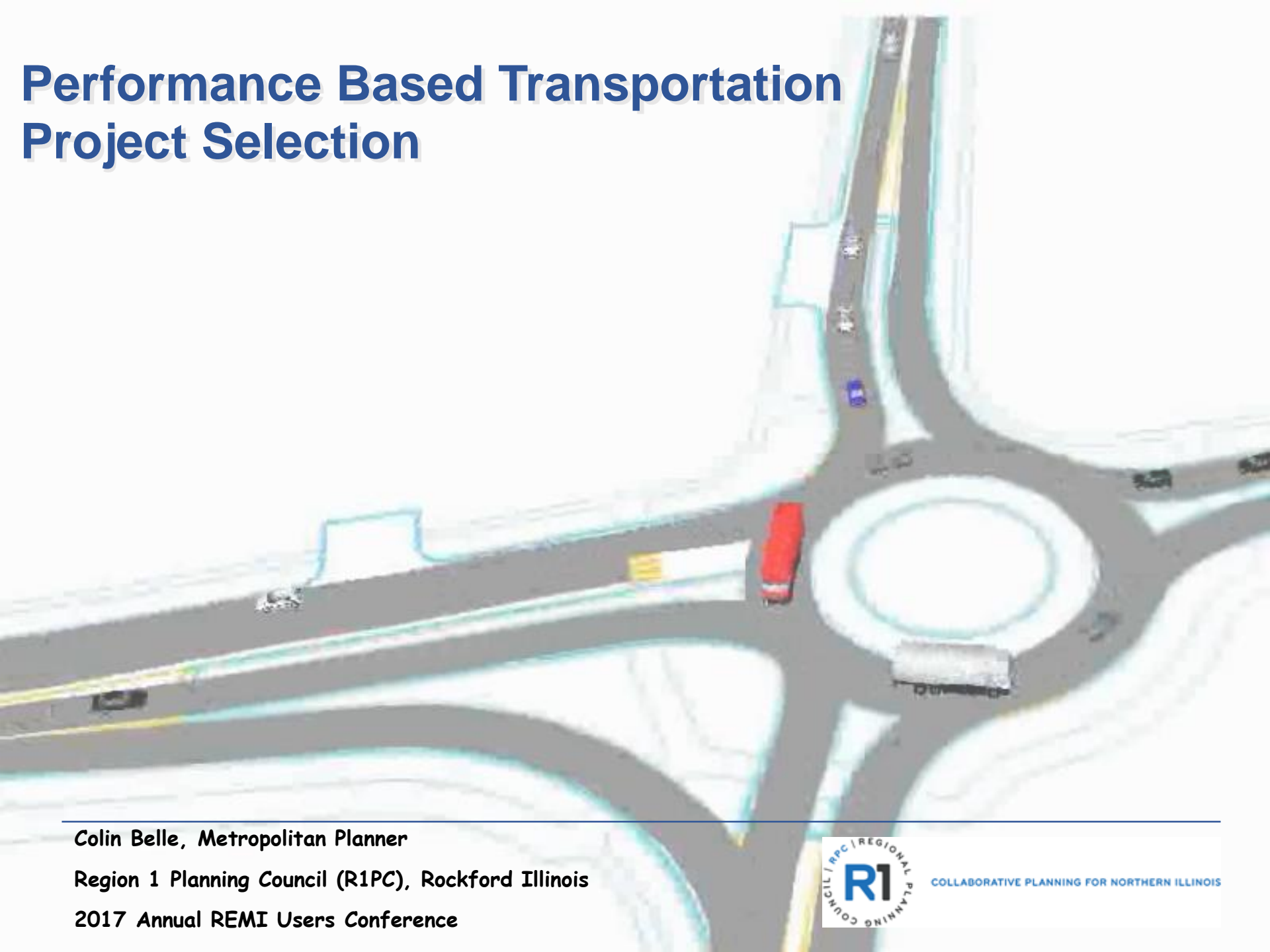


Performance Based Transportation Project Selection



Colin Belle, Metropolitan Planner

Region 1 Planning Council (R1PC), Rockford Illinois

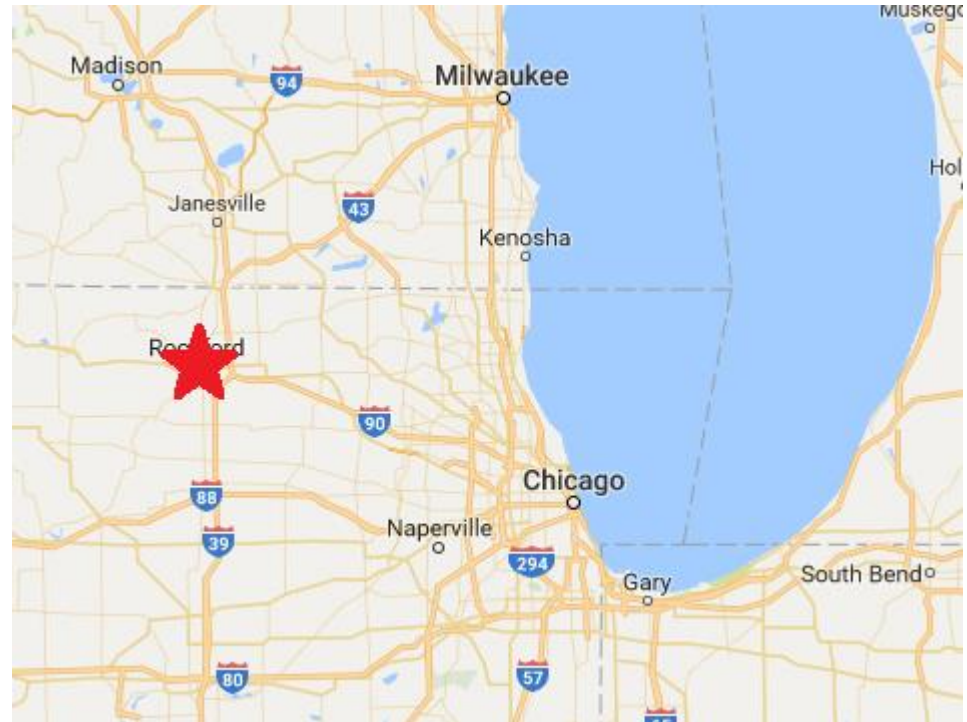
2017 Annual REMI Users Conference



COLLABORATIVE PLANNING FOR NORTHERN ILLINOIS

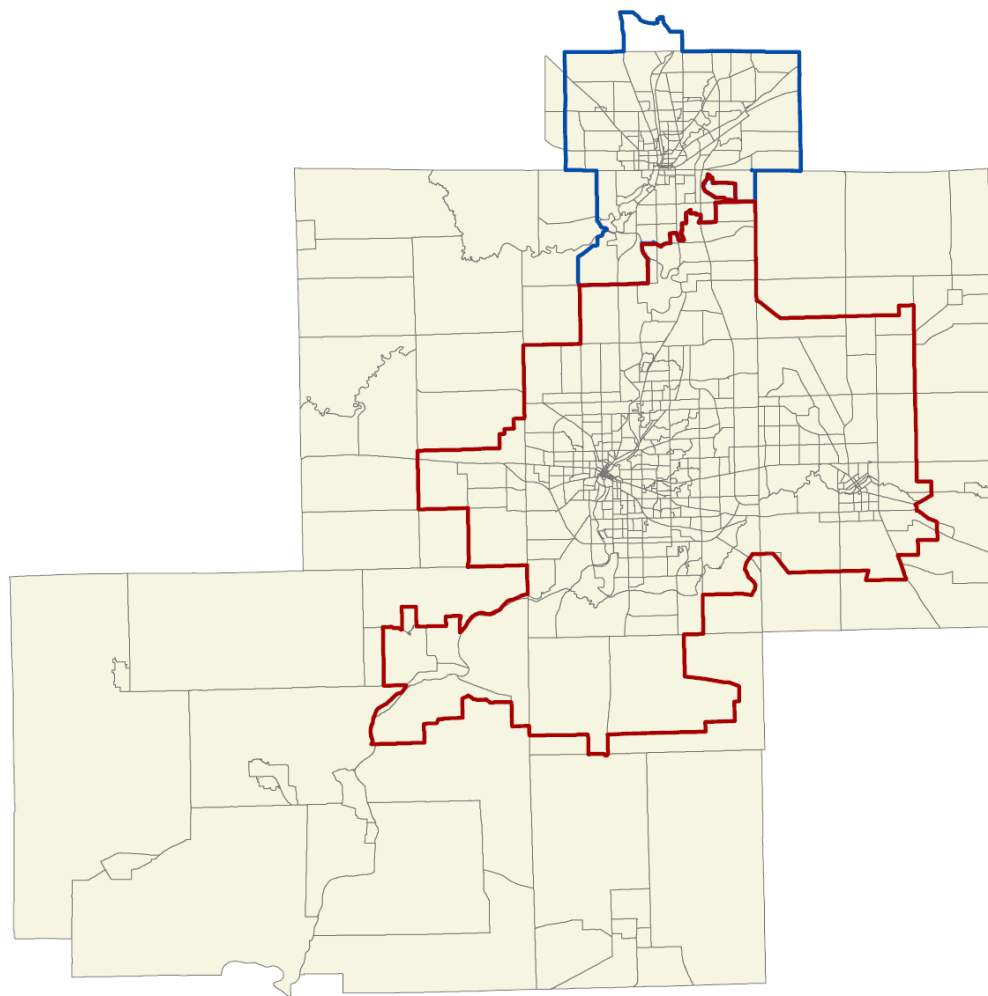
Regional Context

- 80 miles NW Chicago, 60 miles from O'Hare Airport, <100 miles to Milwaukee
- Population of 441,000
1,640+ sq/mi
- U.S. Route 20, Interstate 39/90
- Rockford International Airport
 - 3rd busiest airport in Illinois
 - 29th for cargo in the nation
 - UPS, Amazon



Local Context

- Rockford Metropolitan Agency for Planning (RMAP) transitioning from an MPO to an RPC – Region 1 Planning Council
- Past, economy was based on heavy industrial processes
- Today, health care, manufacturing, tourism, agriculture, freight and cargo transportation.



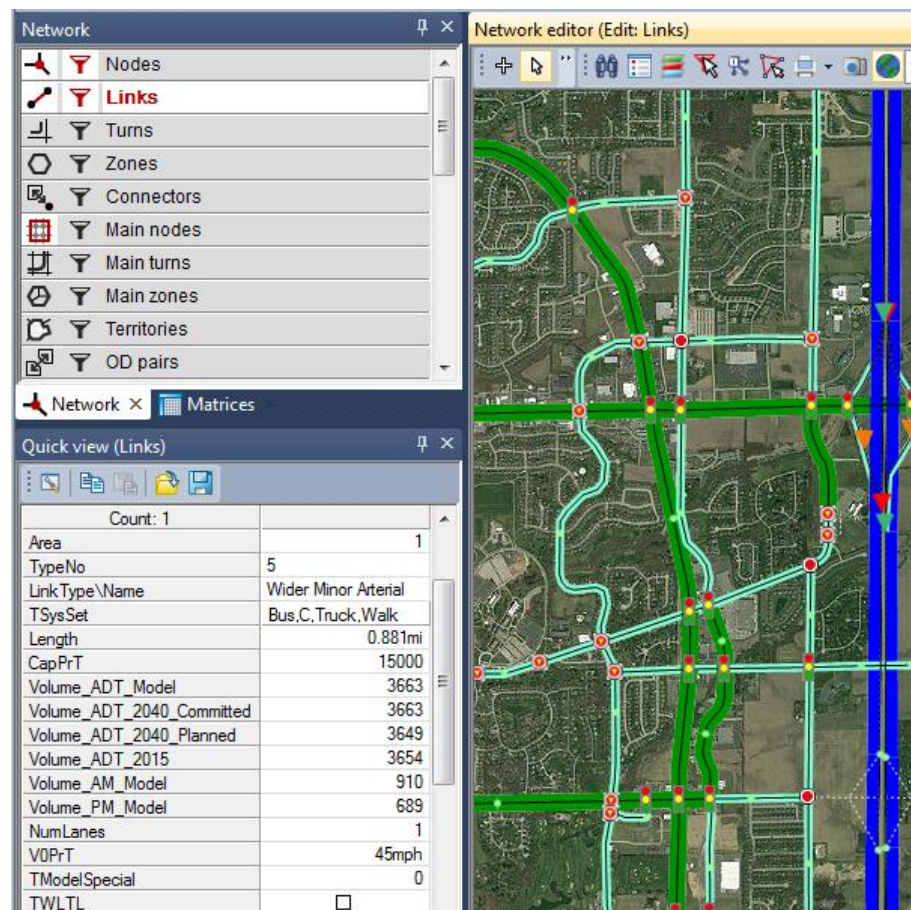
Federal and State Accountability

- During RMAPs last Transportation Management Area Certification Review from The Federal Highway and Federal Transit Administration a *Corrective Action/Recommendation* was found for our Long Range Transportation Plan. It was recommended to “implement a Benefit-Cost Analysis, or comparable analysis, for aiding in project selection; RMAP should re-evaluate the methodology for rating and selecting major capital investment projects in the LRTP.” (2015)
- Fixing America’s Surface Transportation Act, (FAST) 2015 (Previously MAP-21)
 - The U.S. DOT should require state DOTs and MPOs to perform economic analysis and incorporate regional priorities as part of state regional transportation improvement plans TIP.
 - Performance assessment and reporting should be expanded to include performance areas beyond those currently established. Reporting should be accessible to the community to increase transparency and accountability.

Travel Demand Model Integration

Infrastructure projects are entered into the Travel Demand Model with as much detail as possible.

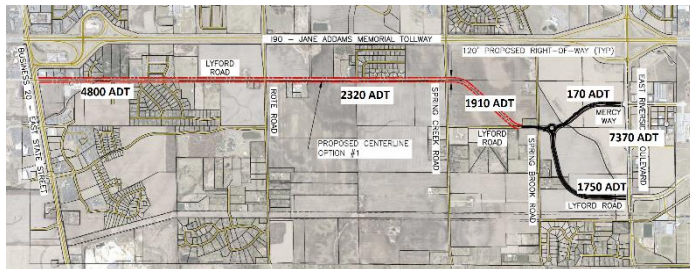
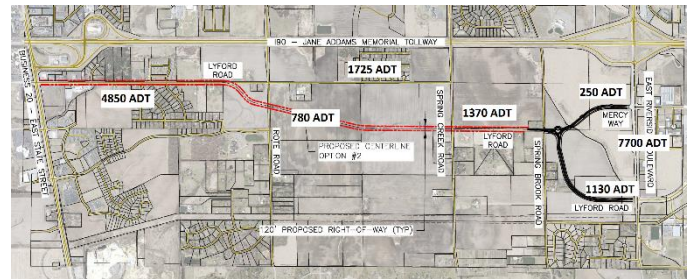
- Functional classification
- Operating speeds
- Number of Lanes
- Intersections, including type
- Future employment data if known, by Traffic Analysis Zone, TAZ



Travel Demand Model Integration

Export changes in VMT, VHT, and Trips which are used to compare against the baseline for the Benefit-Cost Analysis

Project accessibility, travel-time savings,
GHG reductions, decrease VMT, VHT



Project completion time, total project cost,
Economic loss to local economy during construction

Export Data for REMI Integration

Export changes in VMT, VHT, and Trips which are used to compare against the baseline transportation, economic, and demographic model results.

Data is exported into excel in a format developed by our TDM consultant which allows for a seamless upload into REMI TranSight for analysis.

PTV Visum 64 Bit 15.00-17 - Network: RMAP Base-10-04-16a.ver - [Procedure sequence]

File Edit View Lists Filters Calculate Graphics Network Demand Scripts Windows Help Procedure sequence

Select filter... Procedure sequence

Count	311	Execution	Active	Procedure	Reference object(s)	Variant/file	Comment
1			<input type="checkbox"/>	Group RMAP Model Procedures Updated 10-04-2016			RMAP Model Procedures Updated 10-04-2016
2			<input type="checkbox"/>	Group AirSage Matrix Analysis ...	3 - 35		AirSage Matrix Analysis
36			<input type="checkbox"/>	Group Count Attachment ...	37 - 66		Count Attachment
67			<input type="checkbox"/>	Group External Through Trip Computations ...	68 - 87		External Through Trip Computations
88			<input checked="" type="checkbox"/>	Group Network Hourly Capacity Calculations ...	89 - 113		Network Hourly Capacity Calculations
114			<input checked="" type="checkbox"/>	Group Trip Generation and Adjustments ...	115 - 170		Trip Generation and Adjustments
171			<input type="checkbox"/>	Group Iterative Distribution and Mode Choice ...	172 - 202		Iterative Distribution and Mode Choice
203			<input type="checkbox"/>	Group AM Final Assignment ...	204 - 217		AM Final Assignment
218			<input type="checkbox"/>	Group PM Final Assignment ...	219 - 236		PM Final Assignment
237			<input type="checkbox"/>	Group Daily Final Assignment ...	238 - 282		Daily Final Assignment
283			<input type="checkbox"/>	Group Adjust External-External ...	284 - 287		Adjust External-External
288			<input checked="" type="checkbox"/>	Group Assignment Analysis ...	289 - 298		Assignment Analysis
299			<input type="checkbox"/>	Group Truck Analysis ...	300 - 306		Truck Analysis
307			<input checked="" type="checkbox"/>	Group REMI Data Export	308 - 311		REMI Data Export
308			<input checked="" type="checkbox"/>	Combination of matrices and vectors	Matrix([NO]=2000):=Matrix([NO]=100)		Copy Assigned Auto Trips to Matrix
309			<input checked="" type="checkbox"/>	Combination of matrices and vectors	Matrix([NO]=2001):=Matrix([NO]=100)		Copy Assigned Truck Trips to Matrix
310			<input checked="" type="checkbox"/>	Combination of matrices and vectors	Matrix([NO]=2002):=Matrix([NO]=102)		Copy Assigned Truck Trips to Matrix
311			<input checked="" type="checkbox"/>	Run script	Export_REMI.py		RMAP_2015 Base

Operations: Create, Create group, Edit, Delete, Duplicate, Up, Down, Set all active, Set all inactive

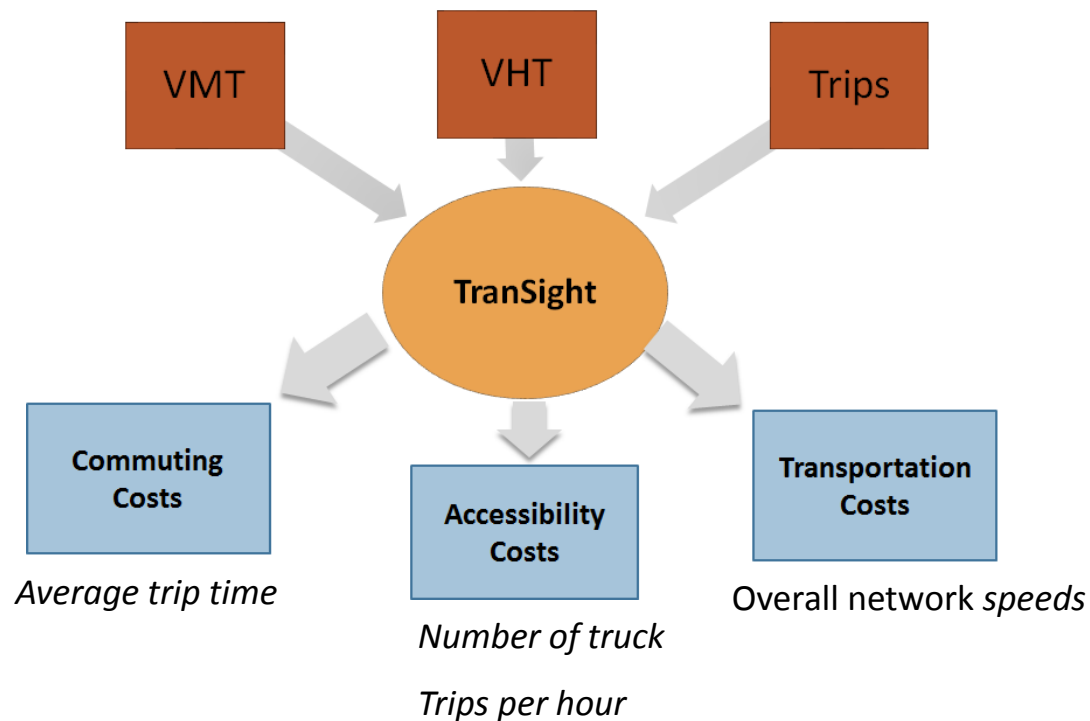
View: Expand group, Reduce group, Reduce all groups, Expand all groups

Computation nodes: Manage computation

Export Data to
REMI Format

VISUM and TranSight Integration

TDM Outputs needed
As inputs to TranSight



REMI TranSight
Calculates...

VISUM – REMI Import Procedure

Regional Simulation 1 - REMI TranSight v4.1

FILE HOME Navigation

Select Inputs Inputs List Forecast Options Results Navigation

Start Travel Demand

Travel Demand

Travel Demand Changes

Government Funding

Travel Demand Parameters

Design and Construction

Operation and Maintenance

Baseline

Import/Export

Highway VMT

Highway VHT

Highway Trips

Transit VMT

Transit VHT

Transit Trips

Adjusted

Import/Export

Highway VMT

Highway VHT

Highway Trips

Transit VMT

Transit VHT

Transit Trips

General Changes

Emission Cost Per Gram

Setting up the baseline Travel Demand data

You can also choose to import from your own transportation model or an existing Travel Demand File.

Please note that importing will overwrite any previously specified baseline VMT, VHT, and Trips data.

Model Type: Custom-Multi-Year

Import Baseline Travel Data

Save to Travel Demand File (.tdd)

Path to Data: None

Add To Inputs List

Cancel

- Vehicle Occupancy
- Accident Rates/Values
- Fuel Costs including pre-tax, federal and state excise tax rates
- Leisure Time Value

Right-click on a tile to select or de-select it as a favorite.

0 policy variable(s) active. Not Saved

Winnebago, Boone, and Ogle County (TS-WB) - 3 Region 70 Sector Model

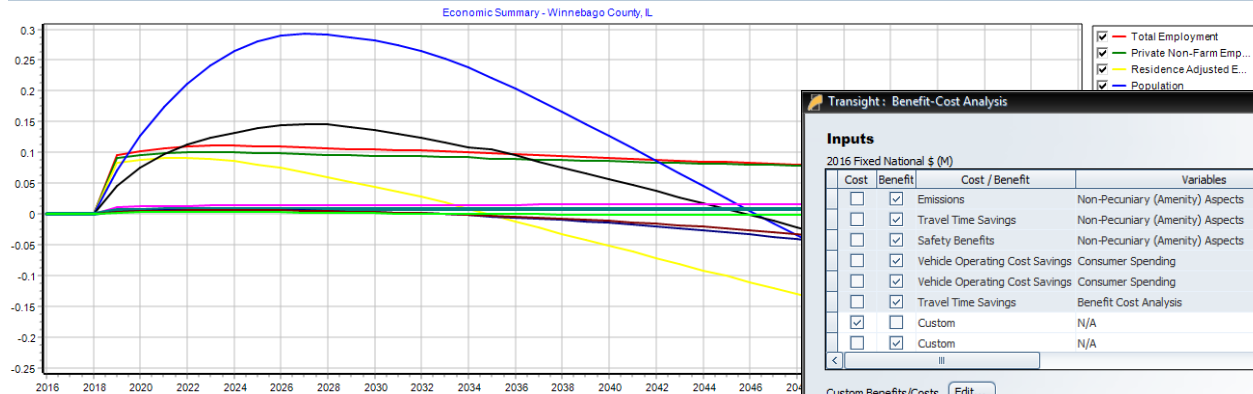
TranSight Benefit – Cost Analysis

Region

Winnebago County, IL

Category	Units	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Labor Force	Thousands	0.000	0.000	0.000	+0.046	+0.076	+0.098	+0.113	+0.124	+0.133	+0.140	+0.144	+0.147	+0.146	+0.141	+0.141
Output	Billions of Fixed (2009) Dollars	0.000	0.000	0.000	+0.011	+0.012	+0.013	+0.013	+0.014	+0.014	+0.014	+0.014	+0.014	+0.014	+0.014	+0.014
PCE-Price Index	2009=100 (Nation)	0.000	0.000	0.000	+0.001	+0.003	+0.003	+0.004	+0.003	+0.003	+0.003	+0.003	+0.002	+0.002	+0.001	+0.001
Personal Income	Billions of Current Dollars	0.000	0.000	0.000	+0.004	+0.005	+0.006	+0.007	+0.007	+0.007	+0.007	+0.006	+0.006	+0.005	+0.004	+0.004
Population	Thousands	0.000	0.000	0.000	+0.071	+0.127	+0.174	+0.211	+0.242	+0.265	+0.281	+0.290	+0.293	+0.292	+0.288	+0.288
Private Non-Farm Employment	Thousands (Jobs)	0.000	0.000	0.000	+0.092	+0.096	+0.099	+0.100	+0.101	+0.100	+0.099	+0.098	+0.097	+0.096	+0.095	+0.095
Residence Adjusted Employment	Thousands	0.000	0.000	0.000	+0.083	+0.088	+0.091	+0.091	+0.090	+0.086	+0.081	+0.075	+0.068	+0.060	+0.053	+0.053
Total Employment	Thousands (Jobs)	0.000	0.000	0.000	+0.096	+0.103	+0.107	+0.110	+0.111	+0.111	+0.110	+0.109	+0.108	+0.106	+0.105	+0.105

II



Transight: Benefit-Cost Analysis

Inputs

2016 Fixed National \$ (M)

Cost	Benefit	Cost / Benefit	Variables	Detail	2017	2018	2019	
<input type="checkbox"/>	<input checked="" type="checkbox"/>		Emissions	Non-Pecuniary (Amenity) Aspects	Total	0.000	0.000	0.109
<input type="checkbox"/>	<input checked="" type="checkbox"/>		Travel Time Savings	Non-Pecuniary (Amenity) Aspects	Total	0.000	0.000	5.365
<input type="checkbox"/>	<input checked="" type="checkbox"/>		Safety Benefits	Non-Pecuniary (Amenity) Aspects	Total	0.000	0.000	2.443
<input type="checkbox"/>	<input checked="" type="checkbox"/>		Vehicle Operating Cost Savings	Consumer Spending	Motor vehicle fuels, lubricants,	0.000	0.000	-0.934
<input type="checkbox"/>	<input checked="" type="checkbox"/>		Vehicle Operating Cost Savings	Consumer Spending	Motor vehicle maintenance and	0.000	0.000	-0.391
<input type="checkbox"/>	<input checked="" type="checkbox"/>		Travel Time Savings	Benefit Cost Analysis	Travel Time Savings	0.000	0.000	0.001
<input checked="" type="checkbox"/>	<input type="checkbox"/>		Custom	N/A	Project Cost	2.046	2.046	2.046
<input type="checkbox"/>	<input checked="" type="checkbox"/>		Custom	N/A	Maintenance	0.005	0.005	0.005

Custom Benefits/Costs

Edit...

Results

Parameters

Discount Rate	7%
Analysis Period	10
Evaluation Year	2016

Evaluation from 2016 to 2025

<input checked="" type="checkbox"/> Total Benefits, Mil PV\$	40.63
Emissions Benefits, Mil PV\$	0.48
Safety Benefits, Mil PV\$	10.75
Vehicle Operating Cost Savings, Mil PV\$	5.83
Maintenance Costs, Mil PV\$	-0.03
Travel Time Savings, Mil PV\$	23.60
Other Benefits, Mil PV\$	0.00
<input checked="" type="checkbox"/> Total Costs, Mil PV\$	5.02
Design & Construction Costs, Mil PV\$	5.02
Land Acquisition Costs, Mil PV\$	0.00
Custom Costs, Mil PV\$	0.00
Benefit-Cost Ratio	8.09

Benefit-Cost Analysis

Benefit-Cost Analysis is an economic tool for evaluating possible projects by comparing their total benefits with their total cost over a period of time. This analysis considers only the direct benefits and direct costs associated with a project, according to the FHWA guidelines. A discount rate is used to calculate the total present value of the benefits of a project to society and the total present value of the costs of designing and constructing the project. Benefits may include changes to the environment due to changes in emissions, vehicle operating cost savings, safety benefits, travel time savings, and maintenance costs/savings. A Benefit-Cost Ratio can be calculated using the net present value of the benefits divided by the net present value of the costs which can be used to evaluate a project's economic merit.

OK

Cancel

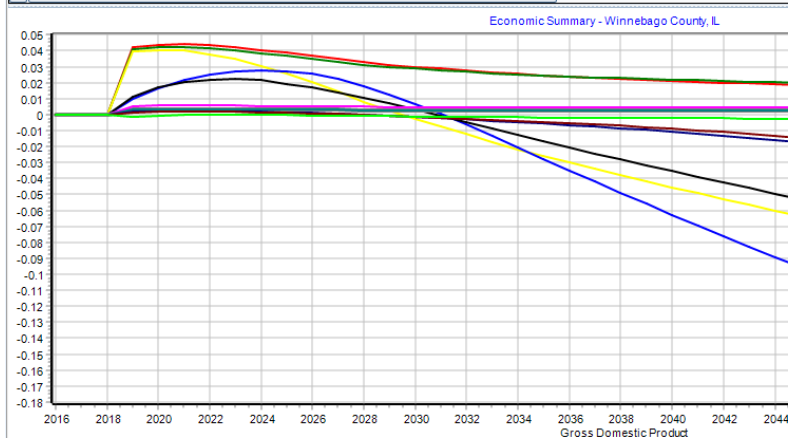
Projects of Regional Significance may be compared to one another based on data-driven results

REGIONAL PLANNING COUNCIL

COLLABORATIVE PLANNING FOR NORTHERN ILLINOIS

TranSight Benefit – Cost Analysis 2

Region																
Winnebago County, IL																
Category	Units	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Total Employment	Thousands (Jobs)	0.000	0.000	0.000	+0.042	+0.044	+0.044	+0.044	+0.042	+0.041	+0.039	+0.037	+0.035	+0.033	+0.031	+0.030
Private Non-Farm Employment	Thousands (Jobs)	0.000	0.000	0.000	+0.041	+0.042	+0.042	+0.041	+0.040	+0.038	+0.037	+0.035	+0.033	+0.031	+0.030	+0.029
Residence Adjusted Employment	Thousands	0.000	0.000	0.000	+0.040	+0.040	+0.040	+0.038	+0.035	+0.031	+0.026	+0.020	+0.014	+0.008	+0.002	-0.002
Population	Thousands	0.000	0.000	0.000	+0.010	+0.017	+0.022	+0.025	+0.027	+0.028	+0.027	+0.026	+0.022	+0.018	+0.012	+0.007
Labor Force	Thousands	0.000	0.000	0.000	+0.011	+0.017	+0.020	+0.022	+0.022	+0.022	+0.019	+0.017	+0.014	+0.011	+0.007	+0.004
Gross Domestic Product	Billions of Fixed (2009) Dollars	0.000	0.000	0.000	+0.003	+0.003	+0.003	+0.003	+0.003	+0.003	+0.003	+0.003	+0.003	+0.003	+0.003	+0.003
Output	Billions of Fixed (2009) Dollars	0.000	0.000	0.000	+0.005	+0.006	+0.006	+0.006	+0.006	+0.006	+0.005	+0.005	+0.005	+0.005	+0.005	+0.005
Value Added	Billions of Fixed (2009) Dollars	0.000	0.000	0.000	+0.003	+0.003	+0.003	+0.003	+0.003	+0.003	+0.003	+0.003	+0.003	+0.003	+0.003	+0.003
III																



Transight: Benefit-Cost Analysis

Region

Winnebago County, IL

Inputs

2016 Fixed National \$ (M)

Cost	Benefit	Cost / Benefit	Variables	Detail	2017	2018	2019	2020
<input type="checkbox"/>	<input checked="" type="checkbox"/>		Emissions Non-Pecuniary (Amenity) Aspects	Total	0.000	0.000	-0.006	-0.006
<input type="checkbox"/>	<input checked="" type="checkbox"/>		Travel Time Savings Non-Pecuniary (Amenity) Aspects	Total	0.000	0.000	-0.396	-0.396
<input type="checkbox"/>	<input checked="" type="checkbox"/>		Safety Benefits Non-Pecuniary (Amenity) Aspects	Total	0.000	0.000	-0.143	-0.143
<input type="checkbox"/>	<input checked="" type="checkbox"/>		Vehicle Operating Cost Savings Consumer Spending	Motor vehicle fuels, lubricants,	0.000	0.000	0.050	0.050
<input type="checkbox"/>	<input checked="" type="checkbox"/>		Vehicle Operating Cost Savings Consumer Spending	Motor vehicle maintenance and	0.000	0.000	0.020	0.020
<input type="checkbox"/>	<input checked="" type="checkbox"/>		Travel Time Savings Benefit Cost Analysis	Travel Time Savings	0.000	0.000	0.000	0.000
<input checked="" type="checkbox"/>	<input type="checkbox"/>		Custom N/A	Project Cost	1.000	1.000	1.000	0.000
<input type="checkbox"/>	<input type="checkbox"/>		Custom N/A	(New Design and Construction	0.005	0.005	0.005	0.005

Custom Benefits/Costs

Edit...

Results

Parameters

Discount Rate	7%
Analysis Period	10
Evaluation Year	2016

Evaluation from 2016 to 2025

<input checked="" type="checkbox"/> Total Benefits, Mil PV\$	-2.70
Emissions Benefits, Mil PV\$	-0.02
Safety Benefits, Mil PV\$	-0.63
Vehicle Operating Cost Savings, Mil PV\$	-0.31
Maintenance Costs, Mil PV\$	0.00
Travel Time Savings, Mil PV\$	-1.74
Other Benefits, Mil PV\$	0.00
<input checked="" type="checkbox"/> Total Costs, Mil PV\$	2.48
Design & Construction Costs, Mil PV\$	2.48
Land Acquisition Costs, Mil PV\$	0.00
Custom Costs, Mil PV\$	0.00
Benefit-Cost Ratio	-1.09

Benefit-Cost Analysis

Benefit-Cost Analysis is an economic tool for evaluating possible projects by comparing their total benefits with their total cost over a period of time. This analysis considers only the direct benefits and direct costs associated with a project, according to the FVHA guidelines. A discount rate is used to calculate the total present value of the benefits of a project to society and the total present value of the costs of designing and constructing the project. Benefits may include changes to the environment due to changes in emissions, vehicle operating cost savings, safety benefits, travel time savings, and maintenance costs/savings. A Benefit-Cost Ratio can be calculated using the net present value of the benefits divided by the net present value of the costs which can be used to evaluate a project's economic merit.

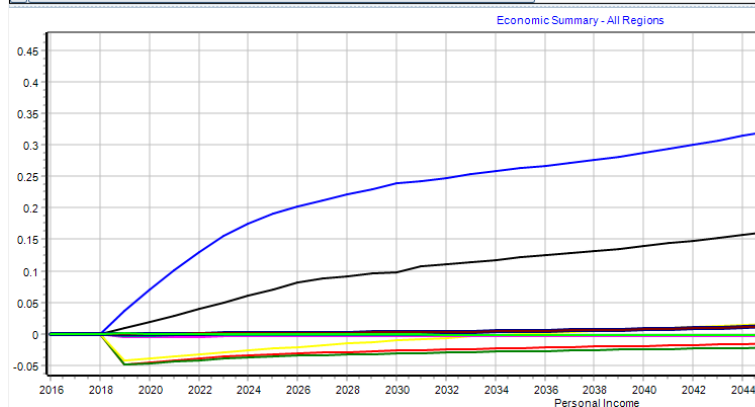
OK

Cancel

Benefit-Cost Analysis may be one metric used within a project selection criteria process.

TranSight Benefit – Cost Analysis 2

Region			2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
All Regions																	
Category	Units																
Total Employment	Thousands (Jobs)		0.000	0.000	0.000	-0.049	-0.046	-0.043	-0.040	-0.037	-0.034	-0.033	-0.031	-0.030	-0.029	-0.028	-0.027
Private Non-Farm Employment	Thousands (Jobs)		0.000	0.000	0.000	-0.049	-0.047	-0.045	-0.042	-0.040	-0.038	-0.036	-0.035	-0.034	-0.033	-0.032	-0.031
Residence Adjusted Employment	Thousands		0.000	0.000	0.000	-0.042	-0.039	-0.036	-0.033	-0.029	-0.026	-0.023	-0.021	-0.018	-0.016	-0.013	-0.011
Population	Thousands		0.000	0.000	0.000	+0.037	+0.071	+0.102	+0.130	+0.155	+0.175	+0.191	+0.203	+0.212	+0.221	+0.230	+0.238
Labor Force	Thousands		0.000	0.000	0.000	+0.009	+0.019	+0.028	+0.039	+0.050	+0.061	+0.070	+0.081	+0.088	+0.092	+0.095	+0.098
Gross Domestic Product	Billions of Fixed (2009) Dollars		0.000	0.000	0.000	-0.003	-0.003	-0.003	-0.003	-0.003	-0.003	-0.002	-0.002	-0.002	-0.002	-0.002	-0.002
Output	Billions of Fixed (2009) Dollars		0.000	0.000	0.000	-0.006	-0.005	-0.005	-0.005	-0.005	-0.004	-0.004	-0.004	-0.004	-0.004	-0.004	-0.004
Value Added	Billions of Fixed (2009) Dollars		0.000	0.000	0.000	-0.003	-0.003	-0.003	-0.003	-0.003	-0.003	-0.002	-0.002	-0.002	-0.002	-0.002	-0.002



Transight : Benefit-Cost Analysis

Inputs

2019 Fixed National \$ (M)

Cost	Benefit	Cost / Benefit	Variables	Detail	2017	2018	2019
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Emissions	Non-Pecuniary (Amenity) Aspects	Total	0.000	0.000	0.020
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Travel Time Savings	Non-Pecuniary (Amenity) Aspects	Total	0.000	0.000	0.476
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Safety Benefits	Non-Pecuniary (Amenity) Aspects	Total	0.000	0.000	0.447
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Vehicle Operating Cost Savings	Consumer Spending	Motor vehicle fuels, lubricants,	0.000	0.000	-0.164
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Vehicle Operating Cost Savings	Consumer Spending	Motor vehicle maintenance and	0.000	0.000	-0.071
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Travel Time Savings	Benefit Cost Analysis	Travel Time Savings	0.000	0.000	0.000
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Custom	N/A	(New Design and Construction)	0.529	0.529	0.529
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Custom	N/A	(New Operations and Maintenance)	0.000	0.000	0.000

Custom Benefits/Costs

Edit...

Results

Parameters

Discount Rate	7%
Analysis Period	10
Evaluation Year	2019

Evaluation from 2019 to 2028

<input checked="" type="checkbox"/> Total Benefits, Mil PV\$	8.24
Emissions Benefits, Mil PV\$	0.14
Safety Benefits, Mil PV\$	3.14
Vehicle Operating Cost Savings, Mil PV\$	1.65
Maintenance Costs, Mil PV\$	-0.03
Travel Time Savings, Mil PV\$	3.34
Other Benefits, Mil PV\$	0.00
<input checked="" type="checkbox"/> Total Costs, Mil PV\$	0.49
Design & Construction Costs, Mil PV\$	0.49
Land Acquisition Costs, Mil PV\$	0.00
Custom Costs, Mil PV\$	0.00
Benefit-Cost Ratio	16.68

Benefit-Cost Analysis

Benefit-Cost Analysis is an economic tool for evaluating possible projects by comparing their total benefits with their total cost over a period of time. This analysis considers only the direct benefits and direct costs associated with a project, according to the FHWA guidelines. A discount rate is used to calculate the total present value of the benefits of a project to society and the total present value of the costs of designing and constructing the project. Benefits may include changes to the environment due to changes in emissions, vehicle operating cost savings, safety benefits, travel time savings, and maintenance costs/savings. A Benefit-Cost Ratio can be calculated using the net present value of the benefits divided by the net present value of the costs which can be used to evaluate a project's economic merit.

OK

Cancel

Total benefits may be calculated for each County or the Region as a whole

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COUNCIL
R1

COLLABORATIVE PLANNING FOR NORTHERN ILLINOIS

Measuring Performance of the Regional Transportation System

- Performance Measures have many functions and can be used to:
 - Identify what attributes of the transportation system are most important
 - Provide information on current system conditions
 - Evaluate the success of implemented and on-going projects and programs
 - Provide a metric for communicating with decision-makers and the public about past, current, and expected future transportation systems
 - Serve as criteria for investment decisions made in the transportation planning process.

Conclusions

- Travel Demand Model integration with TranSight gives planners a better understanding of economic drivers and impacts on transportation
- Tool to help influence investment for economic development and Regional Competitiveness, especially for funding
- Scenario planning can help planners and engineers better understand “what-if” scenarios such as new road connections, road closures, or increased roadway capacity
- Quantify public investment return on major transportation and capital improvement projects
- Strategic investments in the transportation system are necessary with limited local funding resources to leverage state and federal match.
- Increase government transparency with performance-based project selection

Contact Information

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Region 1 Planning Council

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COLLABORATIVE PLANNING FOR NORTHERN ILLINOIS