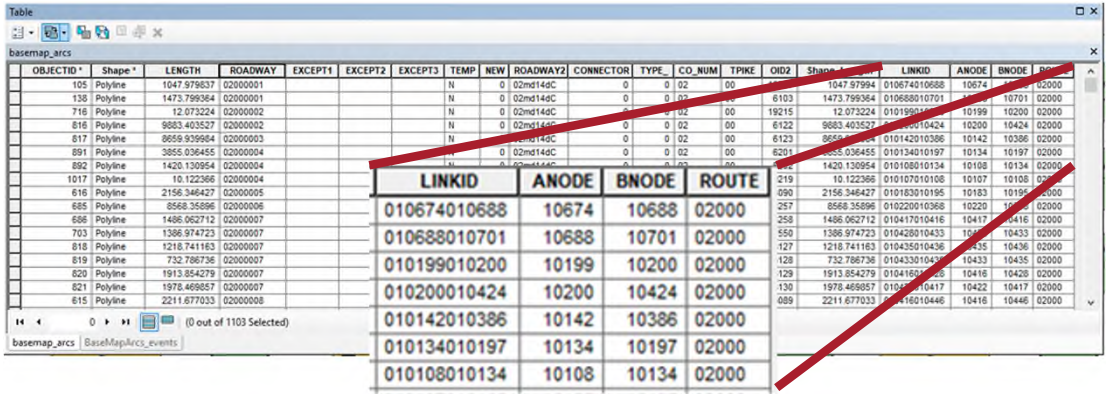
- Tool developed to add unique node pairs (ANODE - BNODE) references to the BaseMap Arcs
- Tool also creates an RCI based events table for the Arcs layer

04 Create RCI Arc Events

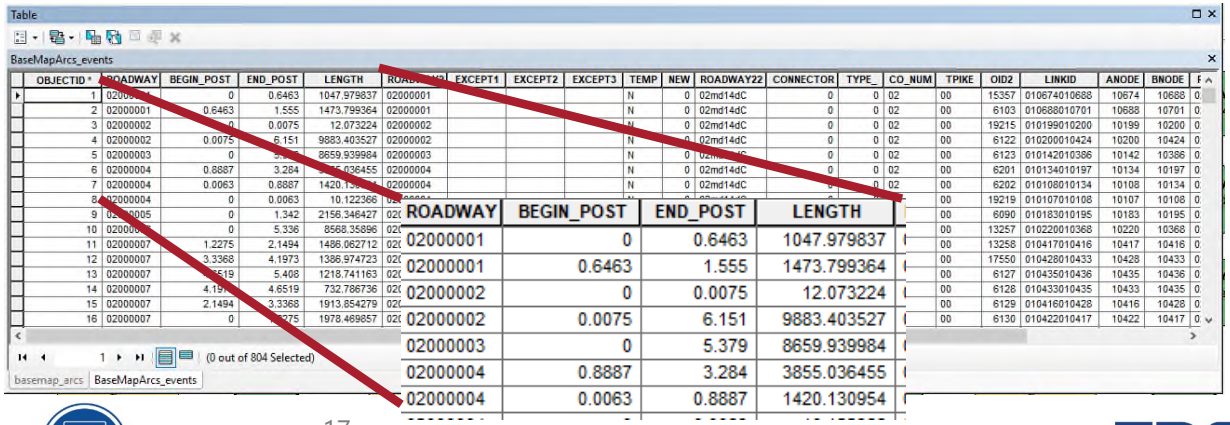


RCI Base Map Automation to CUBE Tools

- Basemap Arcs with unique node (ANODE - BNODE) pairs added

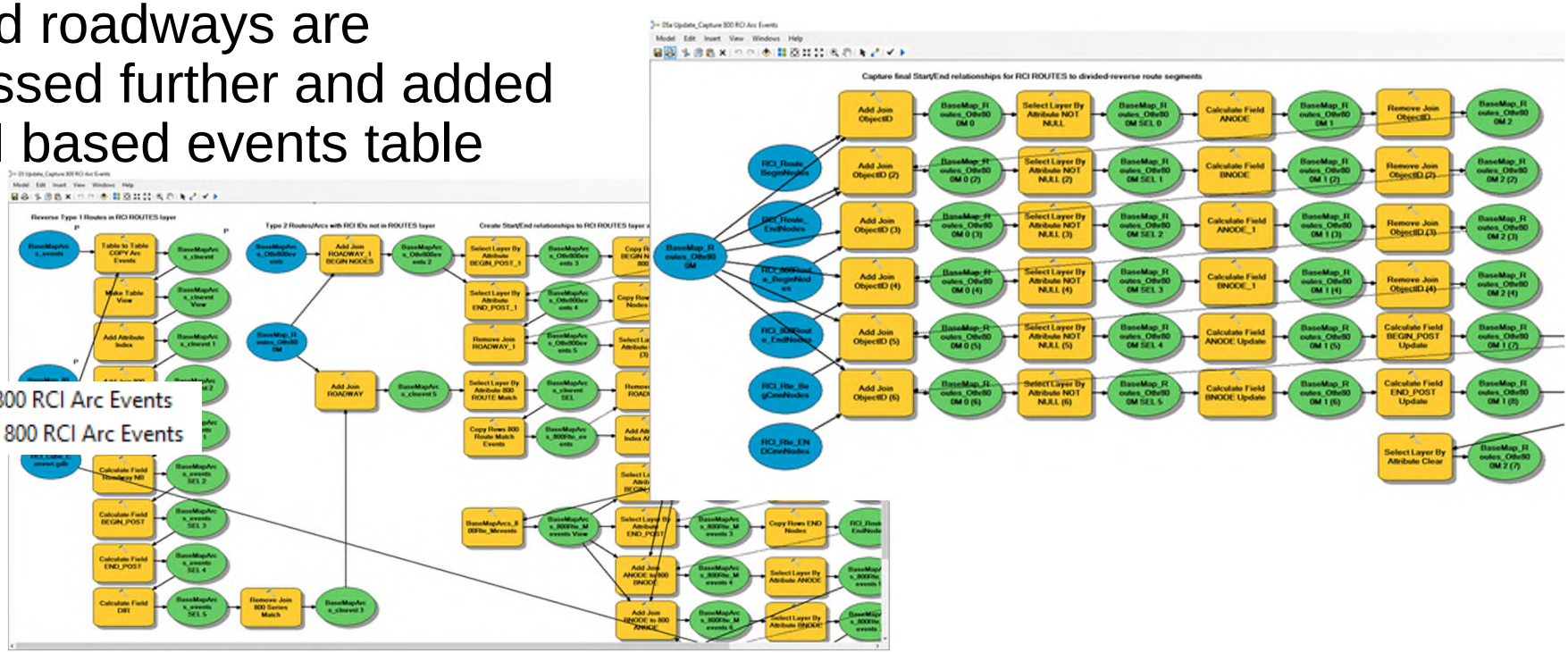


- New Events Table of ARCs layer with RCI linear reference



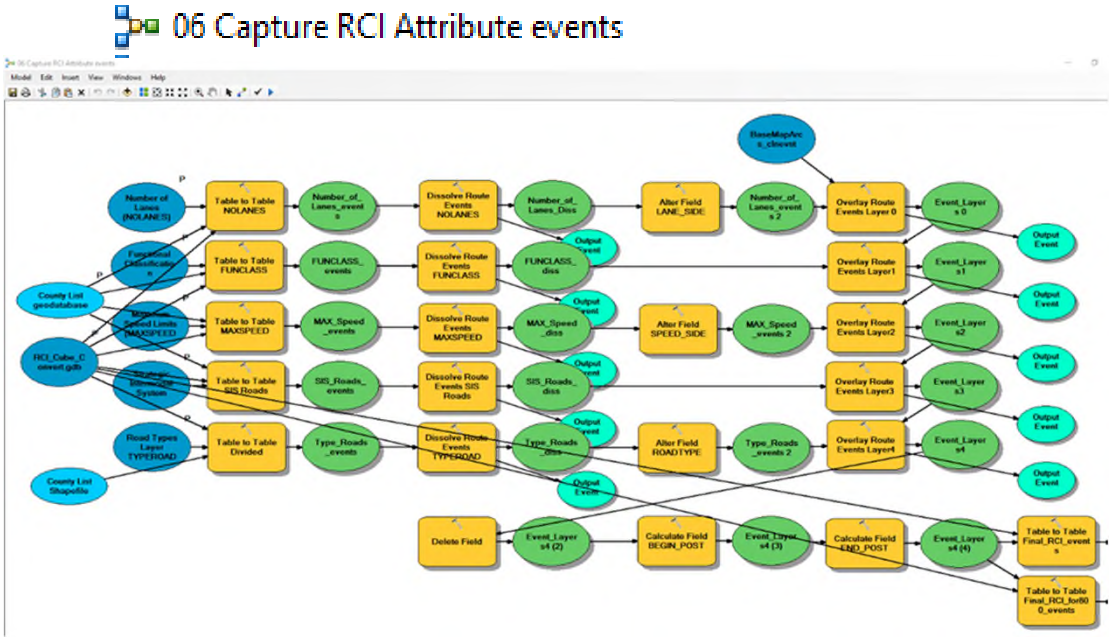
RCI Base Map Automation to CUBE Tools

- Arcs for reverse traffic flow of divided roadways are processed further and added to RCI based events table



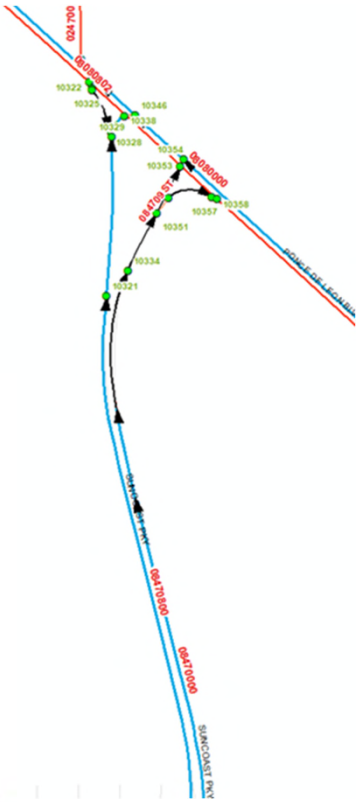
RCI Base Map Automation to CUBE Tools

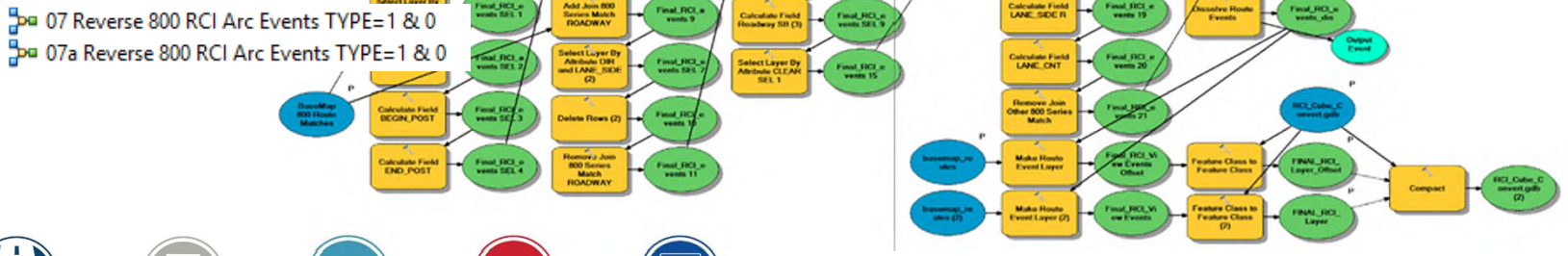
- For demo, five RCI-layer attribute events tables were chosen (SIS, Functional Classification, Number of Lanes, Max Speed, and Road Type)
  - More RCI Events Tables will be selected for modeling needs
- Tool was developed to merge the RCI layer events tables with the Arcs events table into a single master events table of Arcs, Nodes, and RCI attributes



RCI Base Map Automation to CUBE Tools

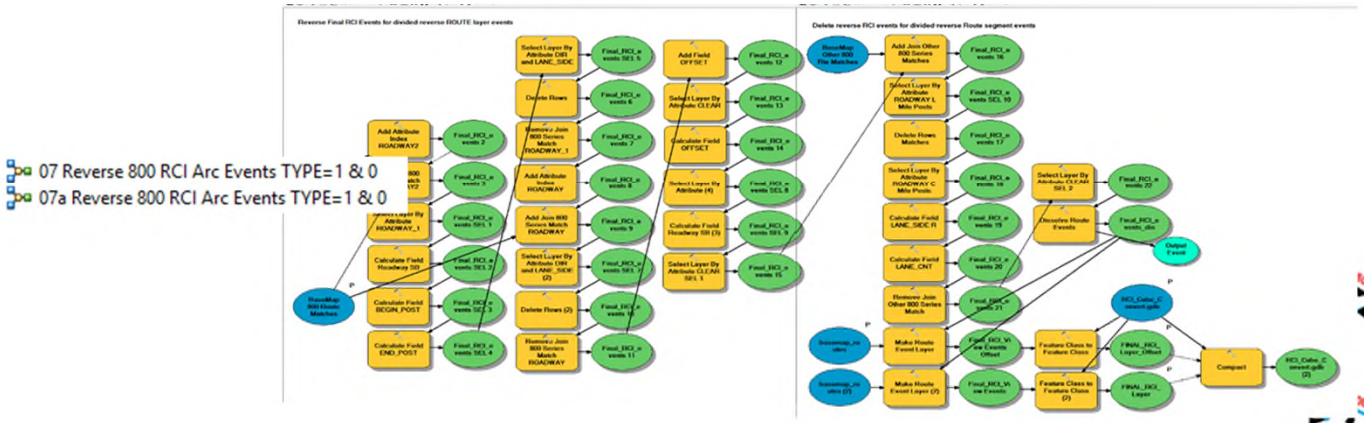
- Tool developed to process reverse traffic-flow attributes into RCI "800" routes to represent opposite-side divided roadway features (e.g. interstates, tollways, major divided arterials, etc.)
  - RCI uses side attribute types L, R & C for distinction of side-of-road
  - L-Left, R-Right, and C-Composite values





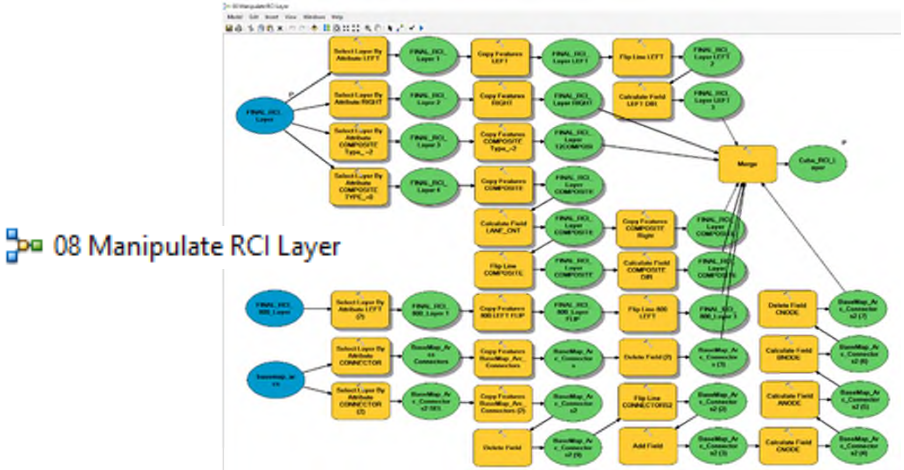
RCI Base Map Automation to CUBE Tools

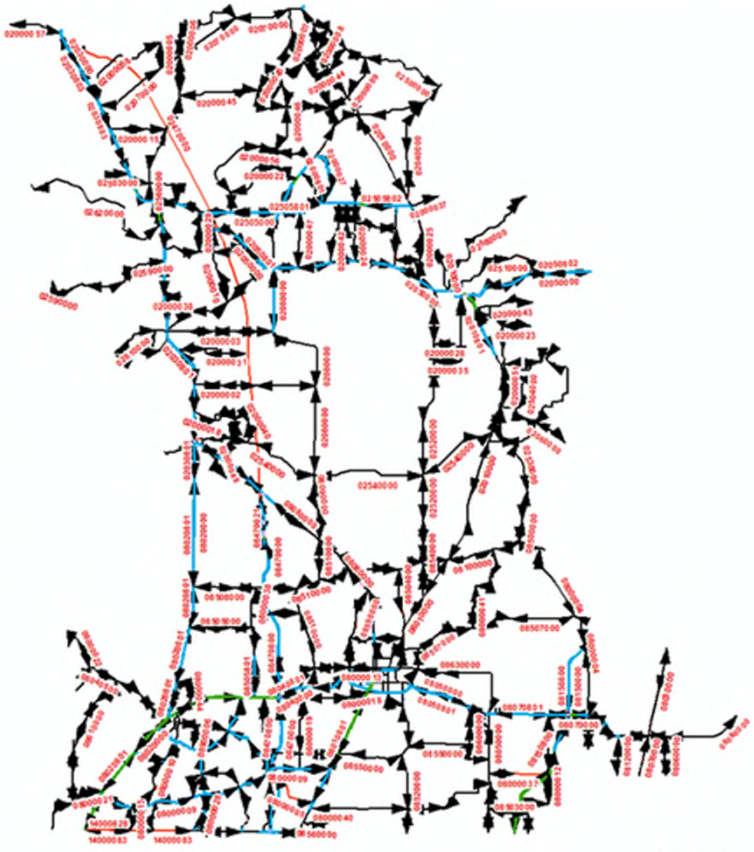
- Tool also applies the changes to a combined Events Table for RCI routes



RCI Base Map Automation to CUBE Tools

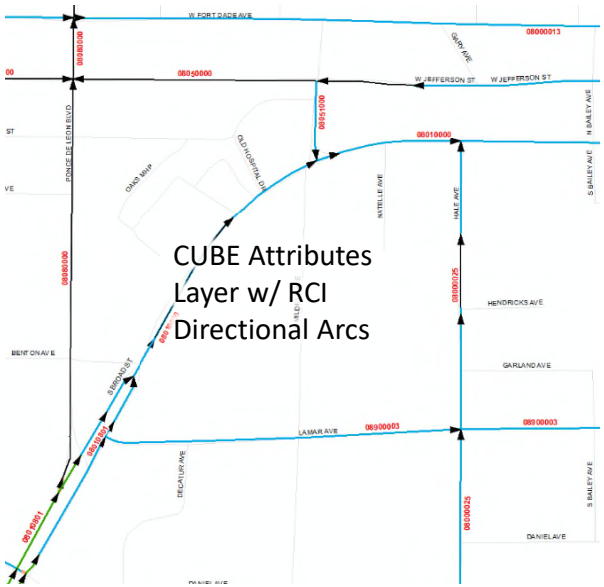
- Tool developed to make graphic adjustments for CUBE
  - Change C-Composite link information to directional
  - Adjust CUBE links directionality
  - Add in GIS based network connectors

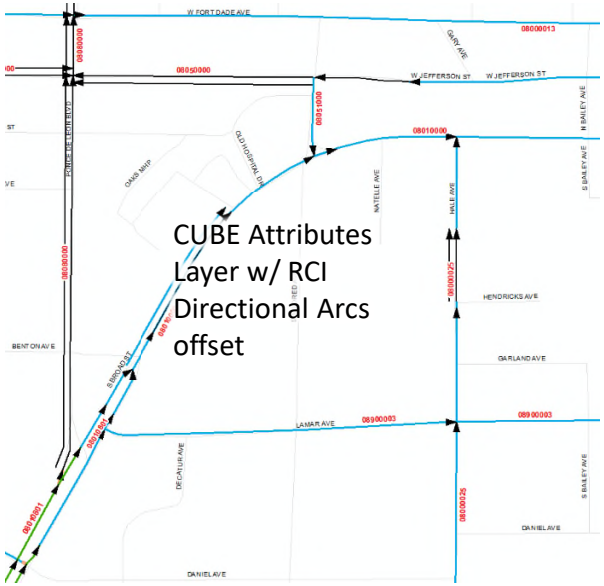


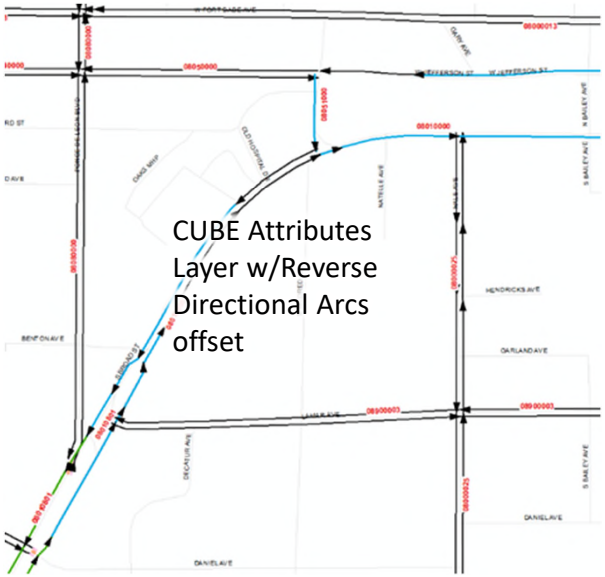


RCI Base Map Automation to CUBE Tools

- Change C-Composite link information to directional
- Adjust Arcs directionality

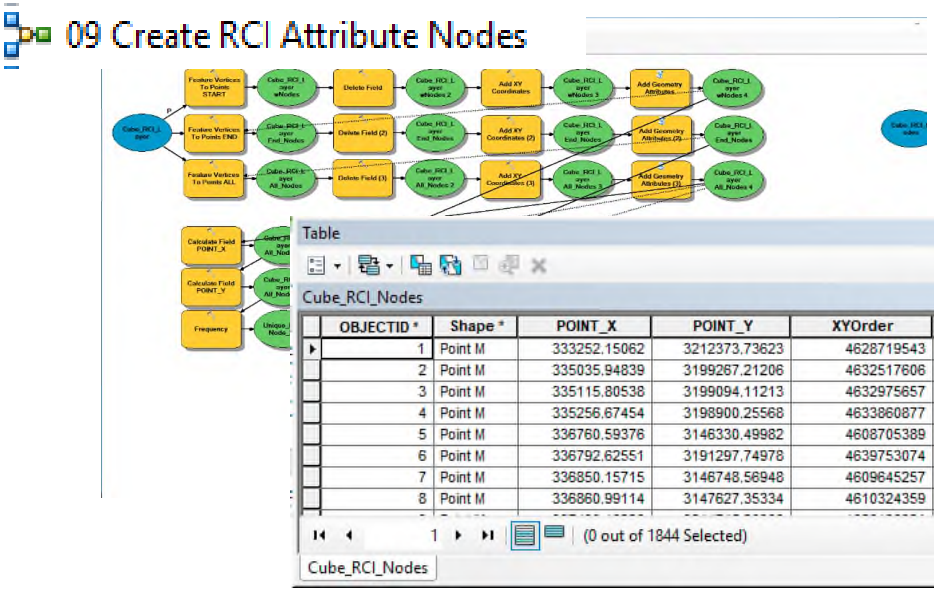


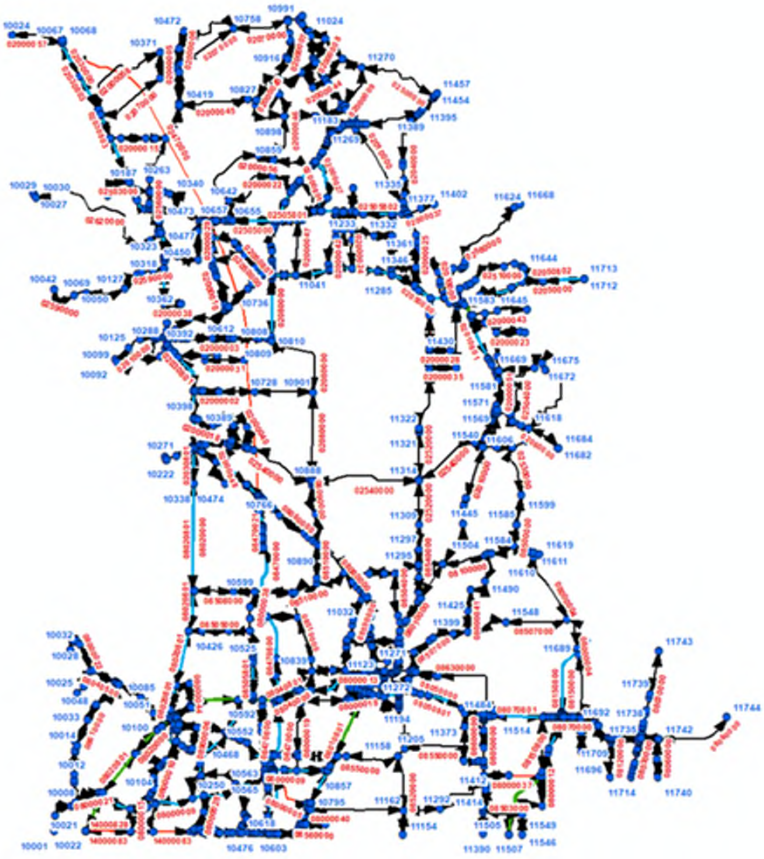




RCI Base Map Automation to CUBE Tools

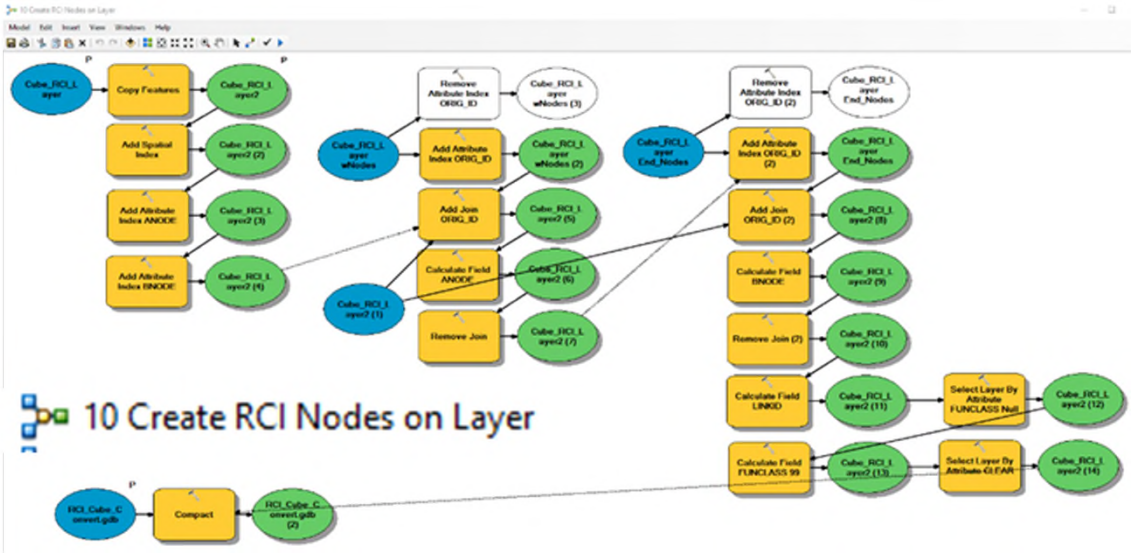
- Tool developed to create a new node structure / nodes layer for the new Arcs with the RCI attributes

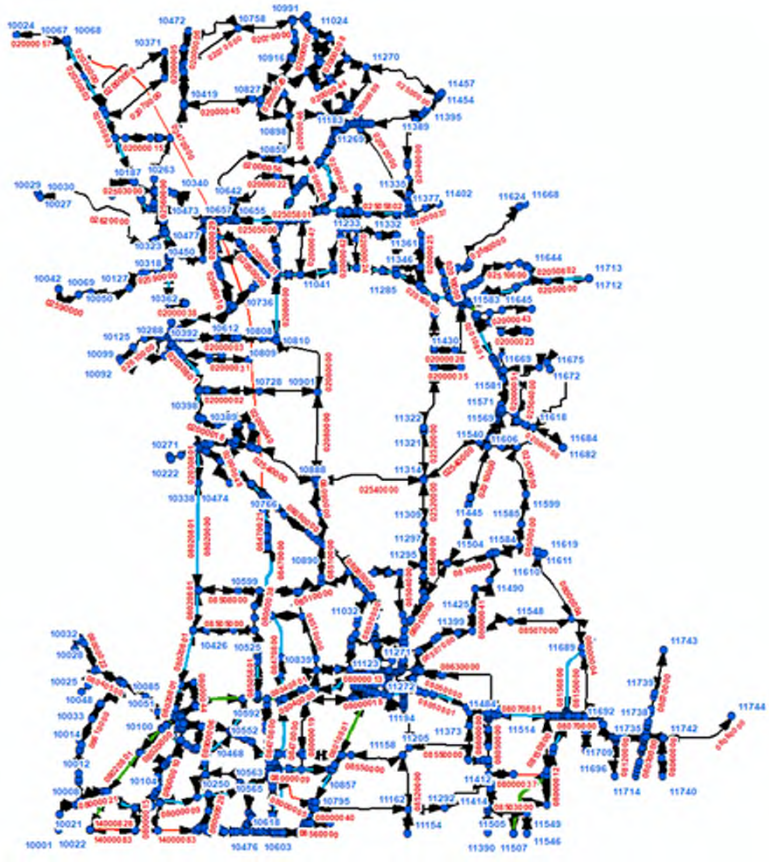




RCI Base Map Automation to CUBE Tools

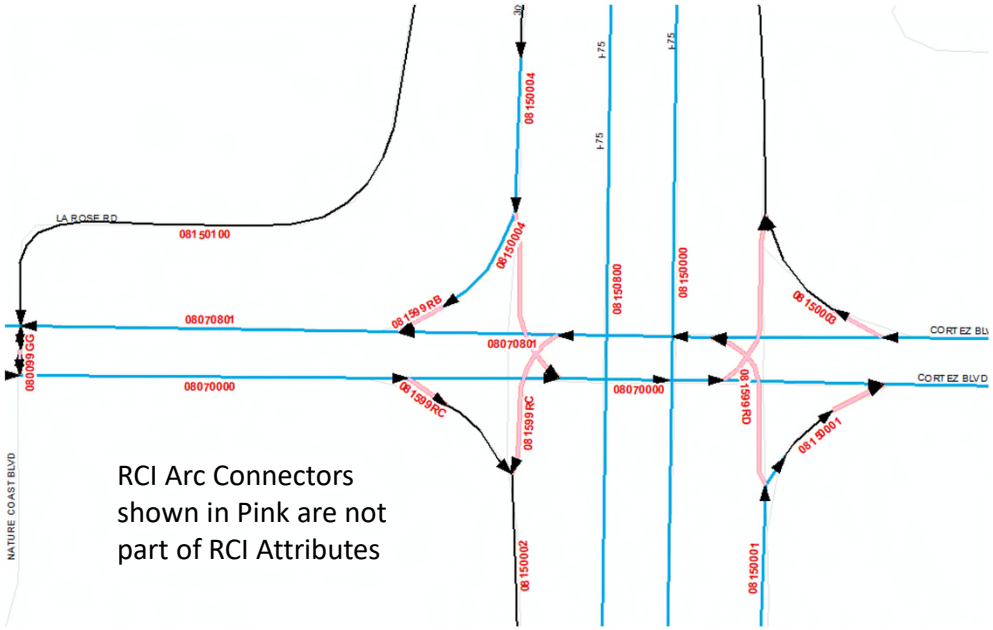
- Tool developed to add new node structure back to Arcs with RCI attributes



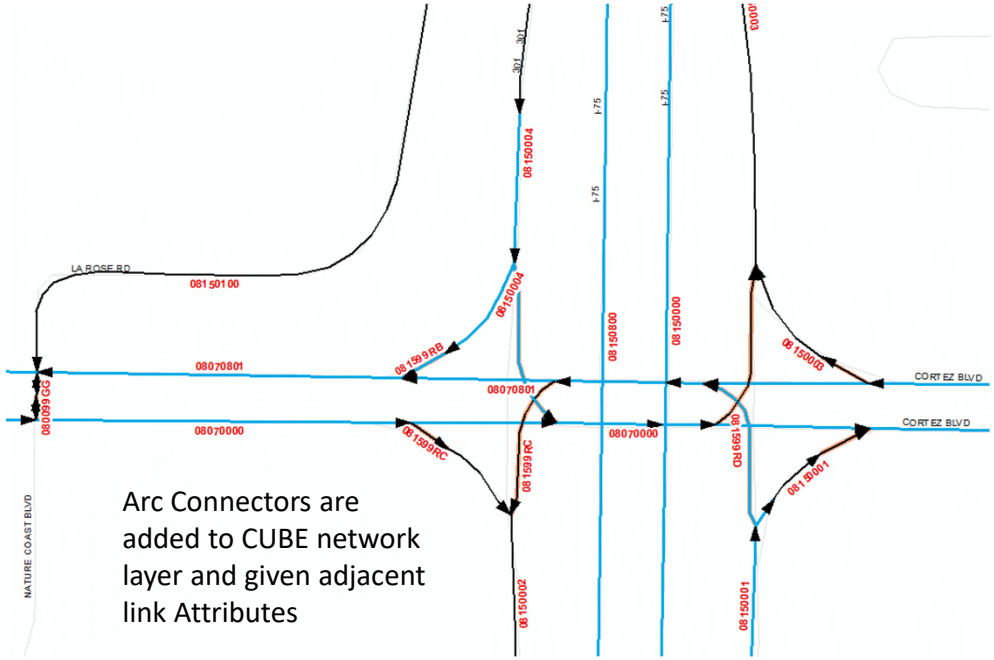


RCI Base Map Automation to CUBE Tools

- Tool developed to add / update Arcs GIS layer with network connectors



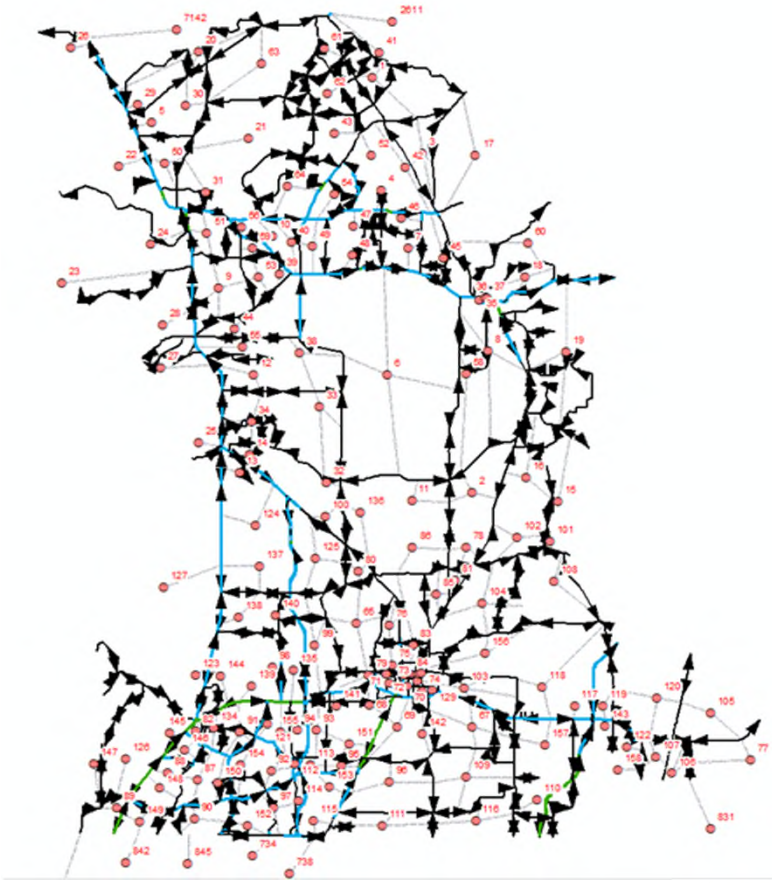
RCI Arc Connectors shown in Pink are not part of RCI Attributes



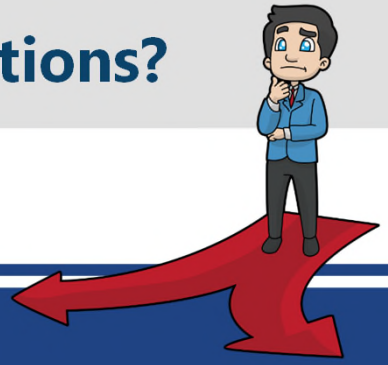
Arc Connectors are added to CUBE network layer and given adjacent link Attributes

RCI Base Map Automation to CUBE Tools

- **Next Steps**
- Refine RCI attribute data/route calibration in coordination with any connectivity issues
- Add other local road connections as needed for FLSWM / SIS
- Add centroids and centroid connectors
- Build CUBE network



Questions?



Thank You!