

CALIPER CORPORATION

TransCAD, TransModeler And Maptitude

CASPT 2012, Santiago, Chile



Caliper Corporation

- Founded in 1983
- Headquarters in Newton, MA
- Transportation consultant and developer of TransCAD (GIS based transportation planning software), TransModeler (GIS based traffic simulation software) and Maptitude a desktop mapping software)
- Present in over 70 countries of the world

TransCAD: GIS based system

TransCAD (Licensed to Caliper Corporation)

File Edit Map Dataview Selection Tools Procedures Networks/Paths Route Systems Planning Transit Routing/Logistics Statistics Window Help

County

Display Manager

- Water Area
- County
- Landmark
- Landmark Area
- State
- City
- Endpoints
- Base Year Network

Map1 - Base Year Network

Multi-Layer Information

Choose a Feature

- County
 - Plymouth MA
- State
 - INTERSTATE 495

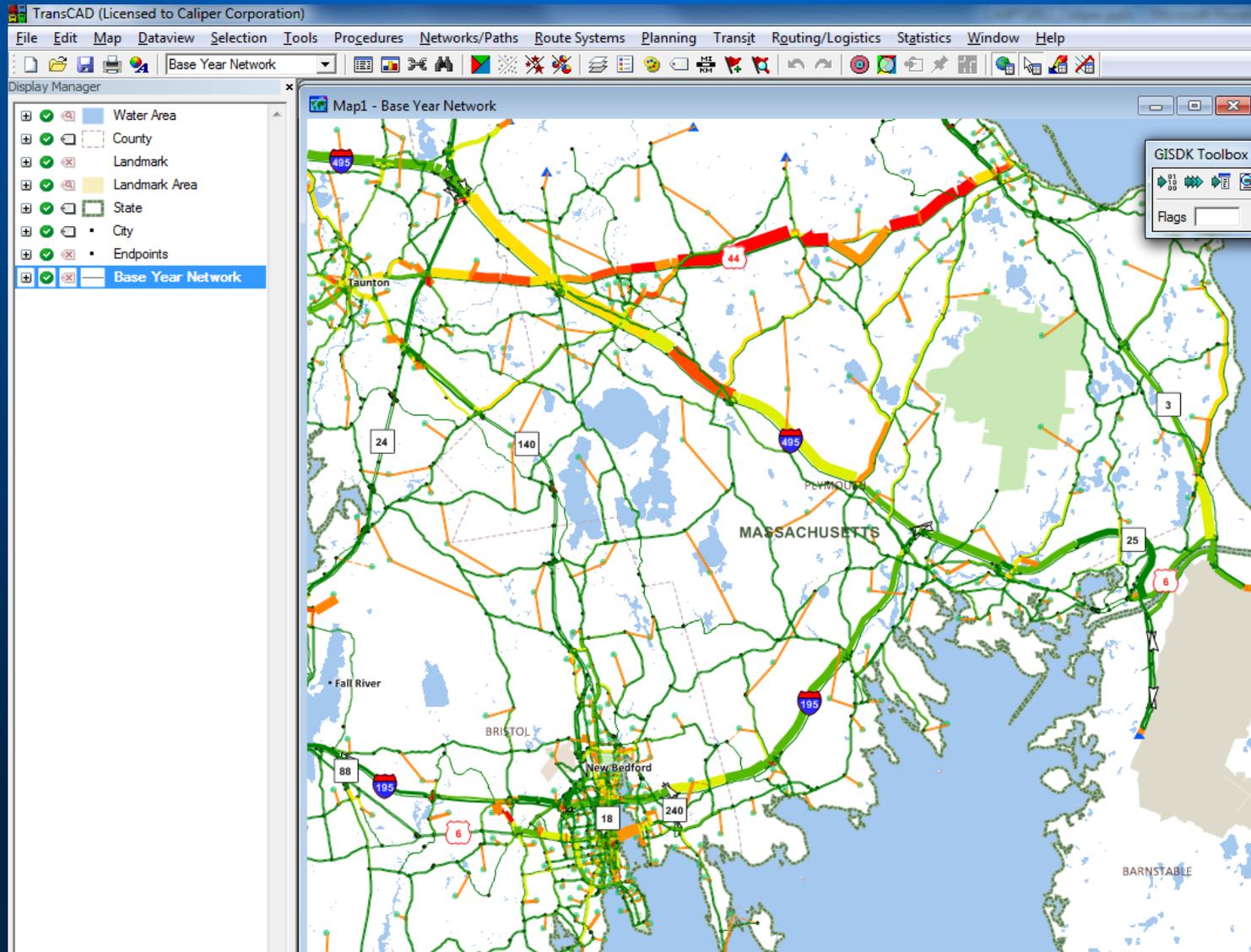
Feature Info

Fields	Values
[Area Type]	3
[Functional Class]	1
[Freeflow Time]	4.398118
AB_Lanes	2
BA_Lanes	
ModelH_CapE	4000
AB_AMCapacity	8000
BA_AMCapacity	
Alpha	0.15
Beta	4
CCSTYLE	100

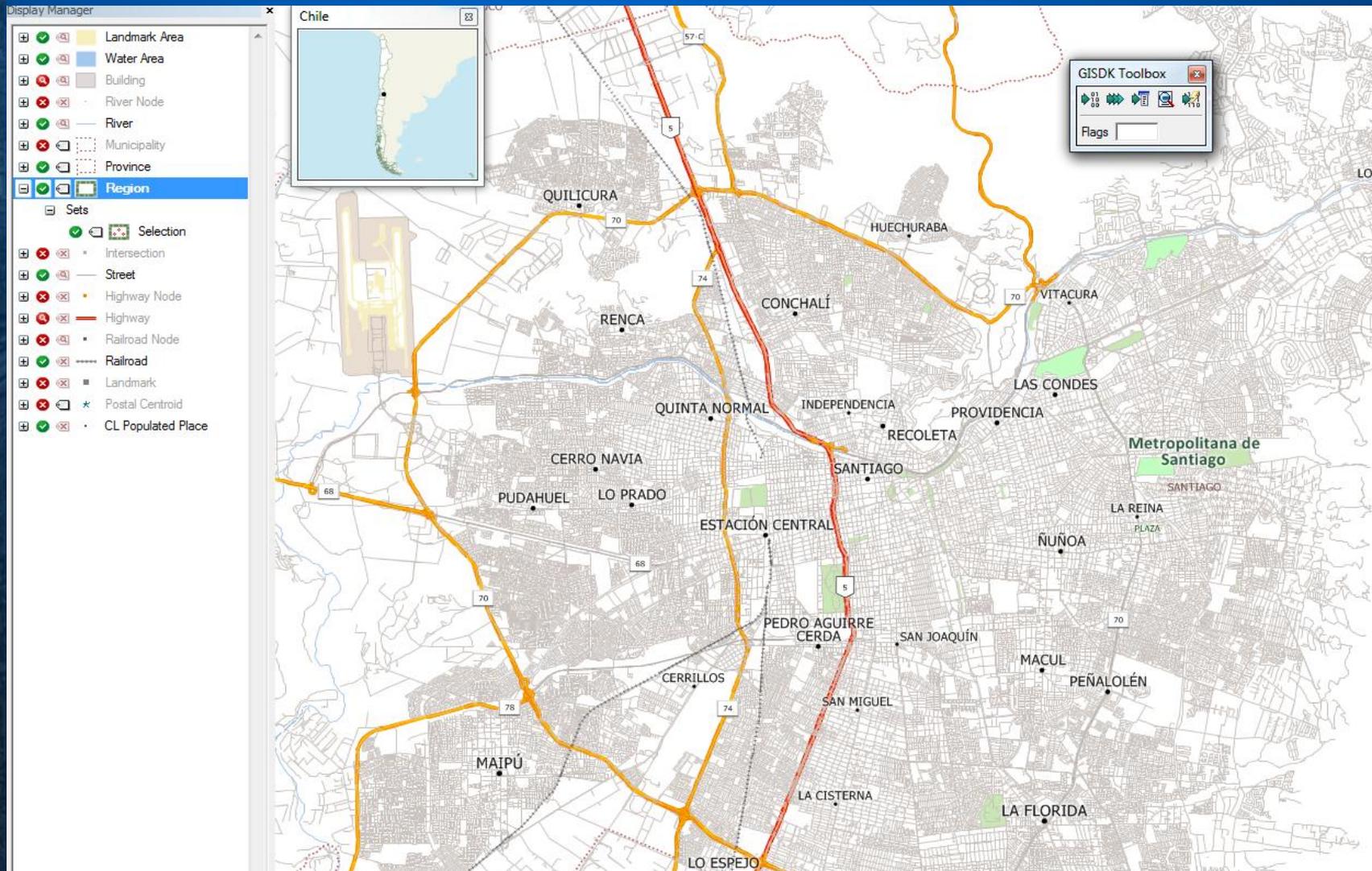
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32

Caliper

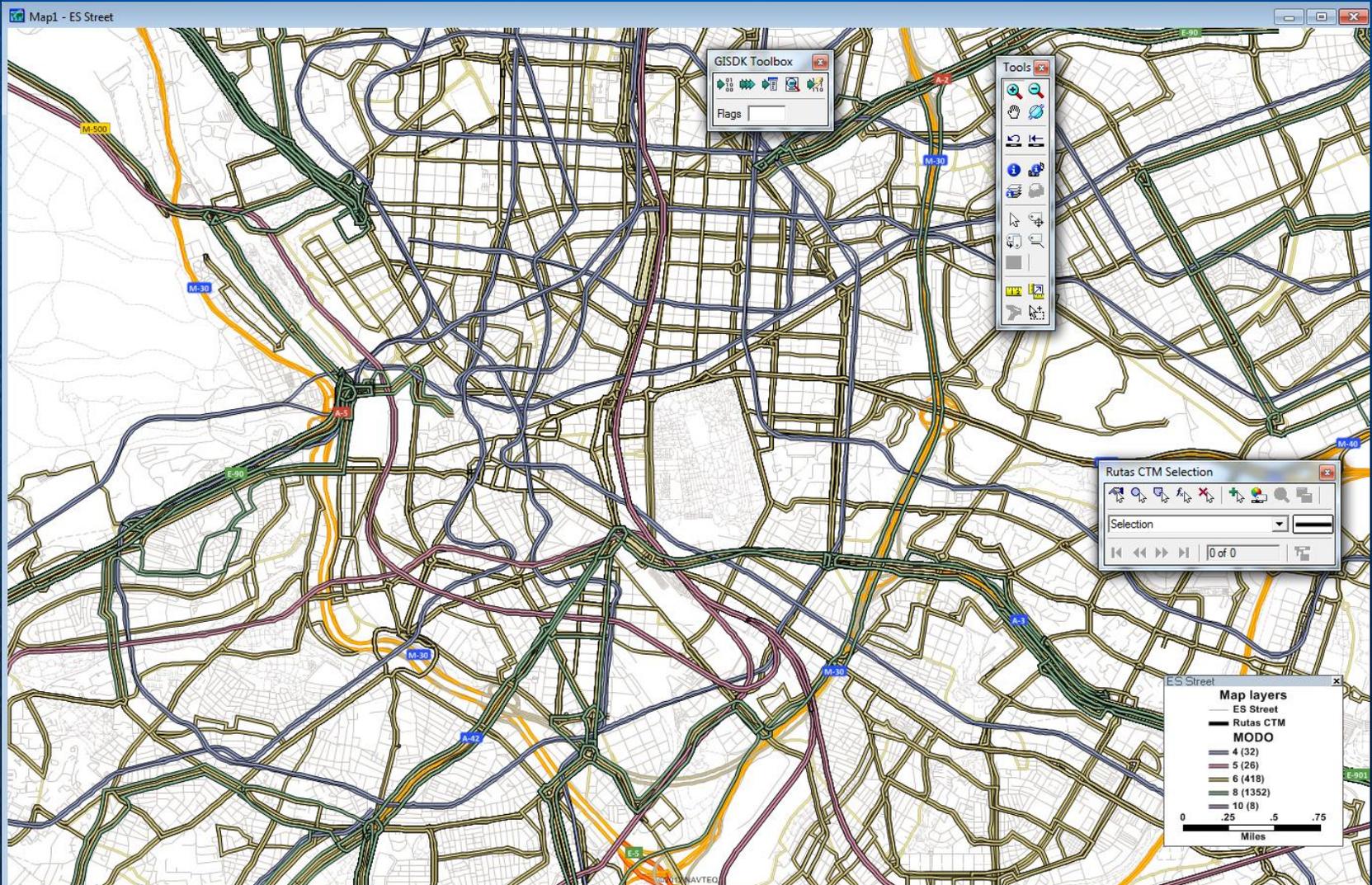
TransCAD: GIS based system



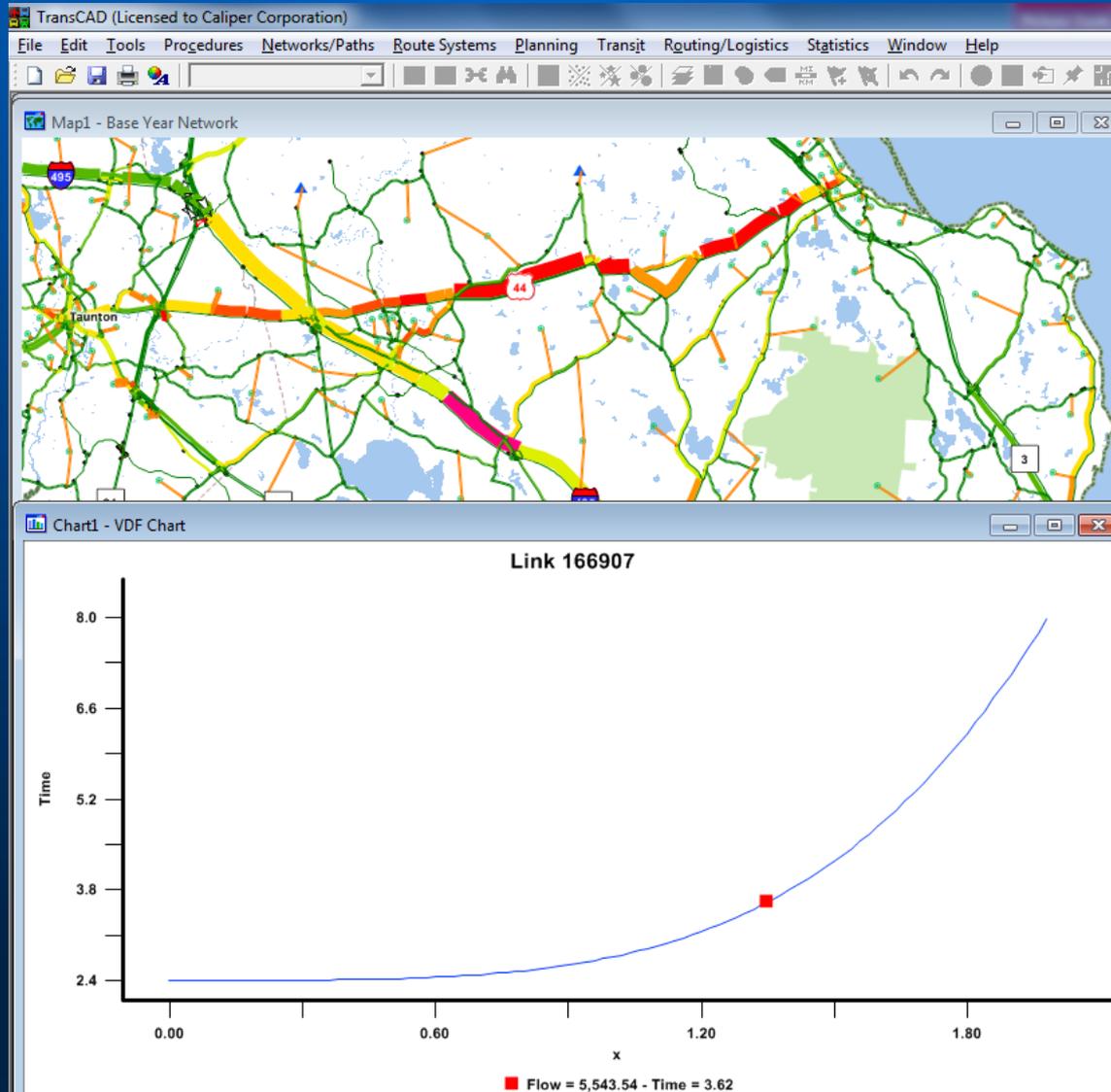
Detailed Cartography Available



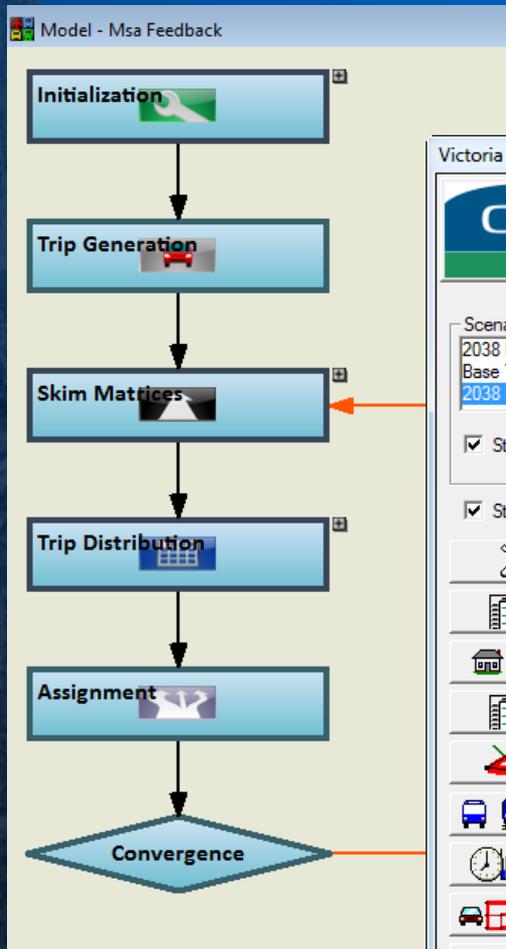
Madrid Route System



TransCAD: GIS Based



TransCAD Graphical User Interface



Victoria Area Planning Model

CRD Planning Model

Scenarios

- 2038 Reference Scenario
- Base Year with HOV
- 2038 Reference Scenario with HOV

Stop after stage Setup

Start with Congested Times

Initialize Transit Skims Trip Generation Highway Skims Trip Distribution Mode Choice Time of Day Highway Assignment Transit Assignment Feedback Quit

v 20090214

Pathfinder Transit Assignment

Inputs

Route Layer: Route System

Network File: C:\...TransCAD Dev\Tutorial\transit.tnw

Method: P

Class: N

O-D: Path Size

Matrix File: Tra

Matrix: O-D

Pathfinder Network Settings

Network: transit Network... Info... OK Cancel

File: C:\...TransCAD Dev\Tutorial\transit.tnw

Class: Nivel Ingreso 5 Class Manager Reset

General | Mode | Fare | Times | Weights | Access P&R | Egress P&R | Others

Link Field

Time: IVTT Time By Mode

Driving Time

Settings

Max Trip Cost: 999.0 Max Xfers: 99 Value of Time: 0.2

Centroids

- Do not use centroids
- Centroids are in network (0 nodes)
- Create centroids from selection set

Access Control

Permit Walk-only Trips Stop Access: None

	Node Field	Global
Max # of WACC Paths		4

TransCAD: Powerful API

- GISDK Macro Language

```
print dk.RunMacro("Echo","gis_ui","string argument",123,{ "key": "value1" , "key2": "value2" })

# while accessing a non-defined function DOES return a run-time exception, try this:
table_name = dk.OpenTable("airports","ffb",["tutorial\\airports.bin",None])
num_rows = dk.GetRecordCount(table_name,None)
print "table " + table_name + " has " + str(num_rows) + " rows."
```

- FORTRAN, C++, C Interfaces

```
options = { 'Index Limit': 0}
query = "select * where Domestic > 10000"
num_found = dk.SelectByQuery("high traffic","several",query,options)
if ( num_found > 0 ) :
```

- Python, Perl scripting

```
print str(num_found) + " records match the query: " + query
field_names, field_specs = dk.GetFields(table_name,"All")
print "field names: " + str(field_names)
print "field specs: " + str(field_specs)
sort_order = None
options = None
order = "Row"
```

- DOTNET

```
for row in dk.GetRecordsValues(view_set,dk.GetFirstRecord(view_set,None),field_names,sort_order,num_found,order,None):
    print "[row " + str(i) + "]" + str(row)
    i = i + 1
```

- OLE

```
dk.SetSelectMax(None)

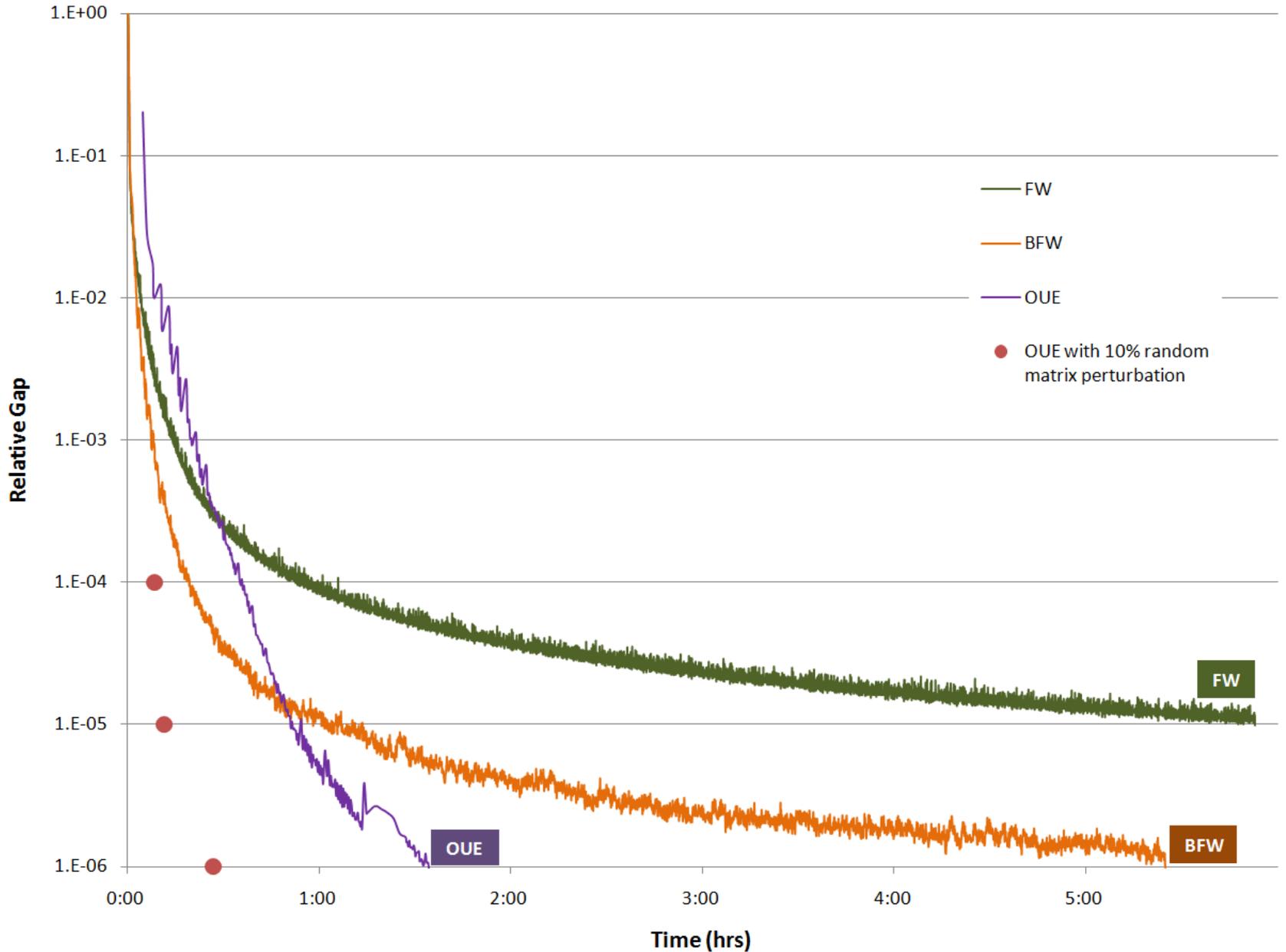
# test matrix processing in transcad

matrix_file = dk.GetTempPath() + "python_od_matrix.mtx"
dk.CopyFile("Tutorial\\OD.mtx",matrix_file)
m = dk.OpenMatrix(matrix_file,None)
mc1 = dk.CreateMatrixCurrency(m, "Vehicles",None,None,None)
mc2 = dk.CreateMatrixCurrency(m, "Vehicle Minutes",None,None,None)
mc3 = dk.CreateMatrixCurrency(m, "Travel minutes",None,None,None)
dk.AddMatrixCore(m,"mc_ones")
dk.AddMatrixCore(m,"mc_temp")
mc_ones = dk.CreateMatrixCurrency(m,"mc_ones",None,None,None)
mc_temp = dk.CreateMatrixCurrency(m,"mc_temp",None,None,None)
```

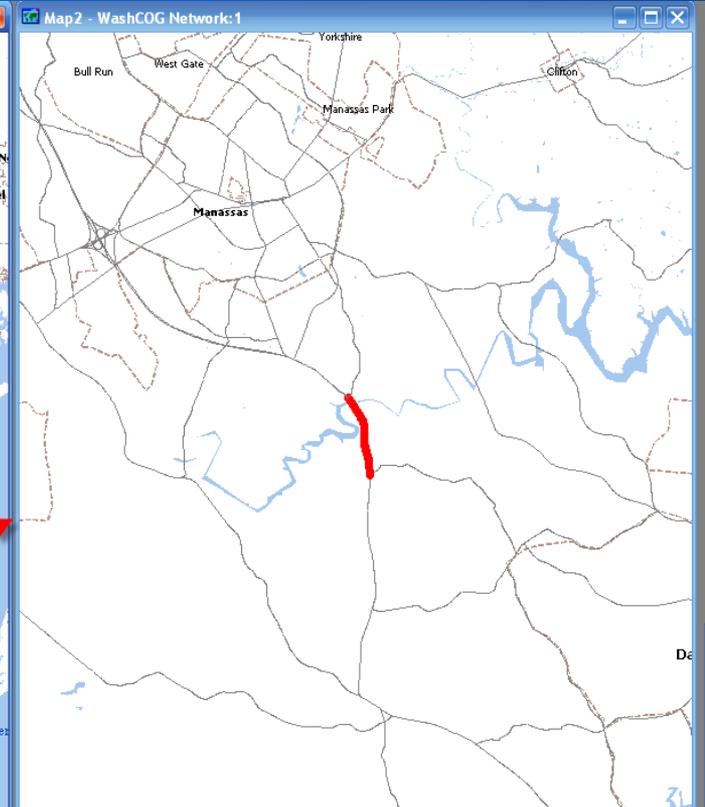
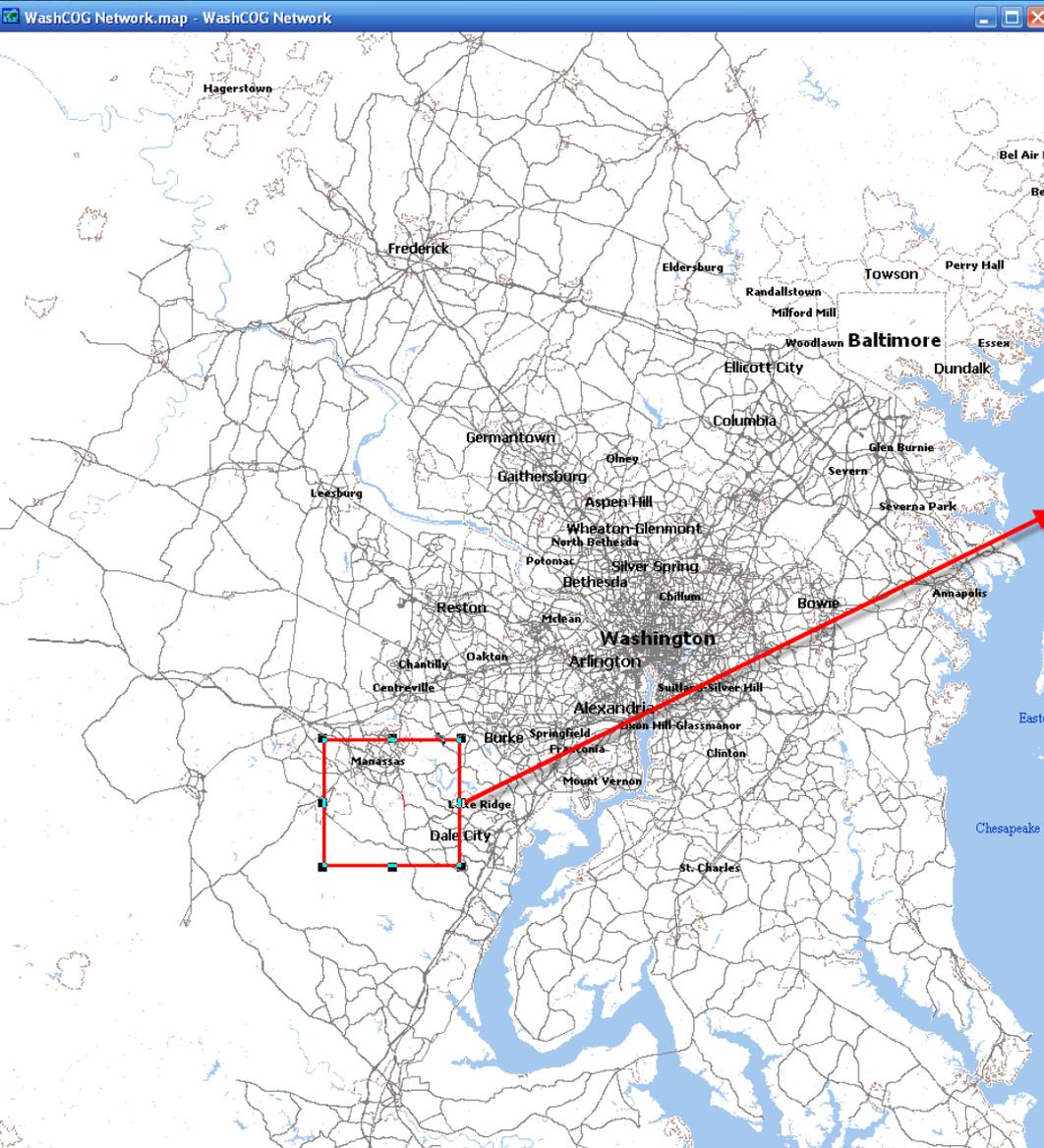
TransCAD: Powerful Computation Engine

- Available as 32 bit or 64 bit application
- Native connection to ESRI enterprise database engines (Geodatabases, SDE)
- Connections to SQL, Oracle, etc
- Googles GTFS (General Transit Feed Specification)
- Most complete transportation modeling library
- Super convergent and fast traffic assignment methods (Origin based assignments, biconjugate traffic assignment methods)

Comparison of FW, BFW, & OUE with 12 cores on a large regional model

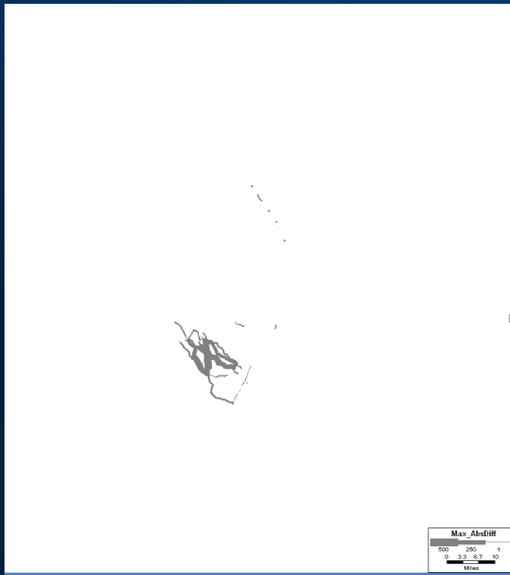
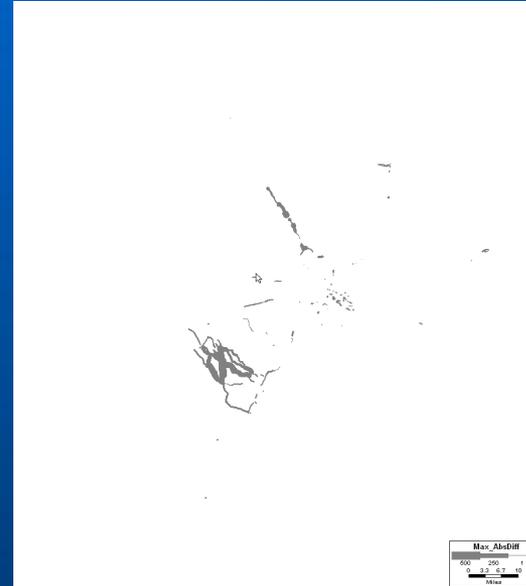
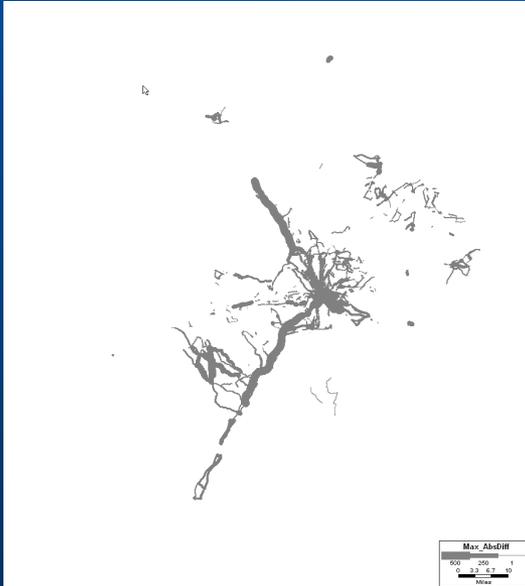


Project Evaluation

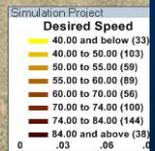
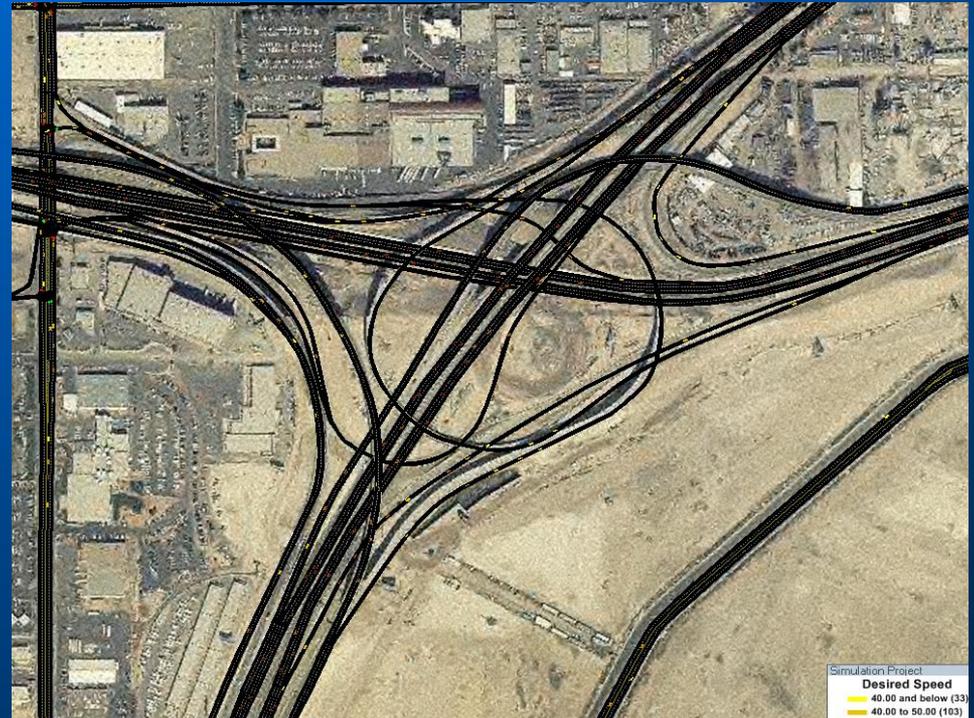
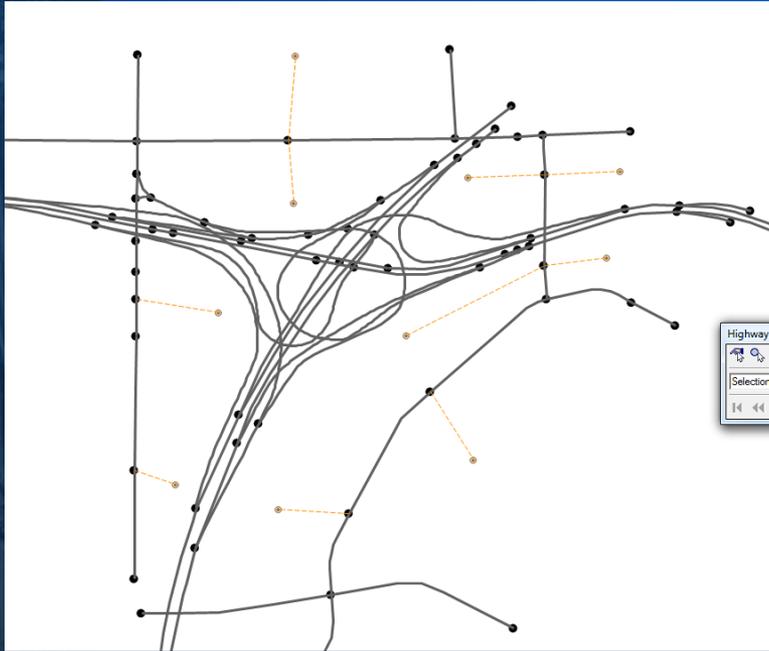


Doble capacidad en 2 arcos

Flow changes with and without project (links with a flow change > 50)



TransCAD to TransModeler



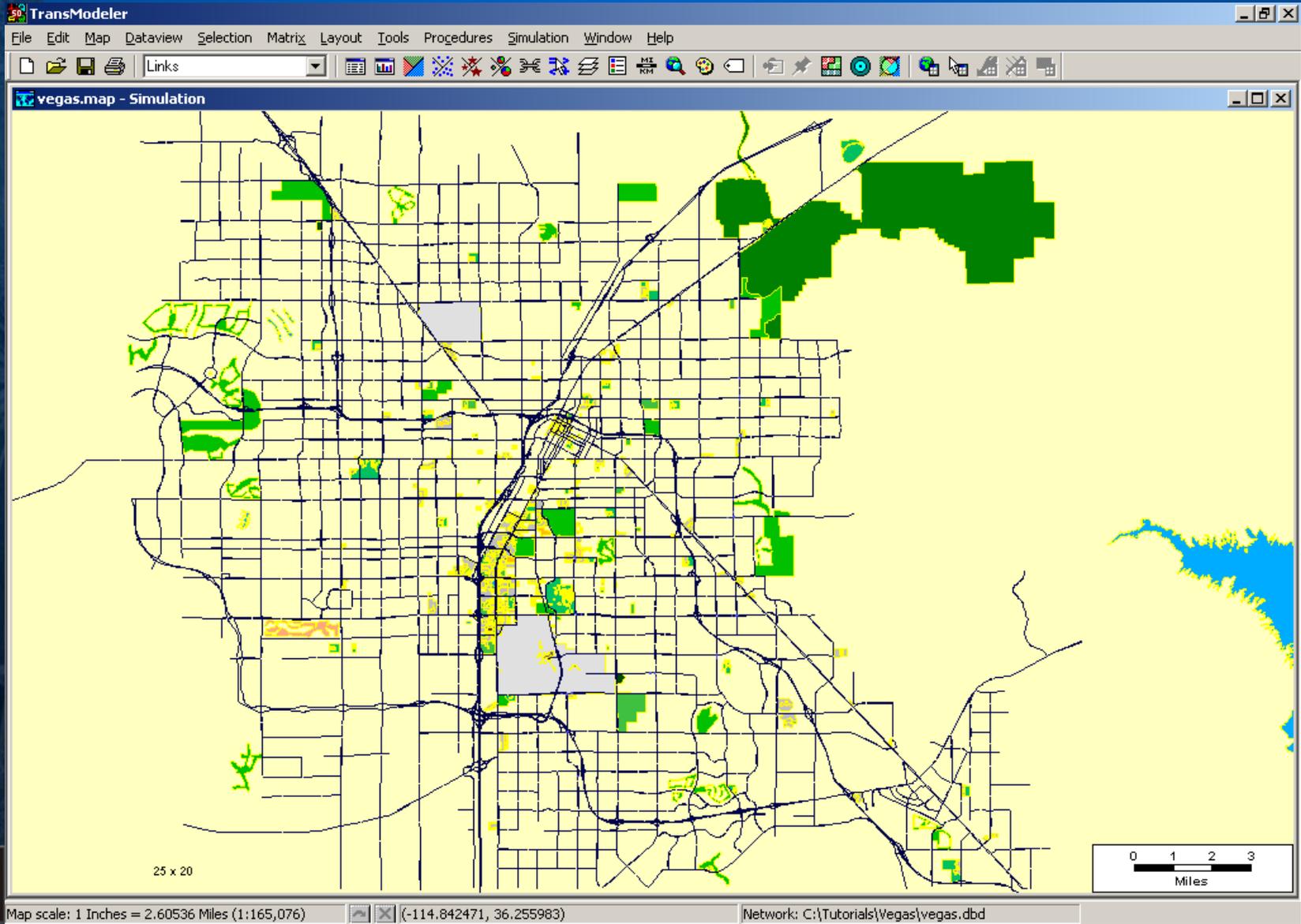
Phase	Dir.	Time	Max
3	SBL/NBL	3.4	100

Cycle	W	S	E	N
48.4	5.4	50.4	5.4	50.4

TransModeler: Simulation Engines

- **Microscopic simulation:** Car-following, lane-changing, driver's response to traffic signals, signs, incidents, etc.
- **Macroscopic simulation:** Travel time and delays computed from speed-density relationship and capacity constraints
- **Mesoscopic simulation:** Similar to macroscopic model, but vehicles are grouped into traffic cells and streams

Case Study – Las Vegas



Case Study

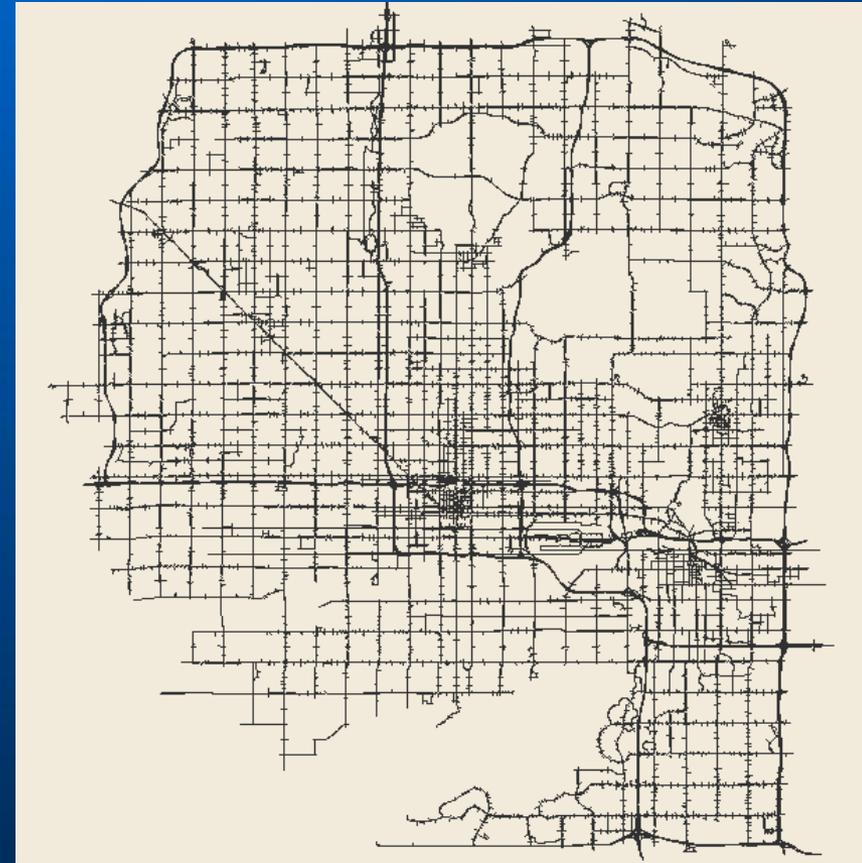
- Las Vegas transportation planning network (3K nodes, 8K links, 10K segments, 20K lanes, 500 signalized intersections)
- Edited for geometric accuracy and to provide info such as turning bays, acc/dec lanes, lane alignment, etc
- Pre-timed signal plans
- Experiment of microscopic and hybrid traffic simulation on a real urban network

Summary of Case Study

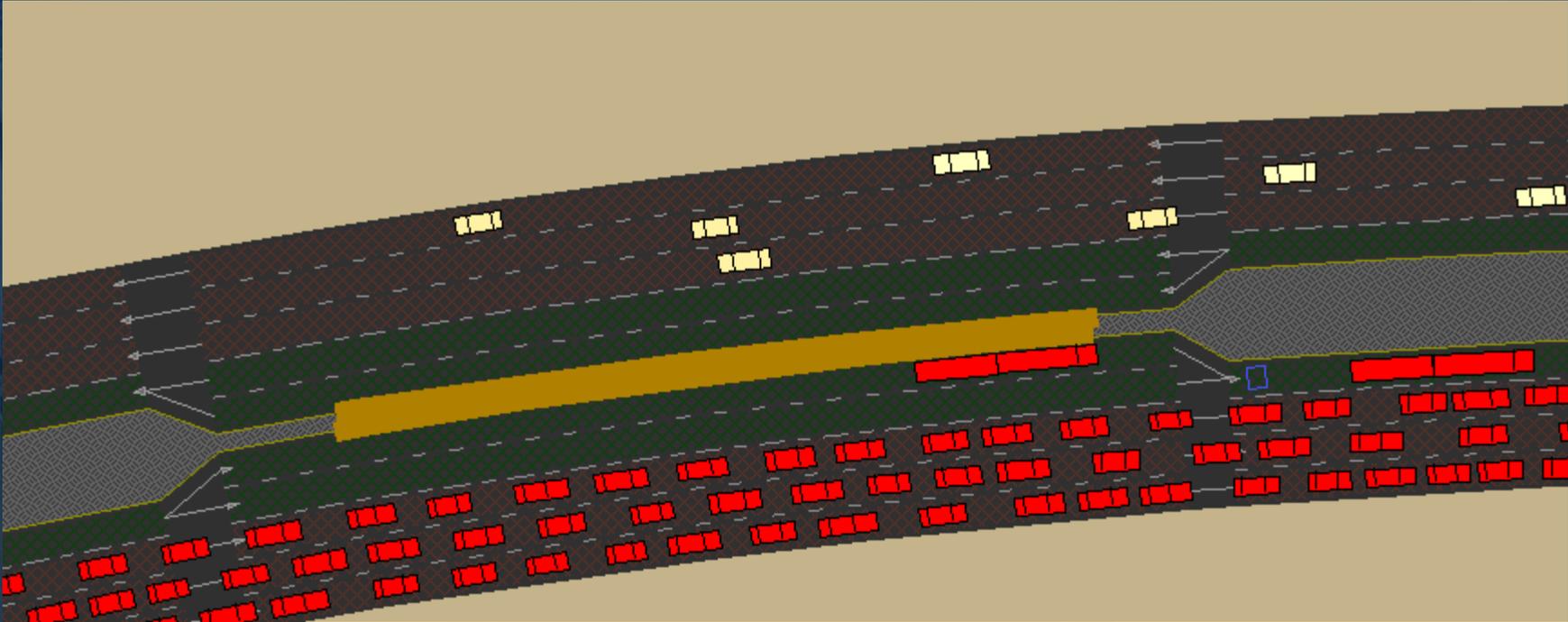
- Time to prepare input data to the model depends on network size and fidelity.
- Running time for one hour simulation (on a PC at 2.4 GHz, 512 MB)
 - Microscopic: 3 hrs. and 44 min.
 - Mesoscopic: 9 min. and 17 sec.
 - Macroscopic: about 1 min.
 - Microscopic and mesoscopic Hybrid: 45 min. and 36 sec.

Regional Microsimulation for Phoenix

- **~500 square miles**
- **17,000 nodes; 23,000 links; 890 zones; 1,800 signals**
- **AM and PM peak periods**
 - **3 hours each**
 - **1.5-2.0 million trips each**



Simulating BRTs



For more information

- **Andres Rabinowicz (andres@caliper.com)**
Caliper Corporation
Newton, MA, USA

- **Alejandro Aldea (aaldea@suroeste.cl)**
Suroeste Consultores
Santiago, Chile