

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
 - Base Year Network
 - INTERSTATE 495

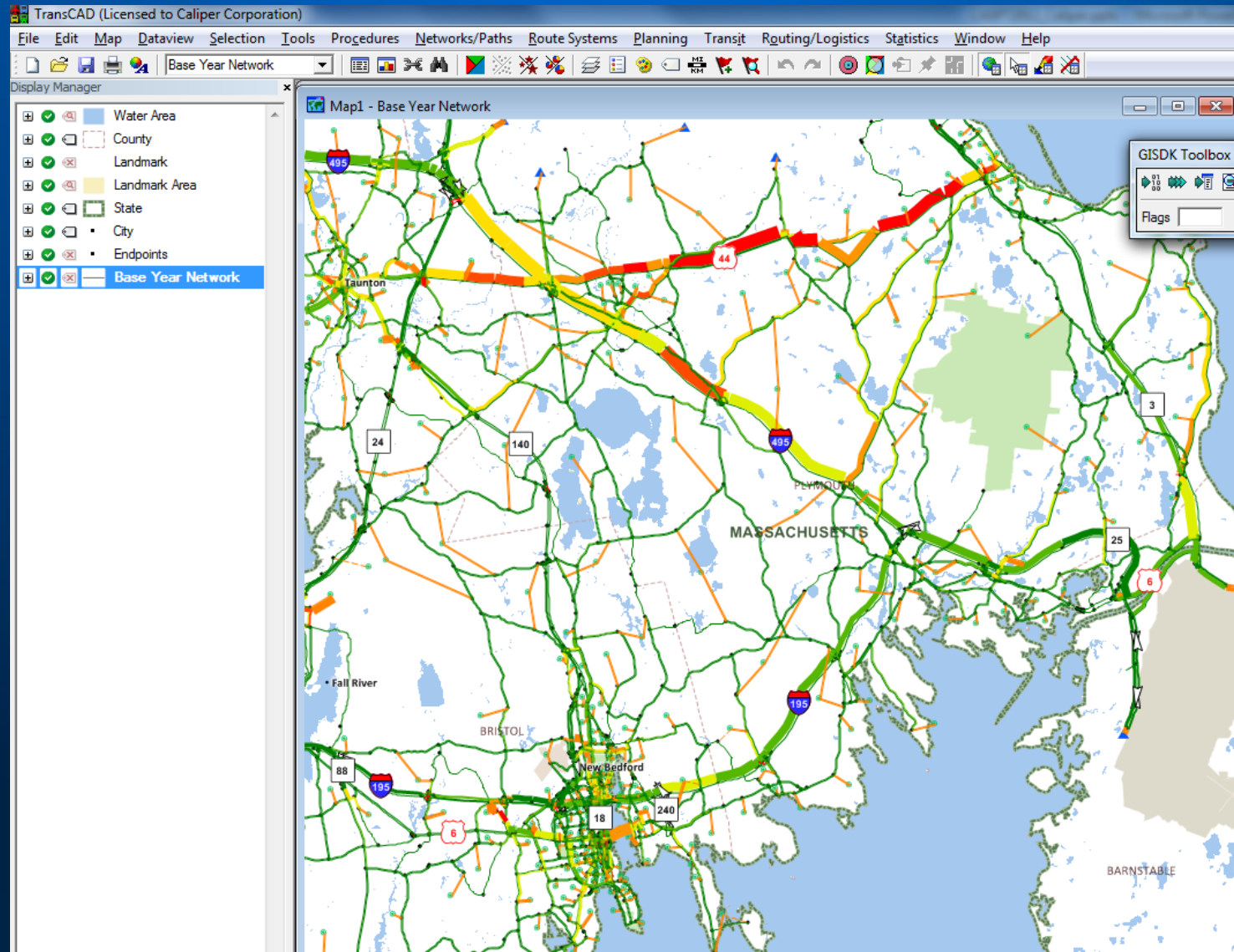
Feature Info

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

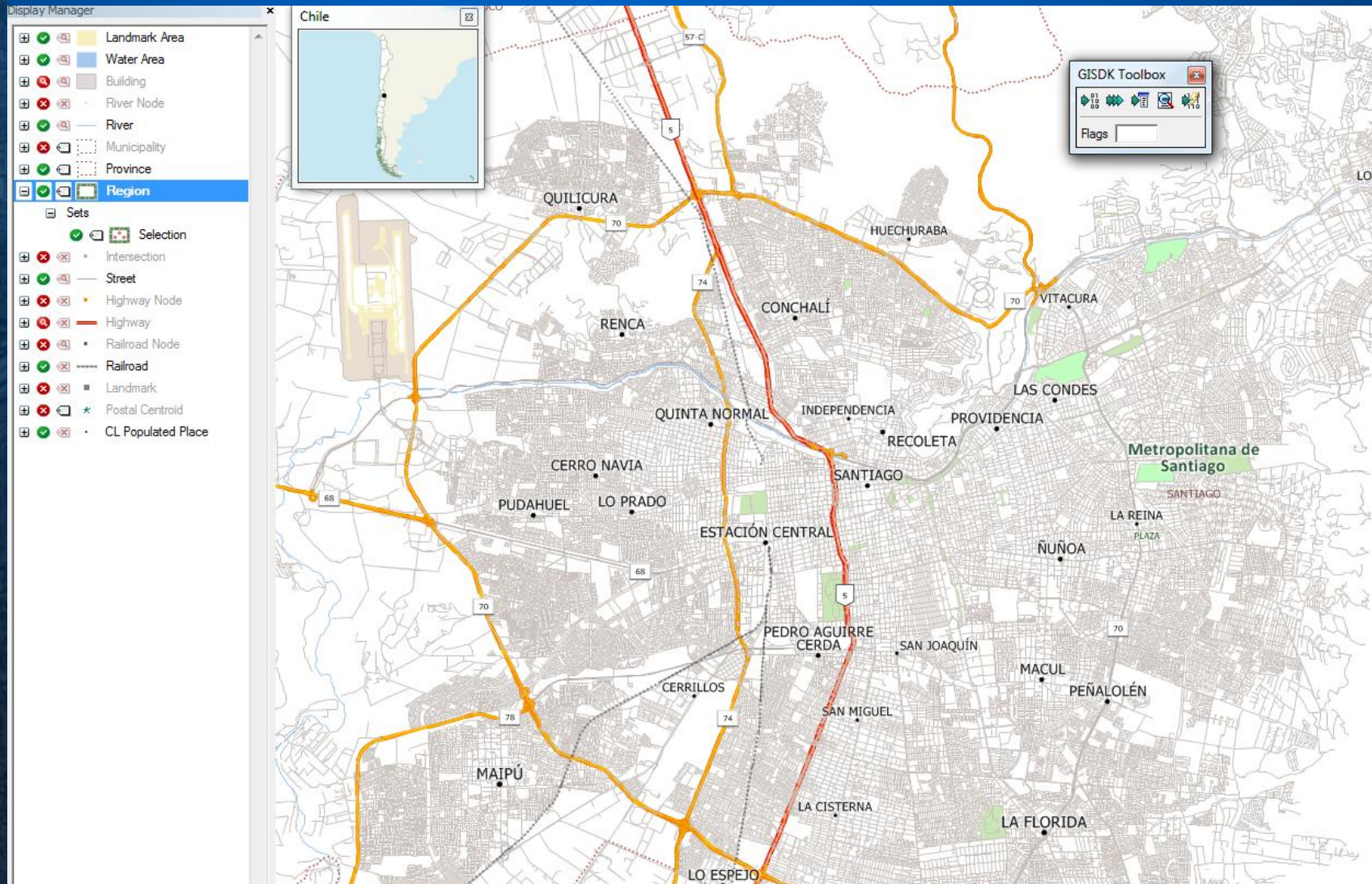
Map showing the Base Year Network in Massachusetts, including major highways (Interstate 495, Interstate 195, Interstate 26, Interstate 25, Interstate 24, Interstate 23, Interstate 22, Interstate 21, Interstate 20, Interstate 19, Interstate 18, Interstate 17, Interstate 16, Interstate 15, Interstate 14, Interstate 13, Interstate 12, Interstate 11, Interstate 10, Interstate 9, Interstate 8, Interstate 7, Interstate 6, Interstate 5, Interstate 4, Interstate 3, Interstate 2, Interstate 1) and cities (Taunton, Fall River, Bristol, New Bedford, Plymouth, Barnstable).

Caliper

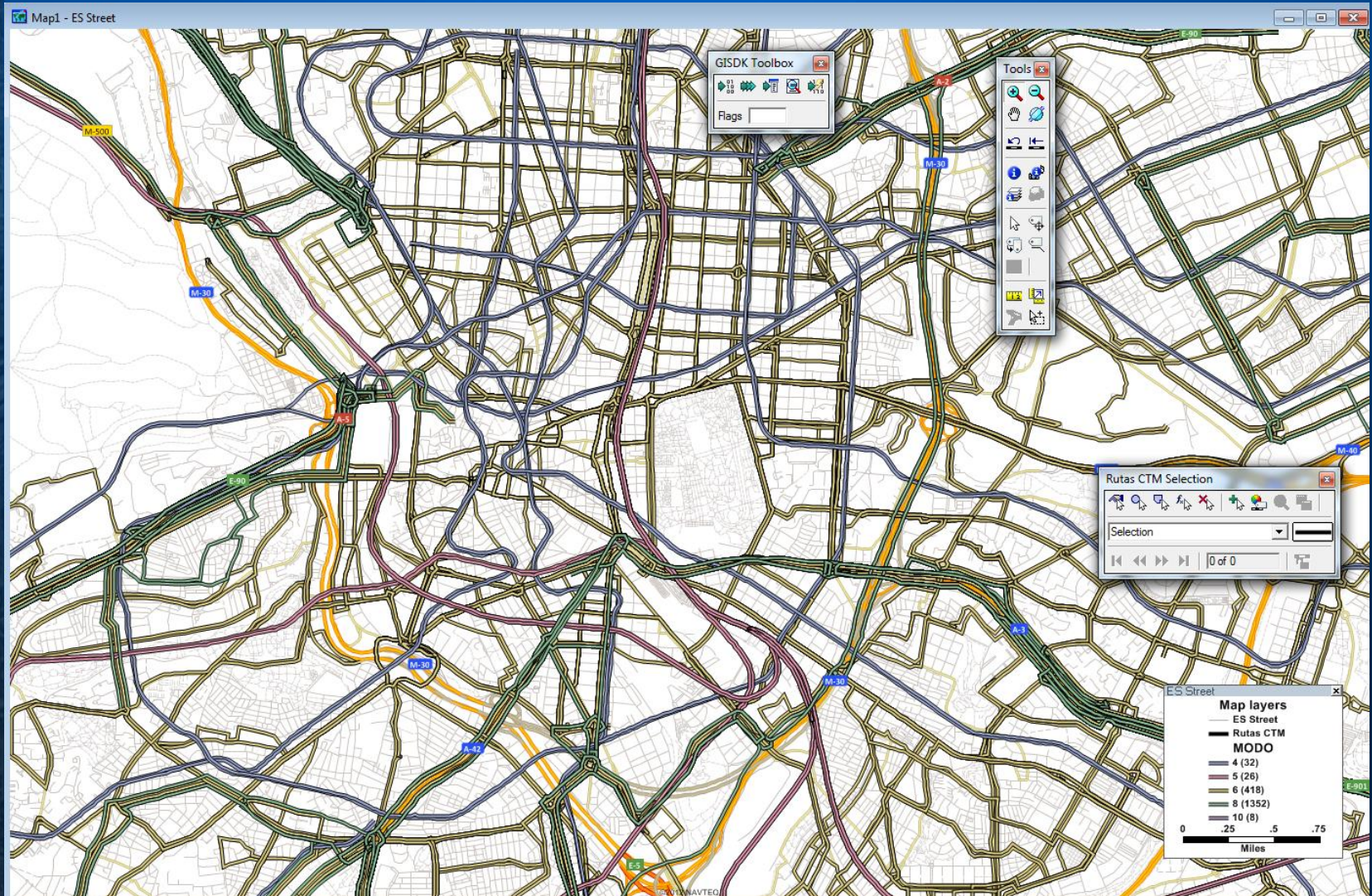
TransCAD: GIS based system



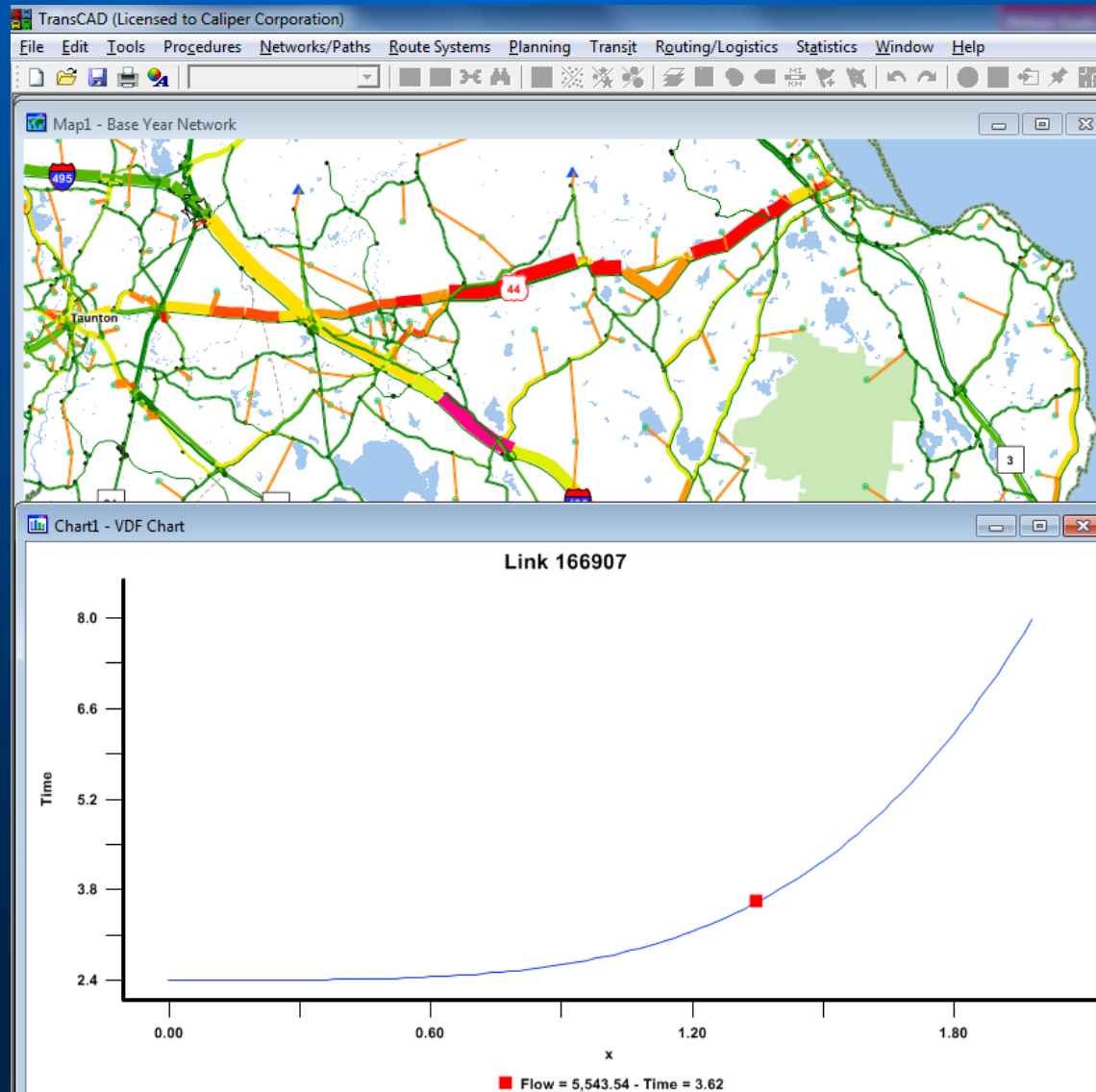
Detailed Cartography Available



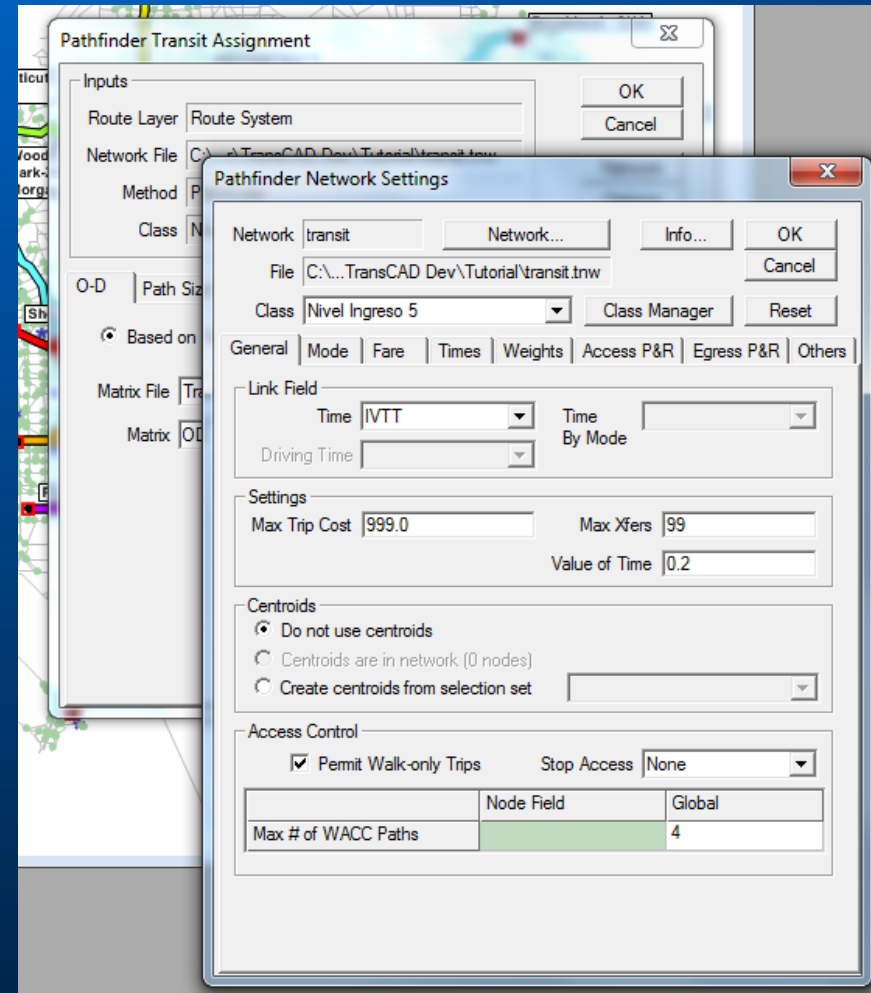
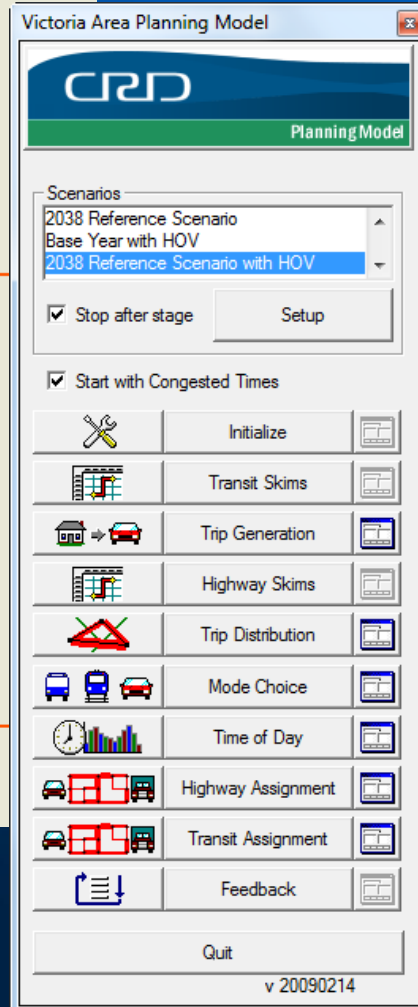
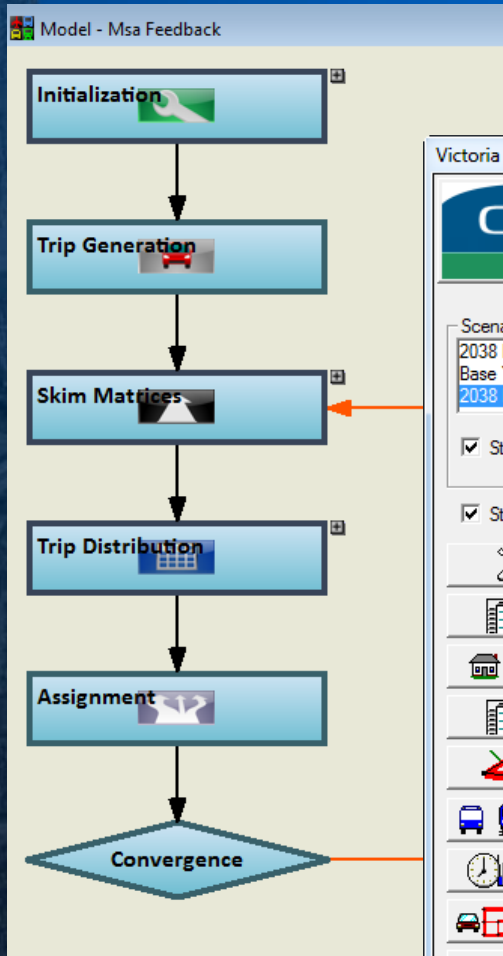
Madrid Route System



TransCAD: GIS Based



TransCAD Graphical User Interface



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)

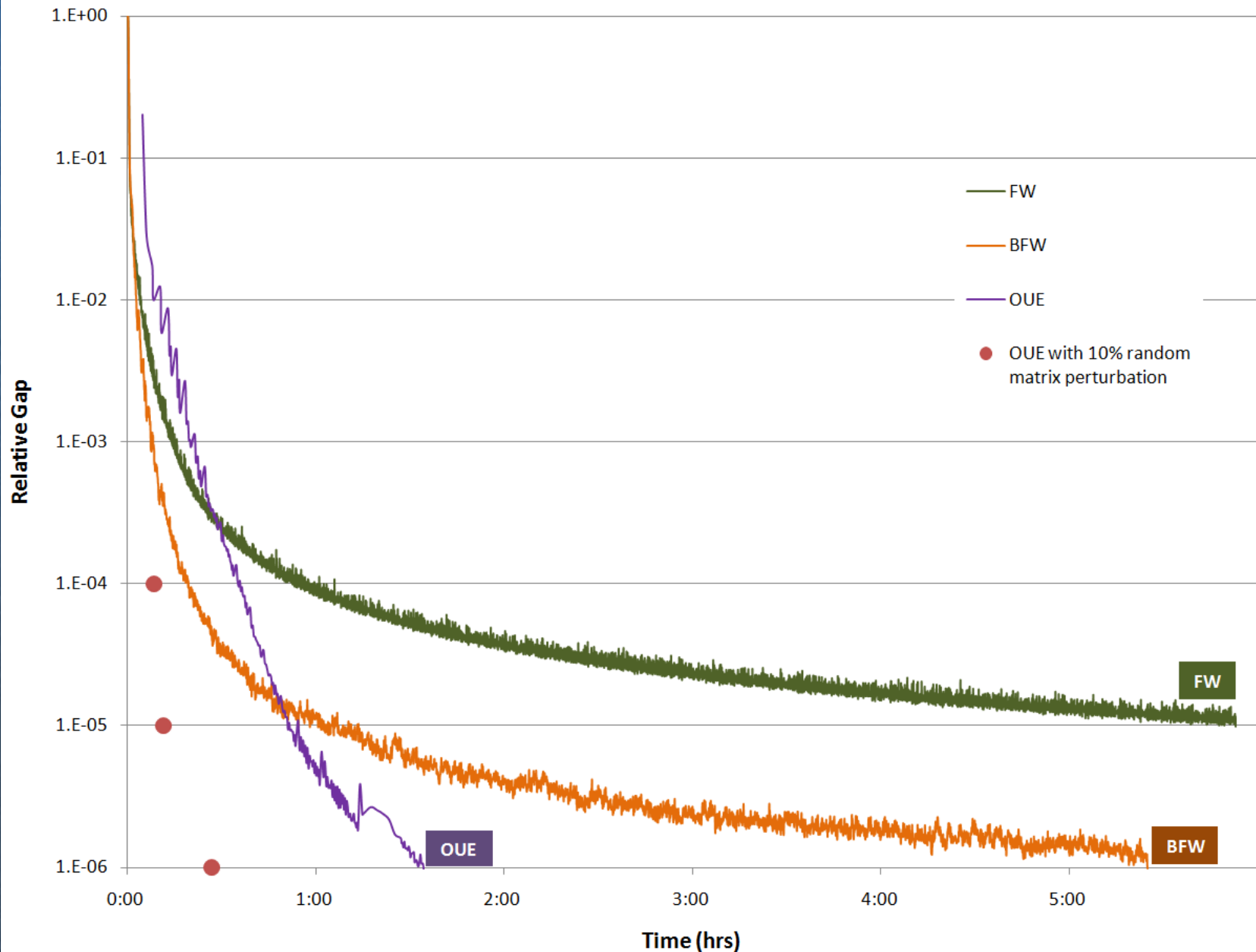
# test matrix processing in transcad

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)
```

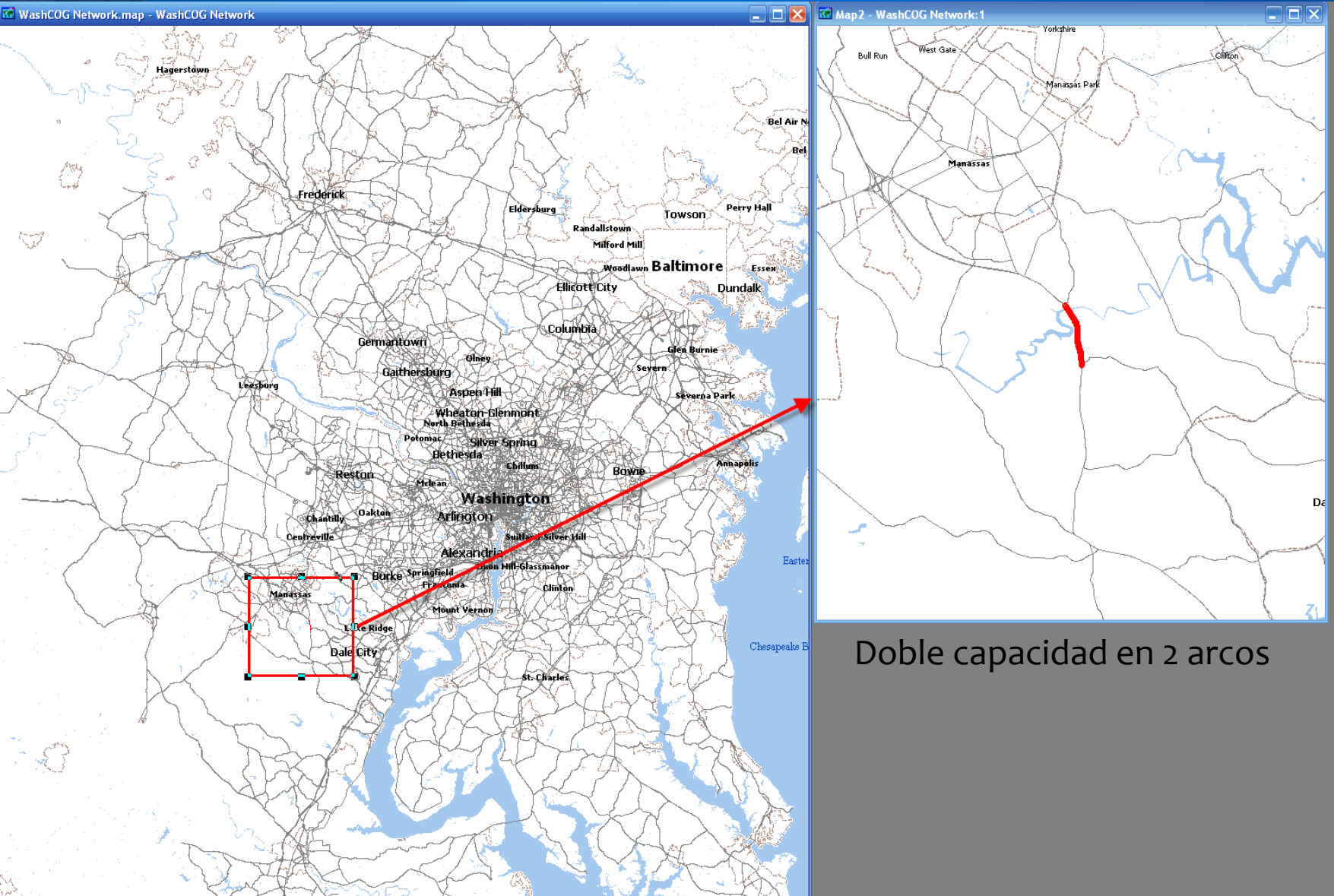
TransCAD: Powerful Computation Engine

- 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

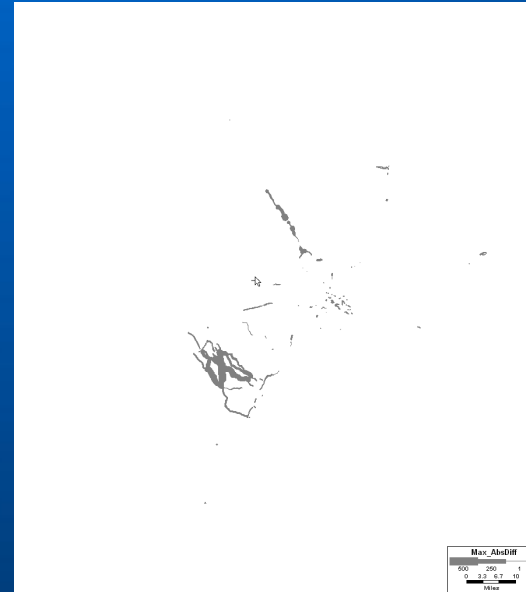
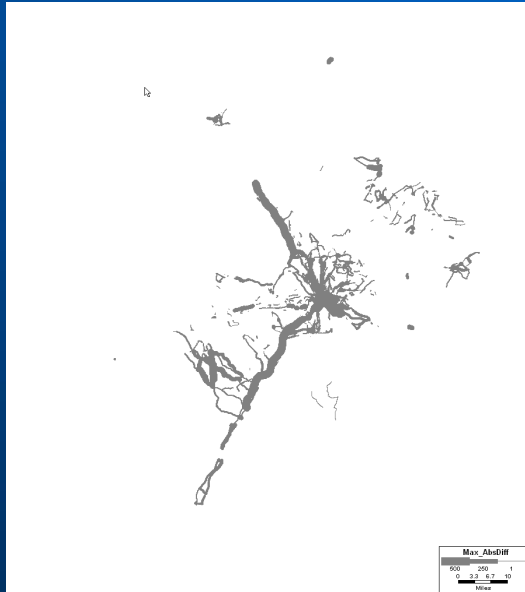


Project Evaluation

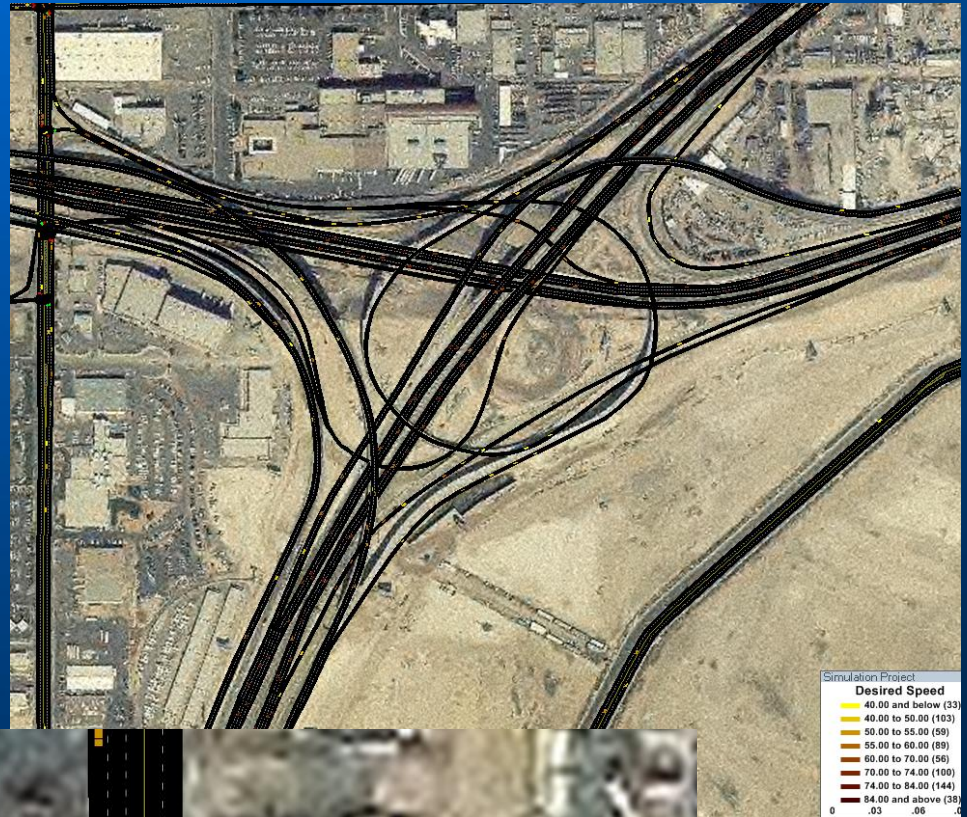
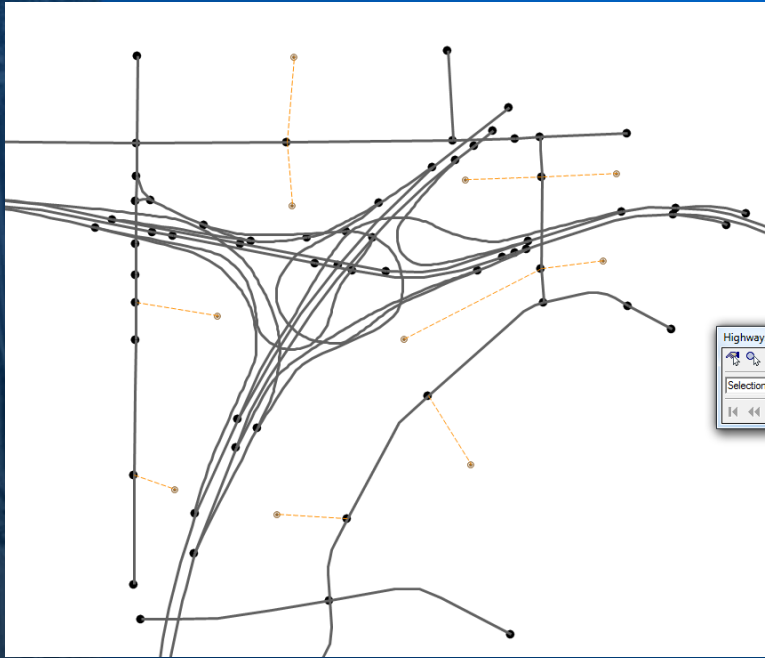


Doble capacidad en 2 arcos

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



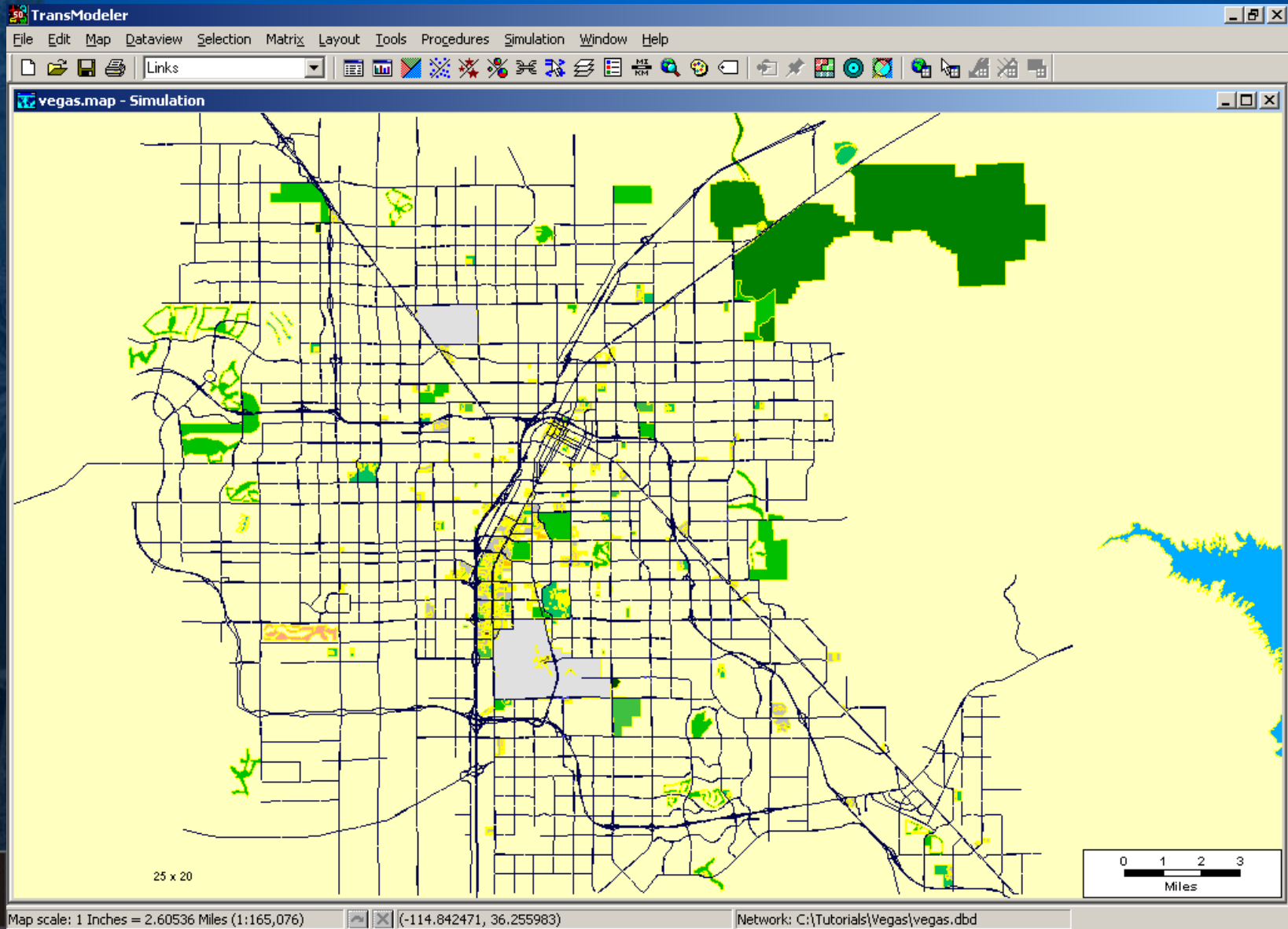
TransCAD to TransModeler



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
- **Mesosopic simulation:** Similar to macroscopic model, but vehicles are grouped into traffic cells and streams

Case Study – Las Vegas



Case Study

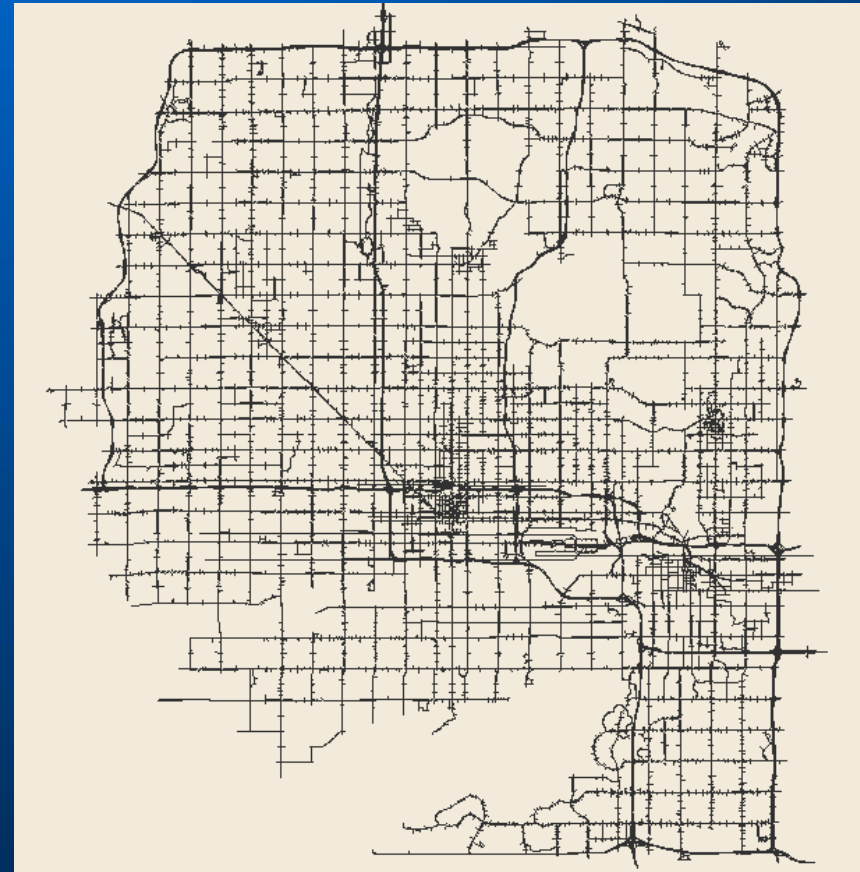
- Las Vegas transportation planning network (3K nodes, 8K links, 10K segments, 20K lanes, 500 signalized intersections)
- Edited for geometric accuracy and to provide info such as turning bays, acc/dec lanes, lane alignment, etc
- Pre-timed signal plans
- Experiment of microscopic and hybrid traffic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

Summary of Case Study

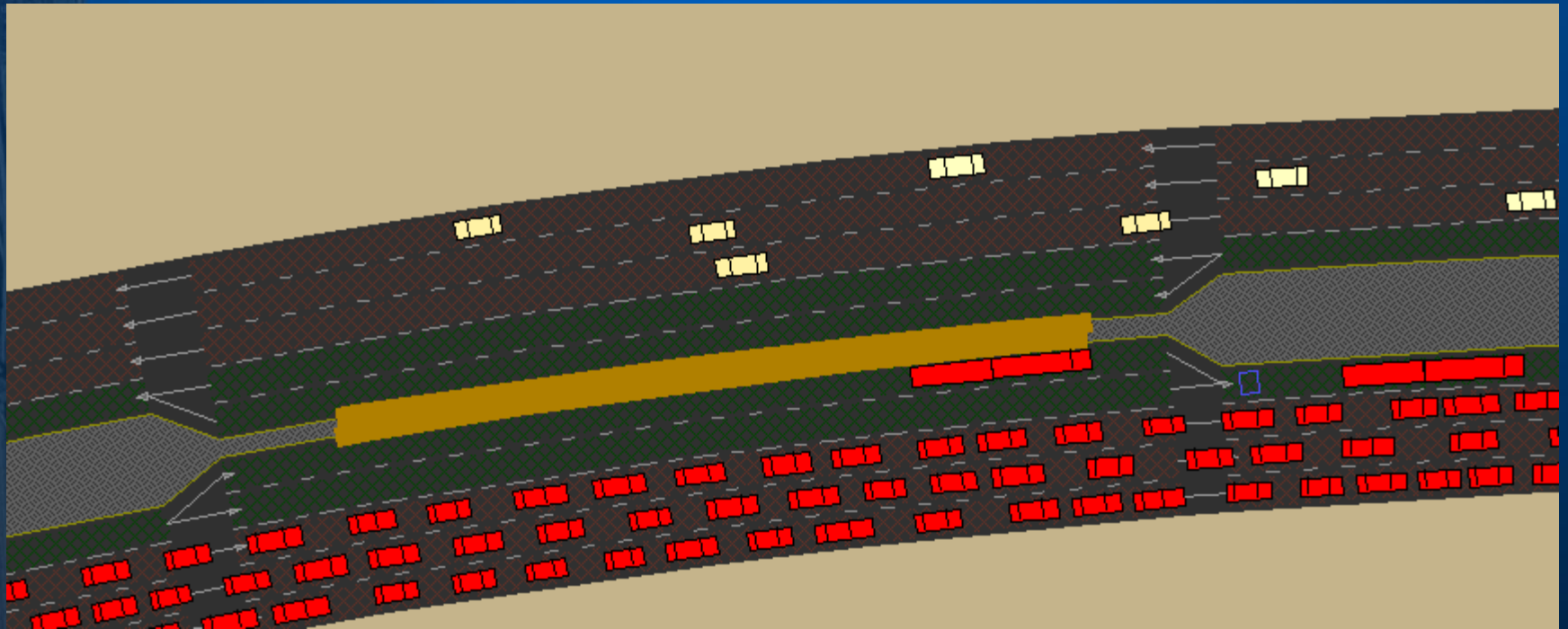
- Time to prepare input data to the model depends on network size and fidelity.
- Running time for one hour simulation (on a PC at 2.4 GHz, 512 MB)
 - Microscopic: 3 hrs. and 44 min.
 - Mesoscopic: 9 min. and 17 sec.
 - Macroscopic: about 1 min.
 - Microscopic and mesoscopic Hybrid: 45 min. and 36 sec.

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

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