

The background of the slide is a dark blue map of a city grid with various colored lines representing transit routes. The right side of the slide is filled with a pattern of small, light blue icons representing various GIS symbols like polygons, lines, and points.

Advances in Transit GIS Analysis and Modeling

Jim Lam, Caliper Corporation
GIS In Transit Conference, November 18, 2009

Caliper
CORPORATION

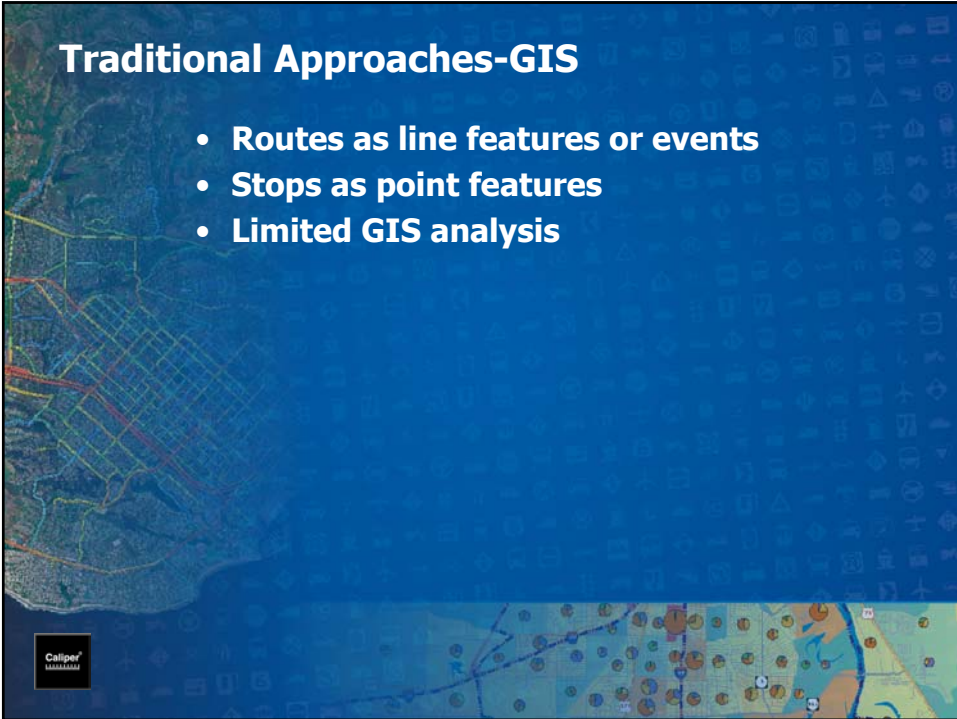
Outline

- **Traditional Approaches**
- **Transit GIS Data Structure Design**
- **Transit Visualization and Analysis**
- **Transit Demand Modeling**
- **Incorporating Schedules**
- **Interfacing with Other Formats**

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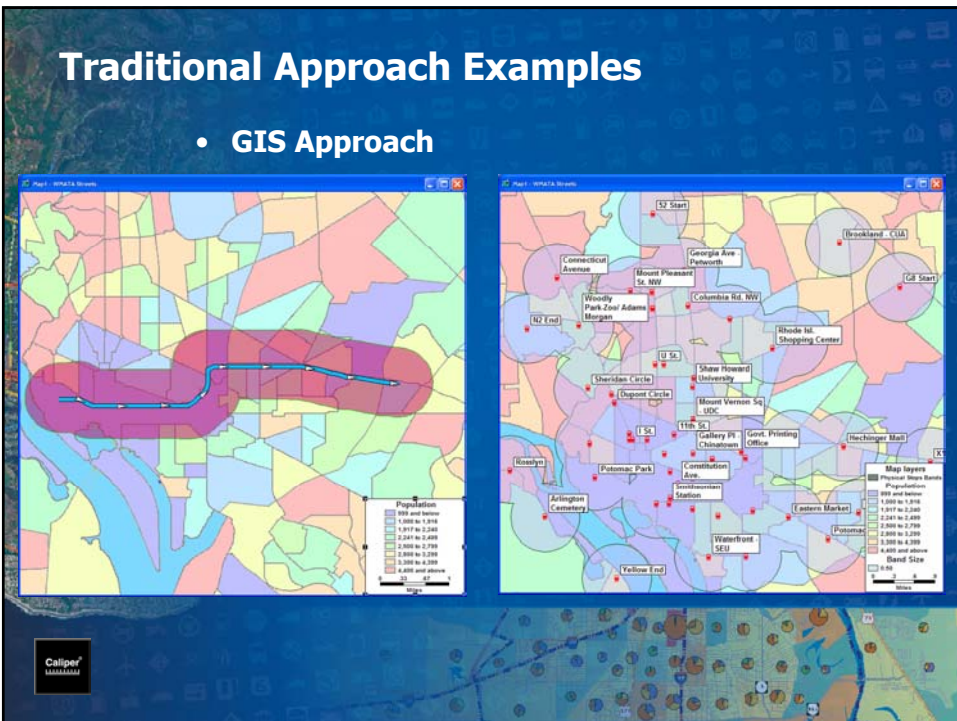
Traditional Approaches-GIS

- Routes as line features or events
- Stops as point features
- Limited GIS analysis



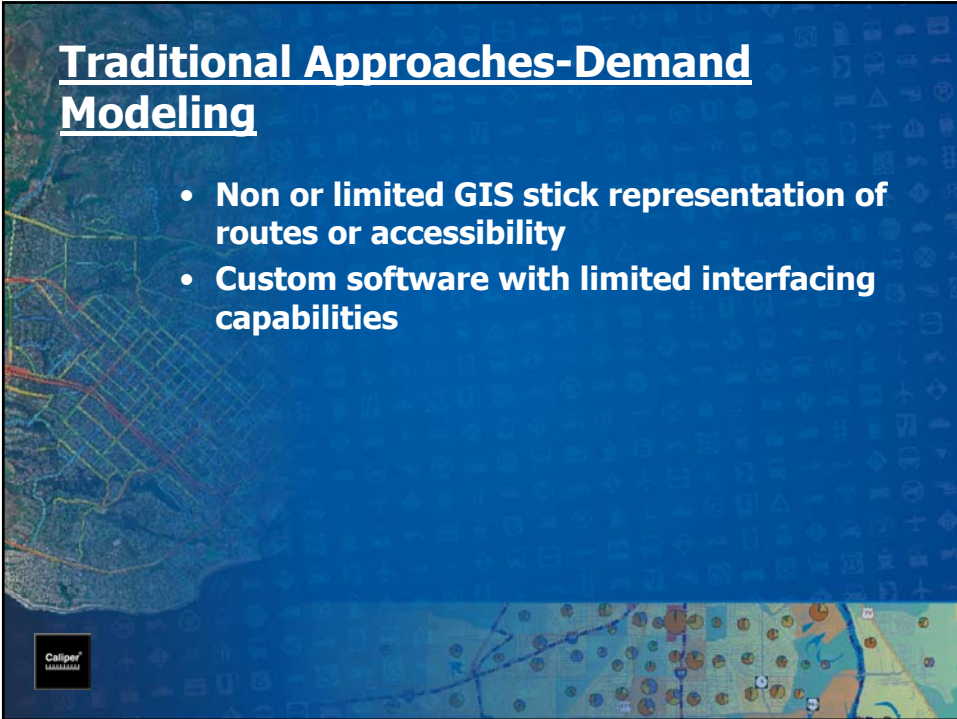
Traditional Approach Examples

- GIS Approach



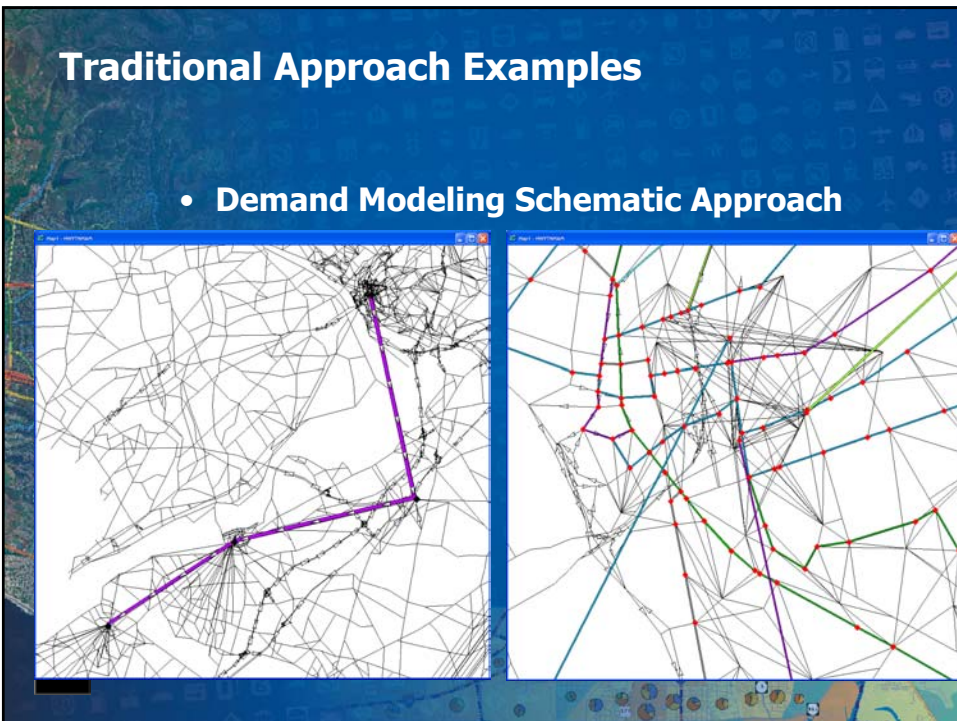
Traditional Approaches-Demand Modeling

- Non or limited GIS stick representation of routes or accessibility
- Custom software with limited interfacing capabilities



Traditional Approach Examples

- Demand Modeling Schematic Approach



Transit GIS Database Design

- Routes follow line feature geography
- Routes and stops are “topological”
- Routes, stops, and route segments have attribute information
- GIS analysis can be performed with route, stop, and segment attributes
- Both route and physical stops can be used
- GIS structures can convert into network graphs for demand modeling

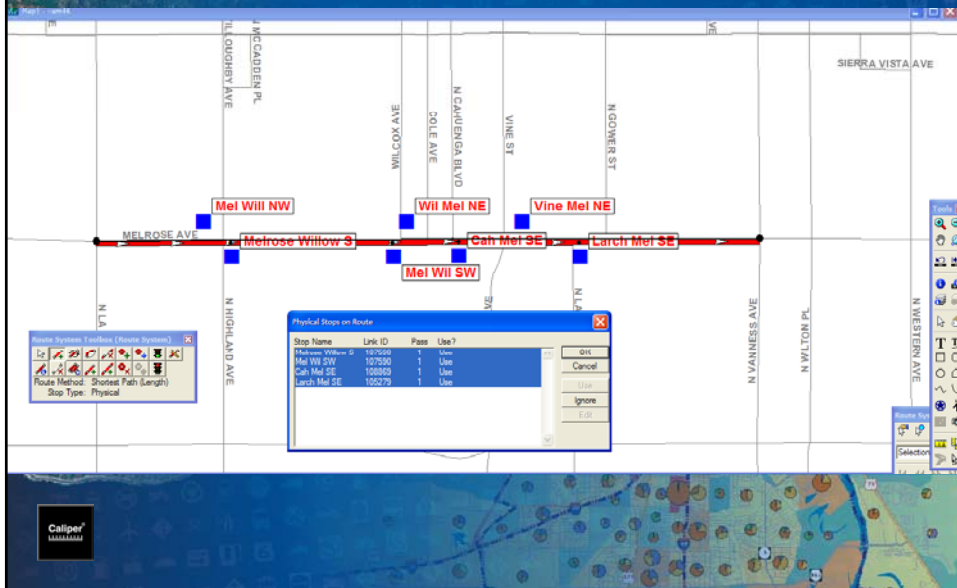
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Transit GIS Data Demo

Station ID	Line ID	Stop Name	Direction	Position	Order	Order	Order	Order	Order	Order	Order	Order	Order	Order	Order	Order	Order	Order	Order
49428	1206	81 N HOLLYWOOD STATION	A1	Y	0	0	4.00	4.00	118420	118420	1206	1	13						
49428	1206	120 E UNIVERSAL CITY STATION	A1	Y	0	0	2.00	2.00	118420	118420	1206	1	13						
49427	1206	202 E HOLLYWOOD	A1	Y	0	0	2.00	2.00	118420	118420	1206	1	13						
49432	1206	301 E HOLLYWOOD	A1	Y	0	0	2.00	2.00	118420	118420	1206	1	13						
49432	1206	371 E HOLLYWOOD	A1	Y	0	0	2.00	2.00	118420	118420	1206	1	13						
49424	1206	426 S VERMONT	A1	Y	0	0	1.00	1.00	118420	118420	1206	1	13						
49426	1206	463 S VERMONT	A1	Y	0	0	2.00	2.00	118420	118420	1206	1	13						
49426	1206	510 S VERMONT	A1	Y	0	0	2.00	2.00	118420	118420	1206	1	13						
49427	1206	568 S VERMONT	A1	Y	0	0	2.00	2.00	118420	118420	1206	1	13						
49428	1206	619 S WESTLAKE	A1	Y	0	0	2.05	2.55	118420	118420	1206	1	13						
49429	1206	670 S WESTLAKE	A1	Y	0	0	2.00	2.00	118420	118420	1206	1	13						
49448	1206	702 N FISHING SQUARE STATION	A1	Y	0	0	1.00	1.00	118472	118472	1206	1	13						
49448	1206	720 N CNIC CENTER STATION	A1	Y	0	0	3.00	3.00	118471	118471	1206	1	13						
49442	1206	772 E UNION STATION	A1	Y	0	0	-	-	118476	118476	1206	1	13						

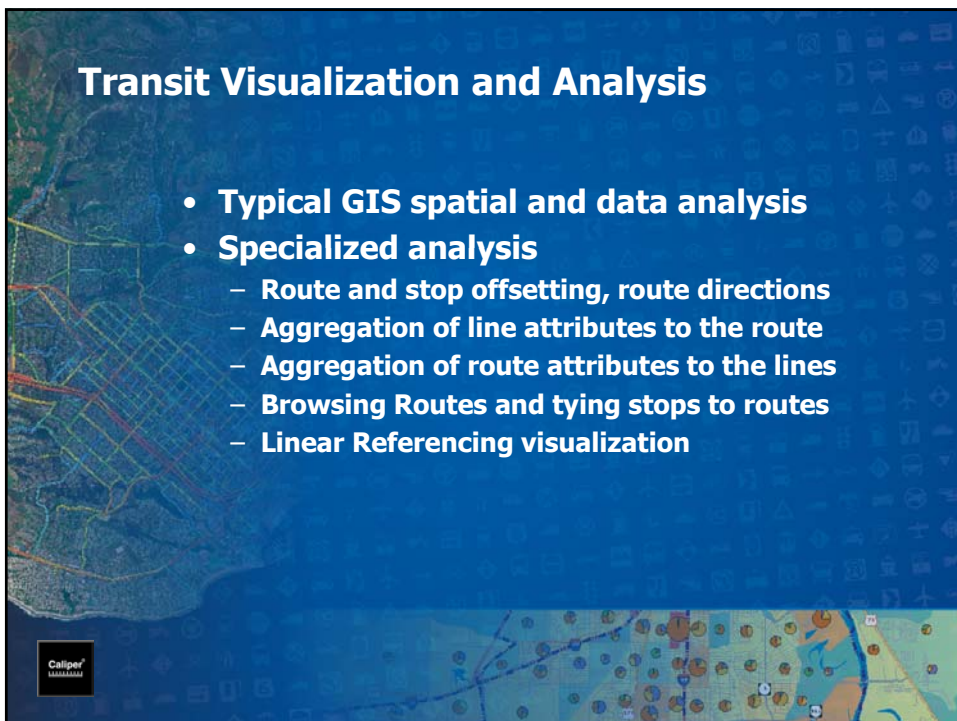
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Physical Stop Demo



Transit Visualization and Analysis

- Typical GIS spatial and data analysis
- Specialized analysis
 - Route and stop offsetting, route directions
 - Aggregation of line attributes to the route
 - Aggregation of route attributes to the lines
 - Browsing Routes and tying stops to routes
 - Linear Referencing visualization

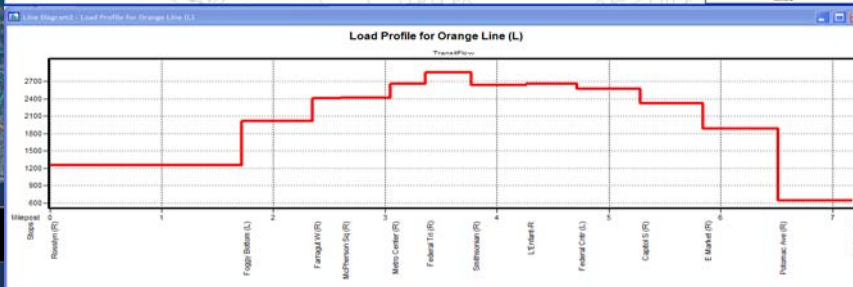
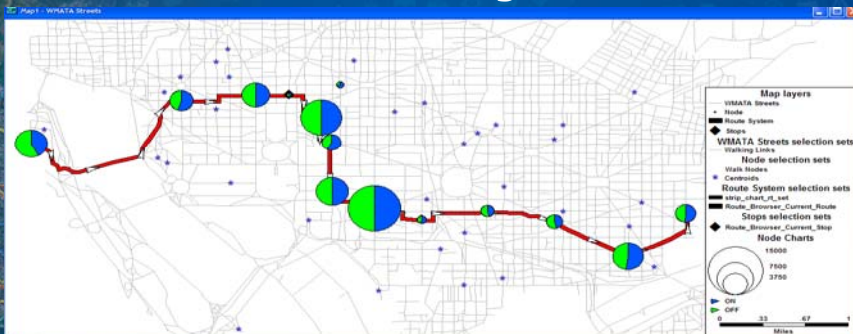


Transit Demand Modeling

- GIS data structures converted into network graphs
- Access/Egress/Transfers are defined naturally over GIS street networks
- Matrix data structures are used
- Transit pathfinding, skimming, and assignments
- Datasets are retained in GIS formats
- Outputs are in conventional database and GIS formats

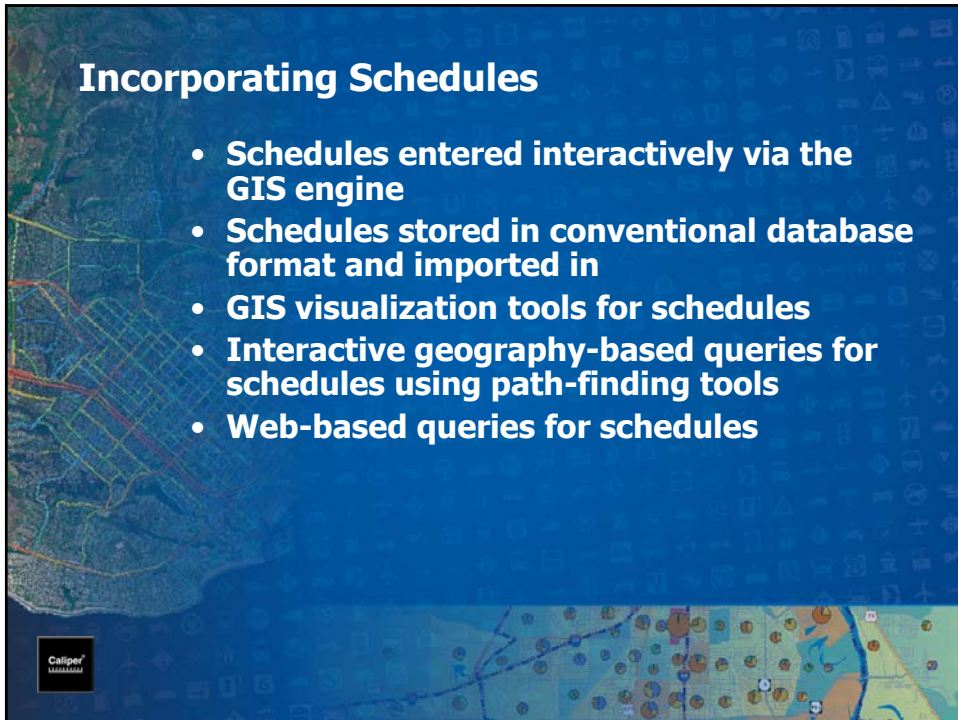
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Transit Demand Modeling Demo

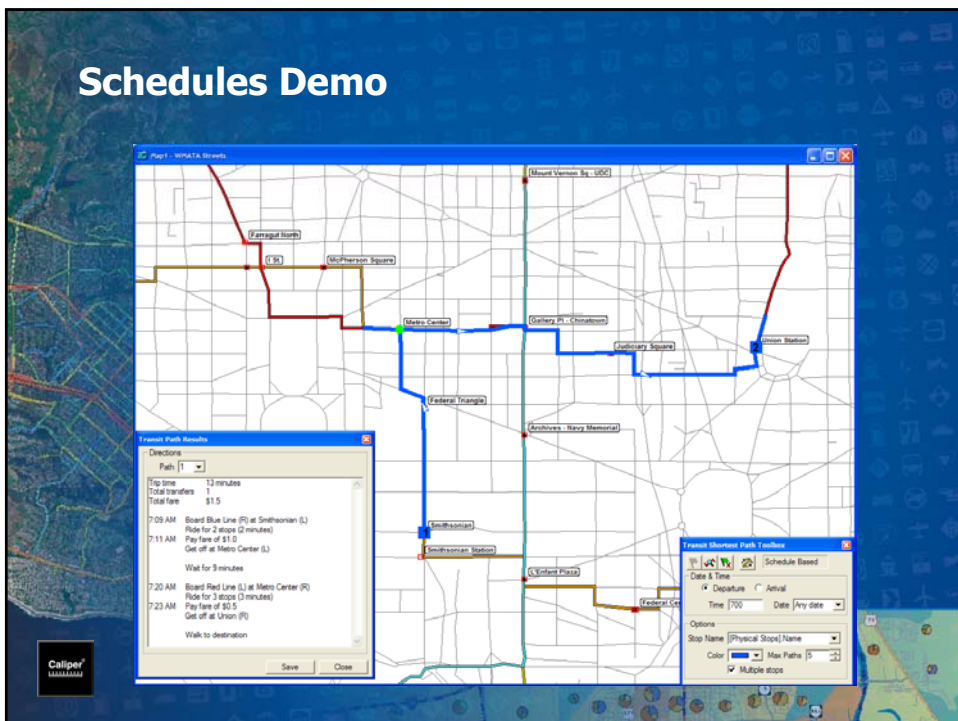


Incorporating Schedules

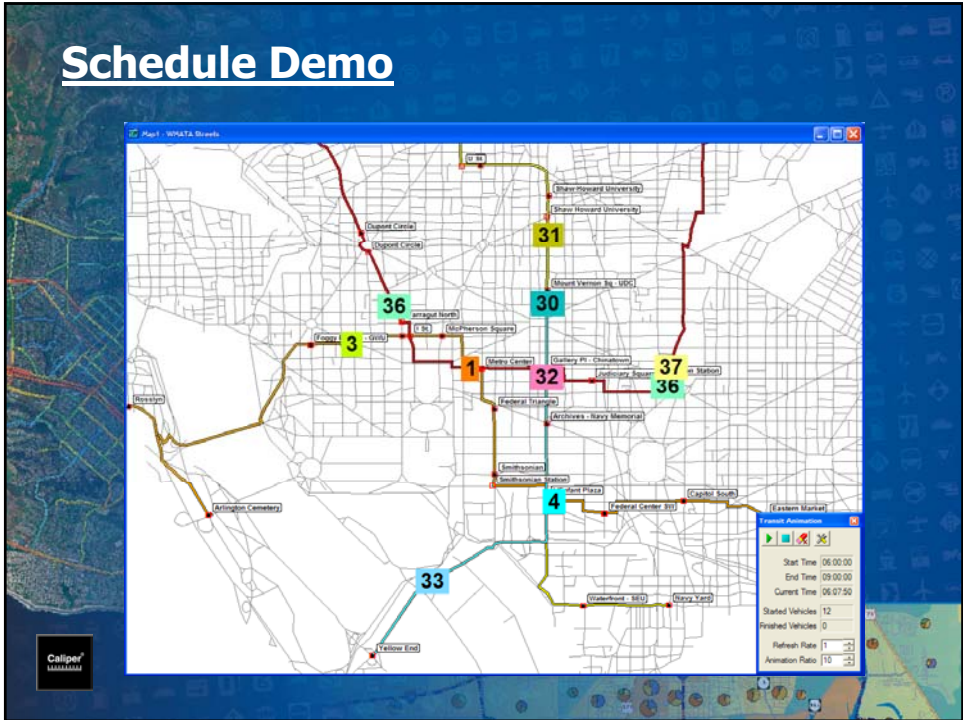
- Schedules entered interactively via the GIS engine
- Schedules stored in conventional database format and imported in
- GIS visualization tools for schedules
- Interactive geography-based queries for schedules using path-finding tools
- Web-based queries for schedules



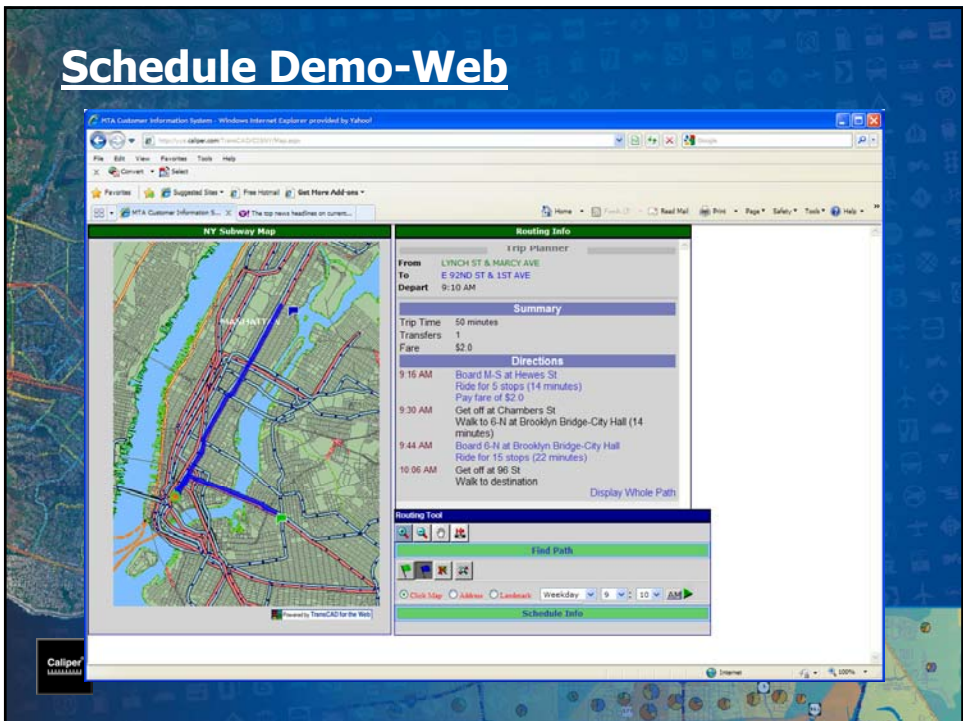
Schedules Demo



Schedule Demo

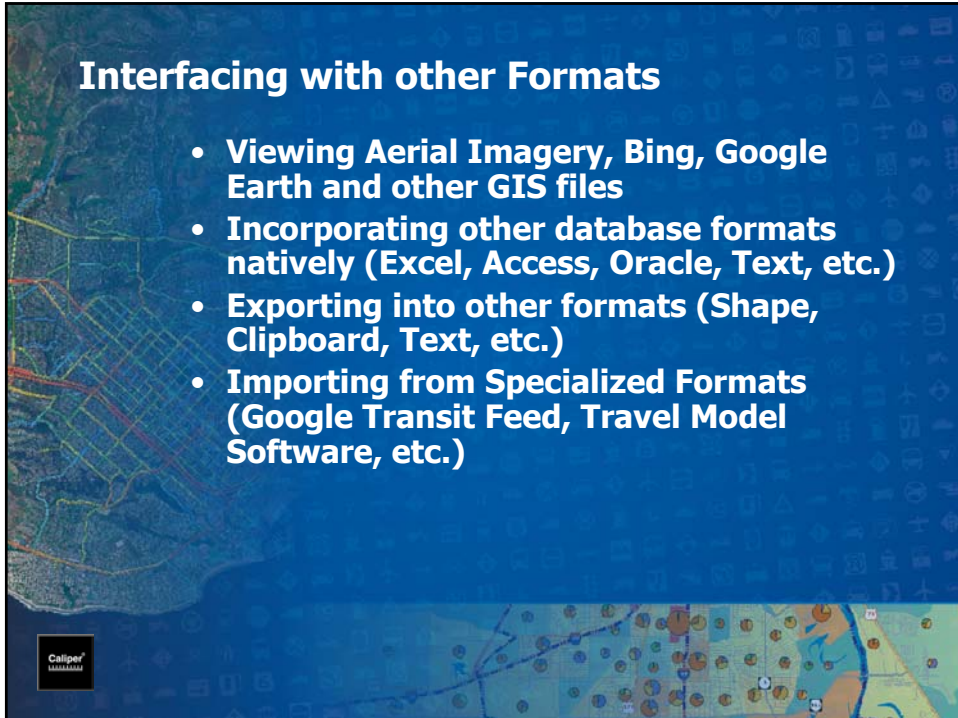


Schedule Demo-Web



Interfacing with other Formats

- Viewing Aerial Imagery, Bing, Google Earth and other GIS files
- Incorporating other database formats natively (Excel, Access, Oracle, Text, etc.)
- Exporting into other formats (Shape, Clipboard, Text, etc.)
- Importing from Specialized Formats (Google Transit Feed, Travel Model Software, etc.)



Interfacing Demo

Import Trip Master Route System

Trip Master Directory: c:\projects\MTA TripMaster\Source

Dictionary Directory: c:\projects\MTA TripMaster\Dictionary\

Planning Network: c:\projects\MTA TripMaster\Network\BYU8_links

Working Directory: c:\projects\MTA TripMaster\Temp\

Output Directory: c:\projects\MTA TripMaster\RouteSystem\

Search Threshold (miles): 0.04

Operations

- Convert Trip Master Files
- Subset Planning Network
- Build Shape Point Database
- Build Route System
- Add Stops
- Verify Route System
- Compute Headways, Frequencies & Travel Times:

Wednesday

Cleanup

Quit GO

Import TP+ Network File

File: C:\projects\ntp\HWYTNMAM.NET OK

ID: NJT Model - Combine Transit Paths -PK Cancel

Transit File: C:\projects\ntp\TRNLINK_PK1.DBF

Links: 156433 Nodes: 47003 Zones: 2553

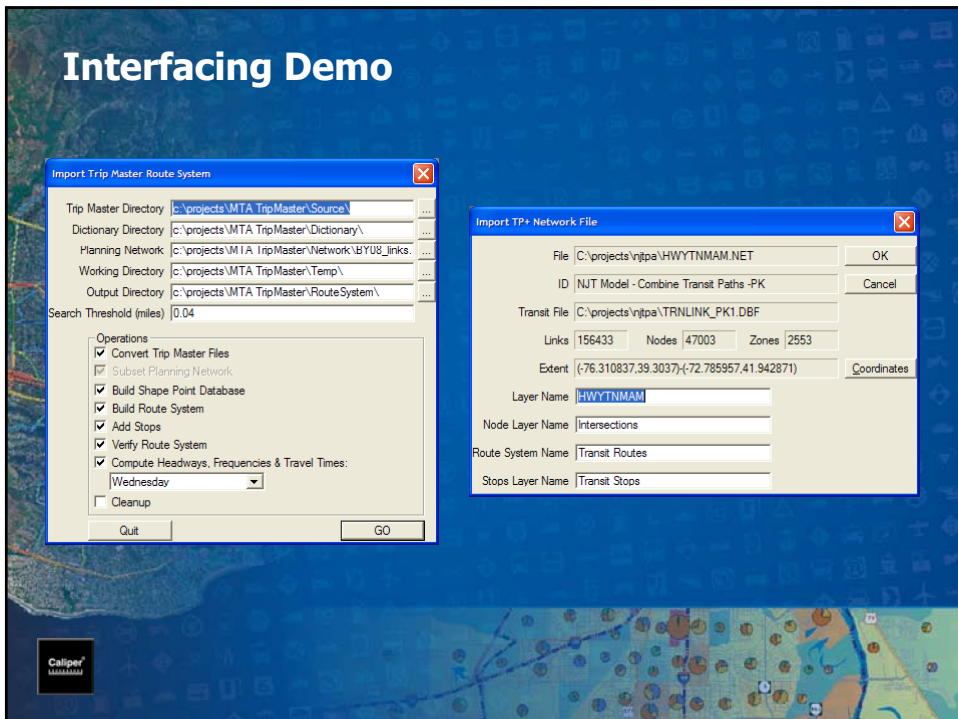
Extent: (-76.310837,39.3037)-(-72.785957,41.942871) Coordinates

Layer Name: HWYTNMAM

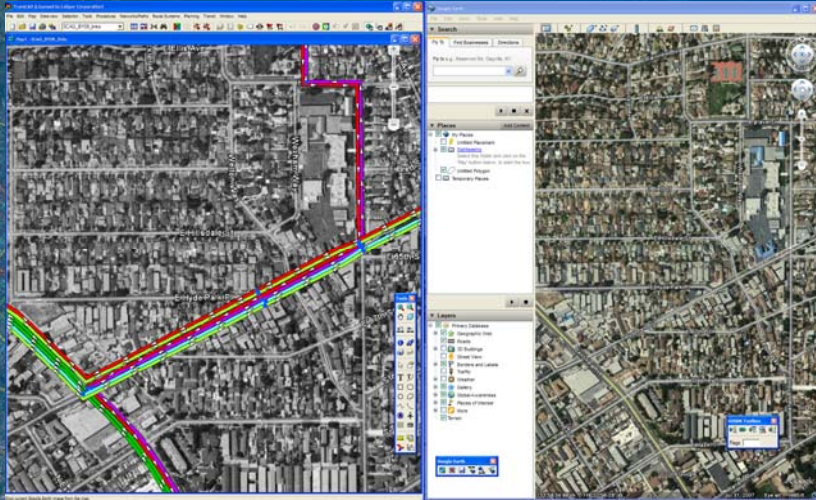
Node Layer Name: Intersections

Route System Name: Transit Routes

Stops Layer Name: Transit Stops



Interfacing Demo



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Thank You

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