

Using Toll Plaza Transactions Data for Model Calibration

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Summary of Presentation

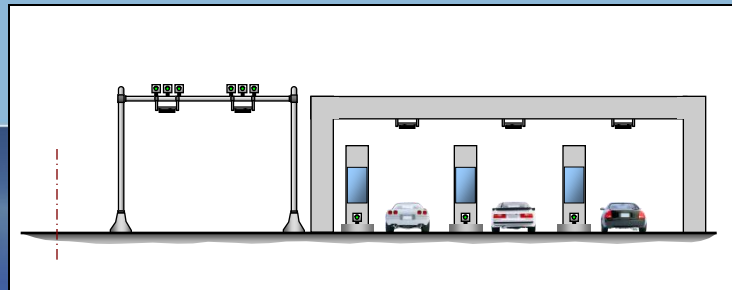
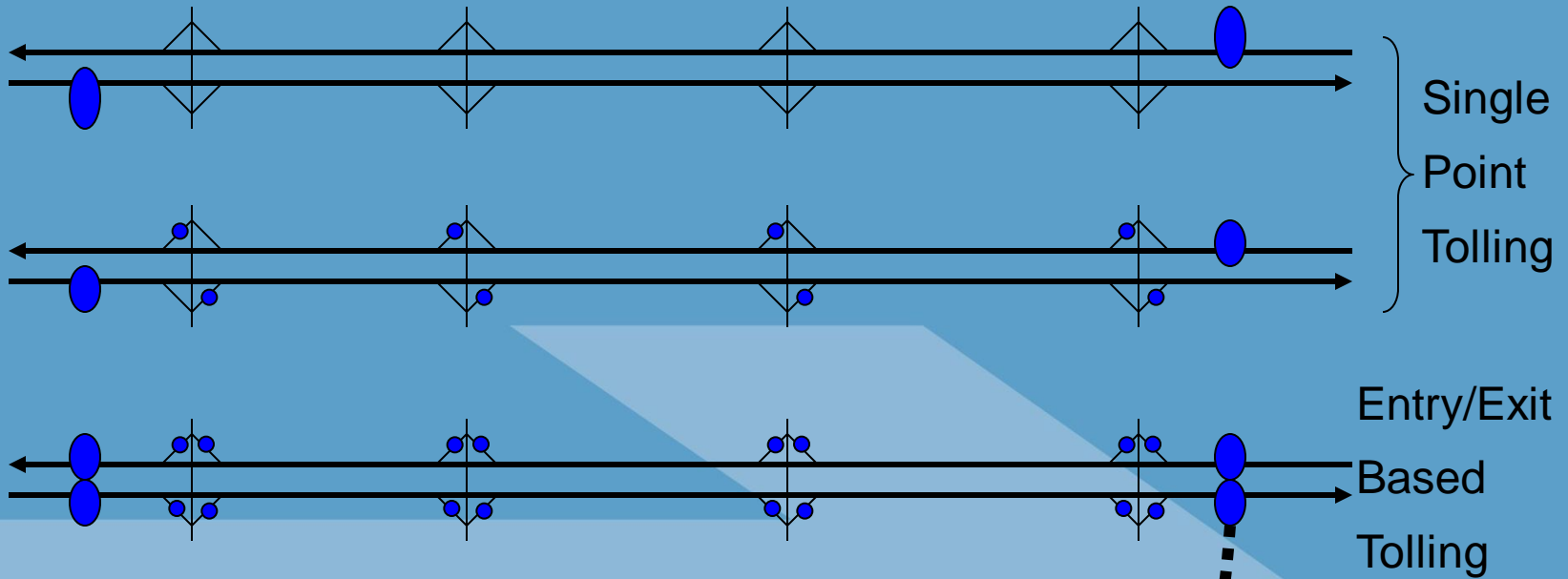
- Background information about traffic and revenue analysis
- Toll Plaza transactions data
- Examples of possible use in model calibration
- Future possibilities
- Feedback from the group

Typical Objectives of Tolling Analysis

- Revenue estimation
- Toll sensitivity analysis
- Design of tolling scheme
- Managed lanes analysis
- Assess impacts of tolling, diversion, etc.

Tolling Scheme

Barrier Plazas

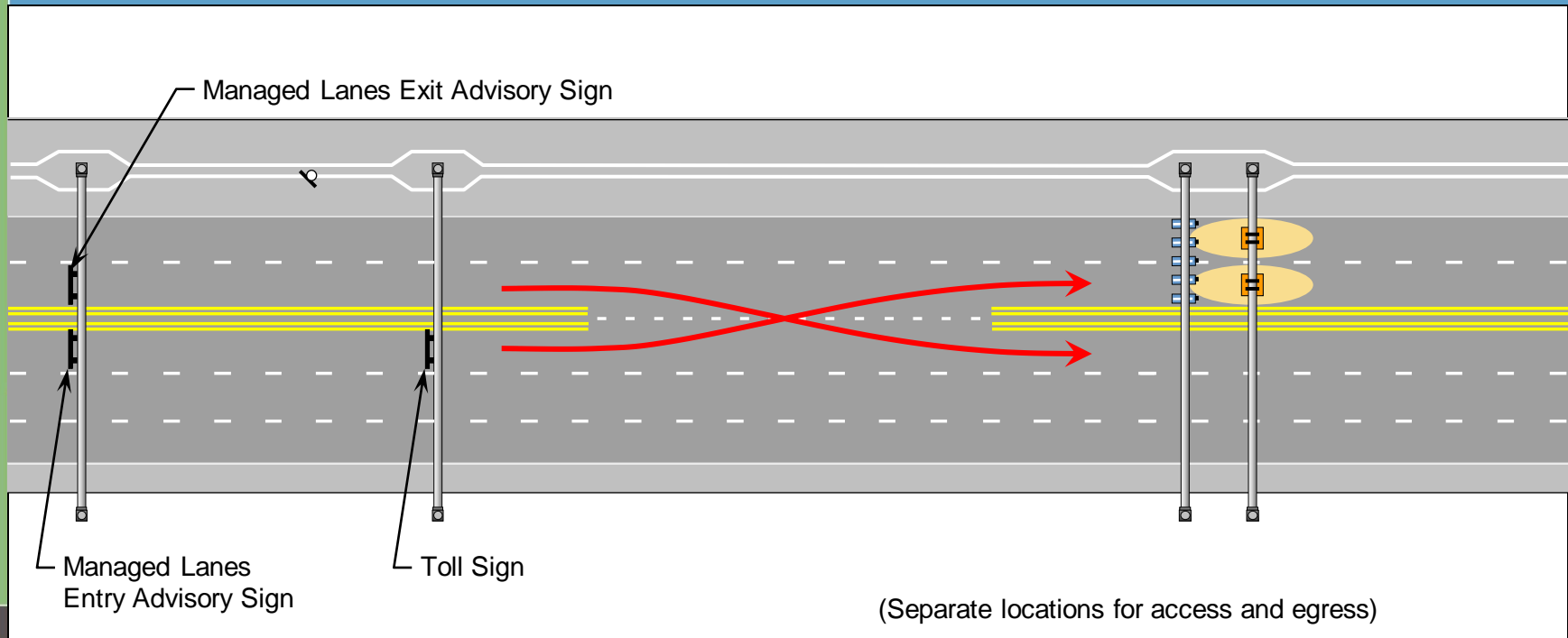


ECONOMISTS
PLANNERS
ENGINEERS

Tolling Scheme

Managed Lanes
(Can be Single Point or Entry/Exit Based)

ECONOMISTS
PLANNERS
ENGINEERS



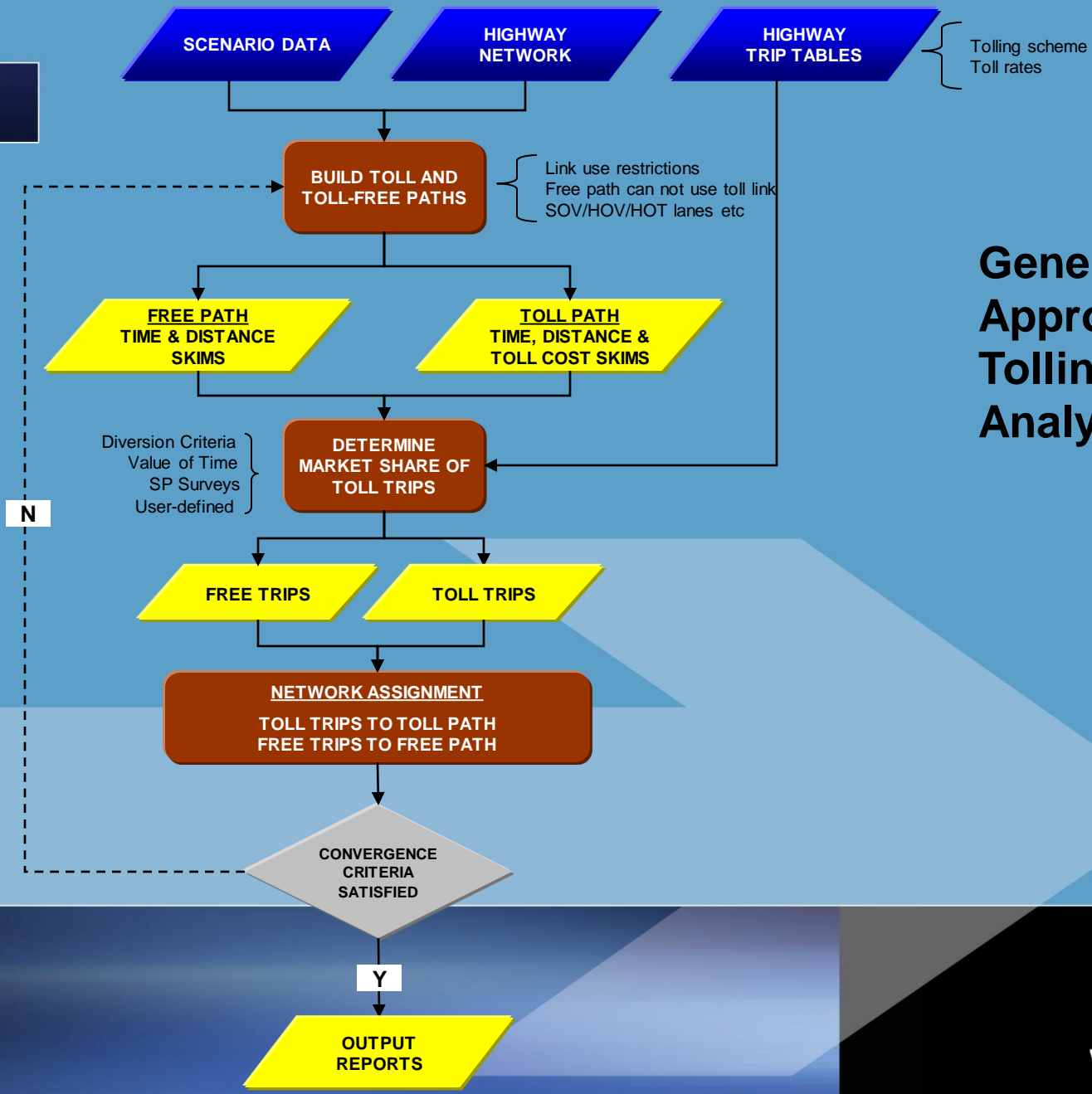
Toll Rate Structure

SIMPLE

COMPLEX

ECONOMISTS
PLANNERS
ENGINEERS

Single fixed toll	Vehicle class	Vehicle class Method of payment	Vehicle class Method of payment Time of day	Vehicle class Method of payment Time of day Congestion level
Cars only	Car Truck	Car cash Car ETC Truck cash Truck ETC	Car cash (peak) Car ETC (peak) Truck cash (peak) Truck ETC (peak) Car cash (off-peak) Car ETC (off-peak) Truck cash (off-peak) Truck ETC (off-peak)	Car cash (peak) Car ETC (peak) Truck cash (peak) Truck ETC (peak) Car cash (off-peak) Car ETC (off-peak) Truck cash (off-peak) Truck ETC (off-peak) (Congestion Level)



General Approach of Tolling Analysis

Challenges in Toll Modeling

- Large number of scenarios
 - Typical Example:
2 Analysis years X 5 Tolling Schemes X 8 Time periods X
6 Toll Rates
= 480 Assignment Runs
- Run Time
- Post-processing of results

Products of Analysis

- Assigned volumes on the system
- Revenue estimates
- Toll sensitivity results
- Managed lanes/general lanes traffic
- Impact summaries

The Illinois Tollway System



- 286 Miles
- 22 Mainline Plazas
- 53 Ramp Plazas
- 100+ Plazas in all
- Two-tier Toll Rate

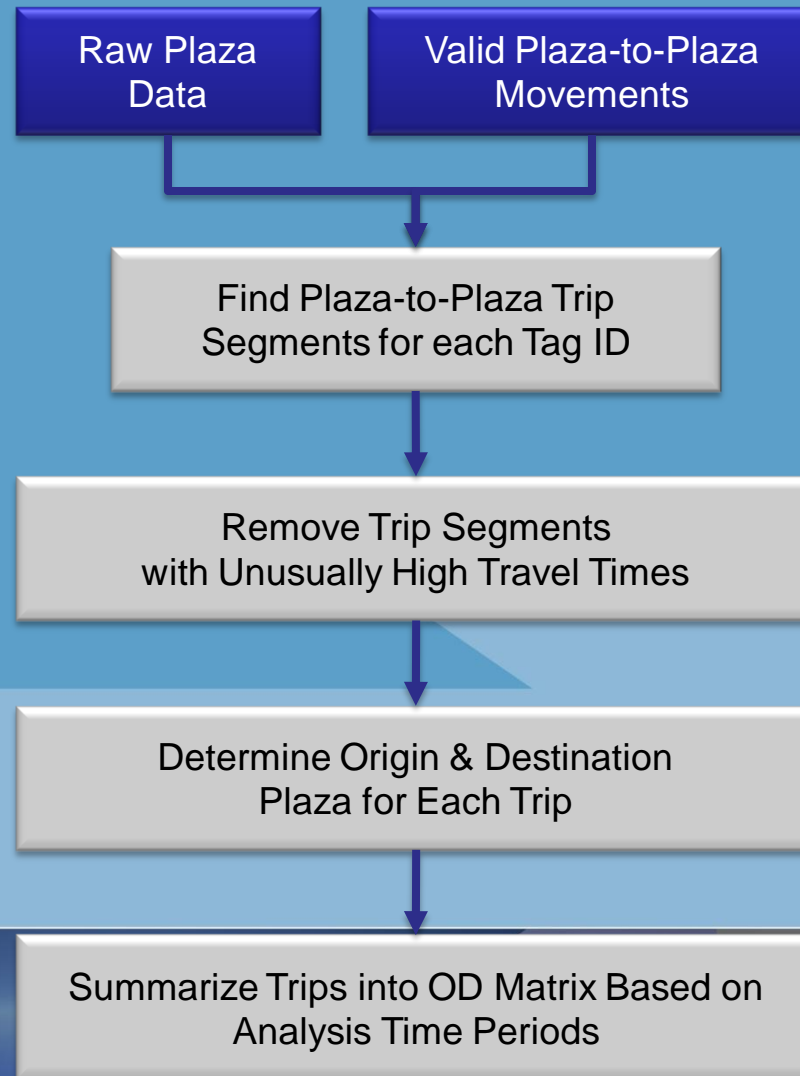
Toll Plaza Transactions Data

- Record of a transponder read at a tolling location:

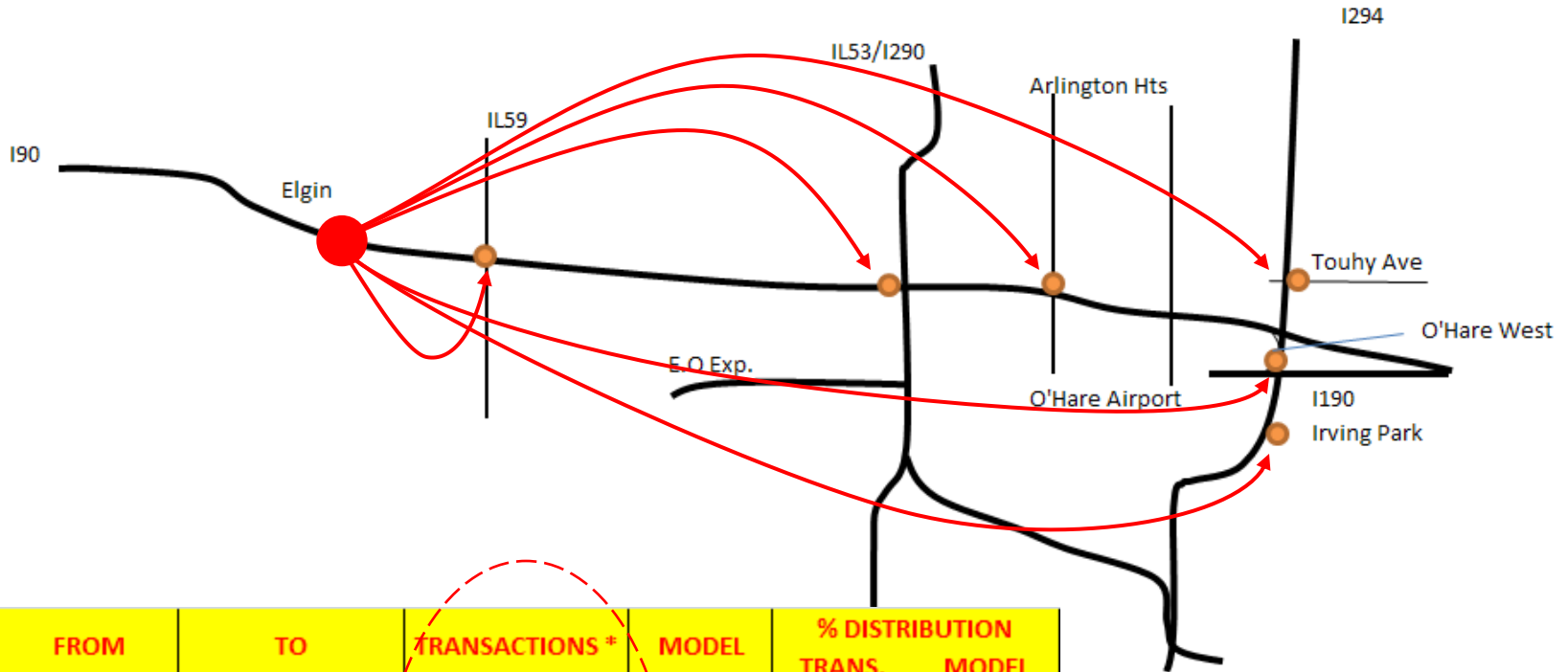
- Account information
- Tag ID and Class
- Amount \$
- Plaza ID
- Date and time

No personal information used or accessed

Transactions Data Processing



Transactions Data Example 1



FROM	TO	TRANSACTIONS *	MODEL	% DISTRIBUTION	
				TRANS.	MODEL
PLAZA 9, ELGIN, EASTBOUND, AM PEAK 6-8 AM	IL59	1648	2443	25%	32%
	I290/IL53	2396	2781	36%	36%
	Arlington Hts Rd	1185	779	18%	10%
	River Rd	628	869	9%	11%
	Touhy Ave	314	208	5%	3%
	O'Hare West	428	533	6%	7%
	Irving Park Rd	121	97	2%	1%
	SUM	6721	7710	100%	100%
PLAZA TOTAL **		8249	10279		

* PROCESSED I-PASS TRANSACTIONS DATA

** ALL TRANSACTIONS INCLUDING CASH

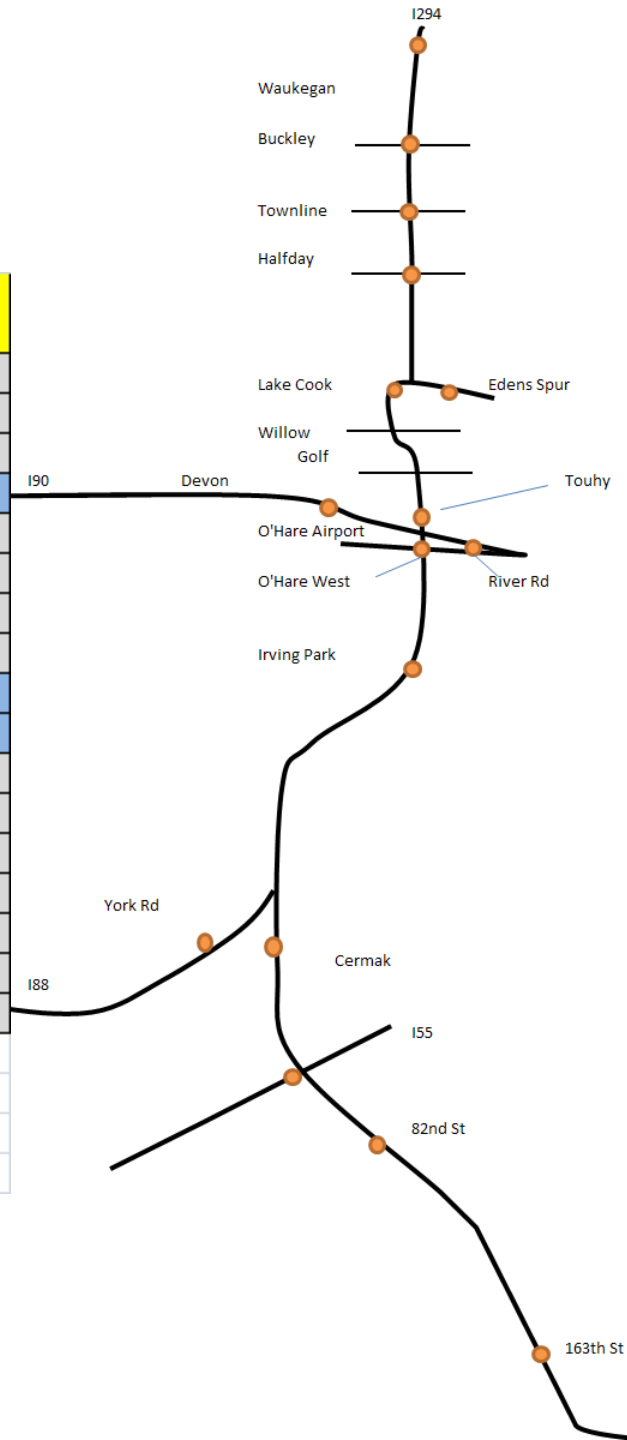
Possible Adjustment Approaches

1. Take all discrepancies and use a robust matrix adjustment process
2. Review the differences and their interrelationships and use a select-link based iterative process:
 - a. Begin with the “farthest” plaza
 - b. Substitute the select-link matrix by a “factored” matrix
 - c. Re-run assignment

Transactions Data Example 2

ENGINEERS PLANNERS ECONOMISTS

FROM	TO	TRANSACTIONS *	MODEL	% DISTRIBUTION	
				TRANS.	MODEL
PLAZA 21, WAUKEGAN, SOUTHBOUND, AM PEAK 6-8 AM	Buckley Rd	1122	1078	24%	9%
	Townline Rd	875	869	19%	7%
	Half Day Rd	513	823	11%	7%
	Edens Spur	383	2168	8%	17%
	Lake Cook Rd	615	347	13%	3%
	Willow Rd	277	313	6%	2%
	Golf Rd	112	298	2%	2%
	O'Hare West	105	319	2%	3%
	Irving Park Rd	182	2257	4%	18%
	Cermak Rd	47	1469	1%	12%
	82nd St	20	932	0%	7%
	I55	96	377	2%	3%
	163rd St	84	582	2%	5%
	Devon Ave	154	177	3%	1%
	River Rd	55	248	1%	2%
	York Rd	77	254	2%	2%
	SUM		4718	12510	100%
PLAZA TOTAL **		5532	10313		
* PROCESSED I-PASS TRANSACTIONS DATA					
** ALL TRANSACTIONS INCLUDING CASH					

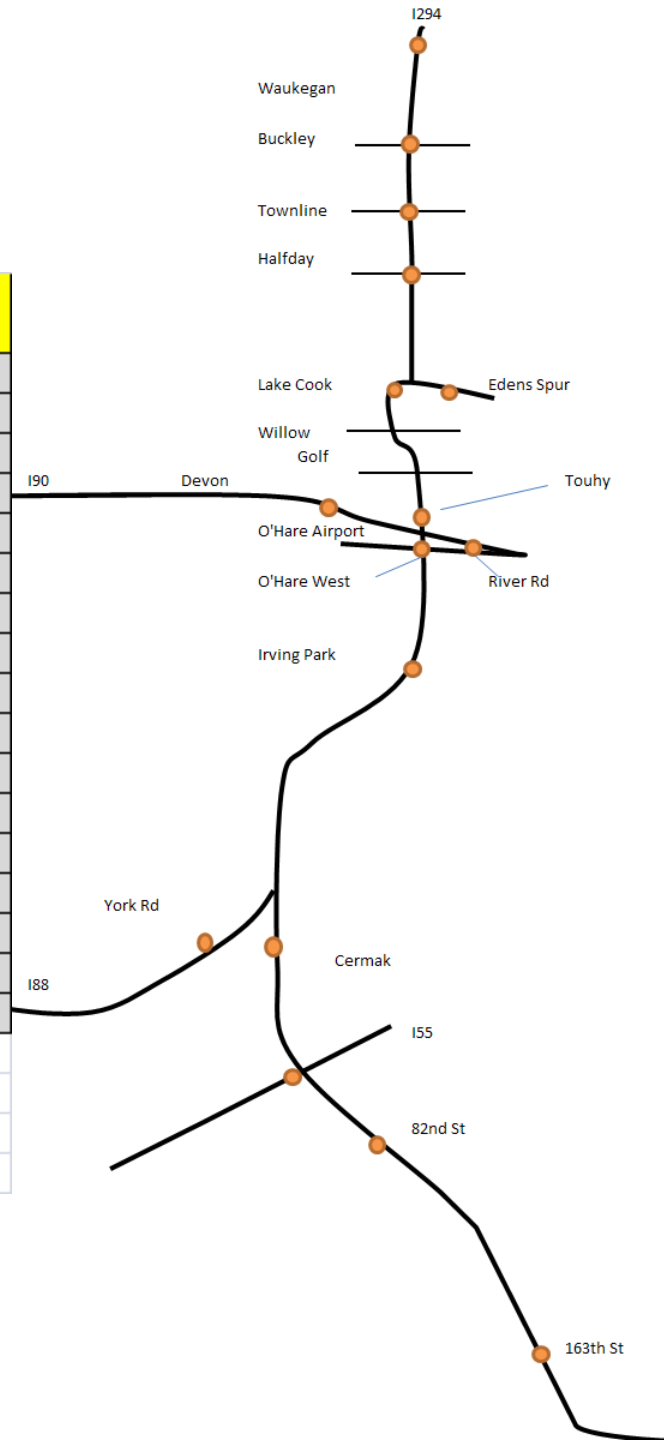


Transactions Data Example 2

(Initial adjustment)

ENGINEERS PLANNERS ECONOMISTS

FROM	TO	TRANSACTIONS #	MODEL	% DISTRIBUTION	
				TRANS.	MODEL
PLAZA 21, WAUKEGAN, SOUTHBOUND, AM PEAK 6-8 AM	Buckley Rd	1122	1200	24%	10%
	Townline Rd	875	943	19%	8%
	Half Day Rd	513	684	11%	6%
	Edens Spur	383	1073	8%	9%
	Lake Cook Rd	615	336	13%	3%
	Willow Rd	277	317	6%	3%
	Golf Rd	112	310	2%	3%
	O'Hare West	105	323	2%	3%
	Irving Park Rd	182	2362	4%	20%
	Cermak Rd	47	1443	1%	12%
	82nd St	20	853	0%	7%
	I55	96	422	2%	4%
	163rd St	84	516	2%	4%
	Devon Ave	154	259	3%	2%
	River Rd	55	202	1%	2%
	York Rd	77	335	2%	3%
	SUM		4718	11580	100%
PLAZA TOTAL **		5532	9763		
* PROCESSED I-PASS TRANSACTIONS DATA					
** ALL TRANSACTIONS INCLUDING CASH					

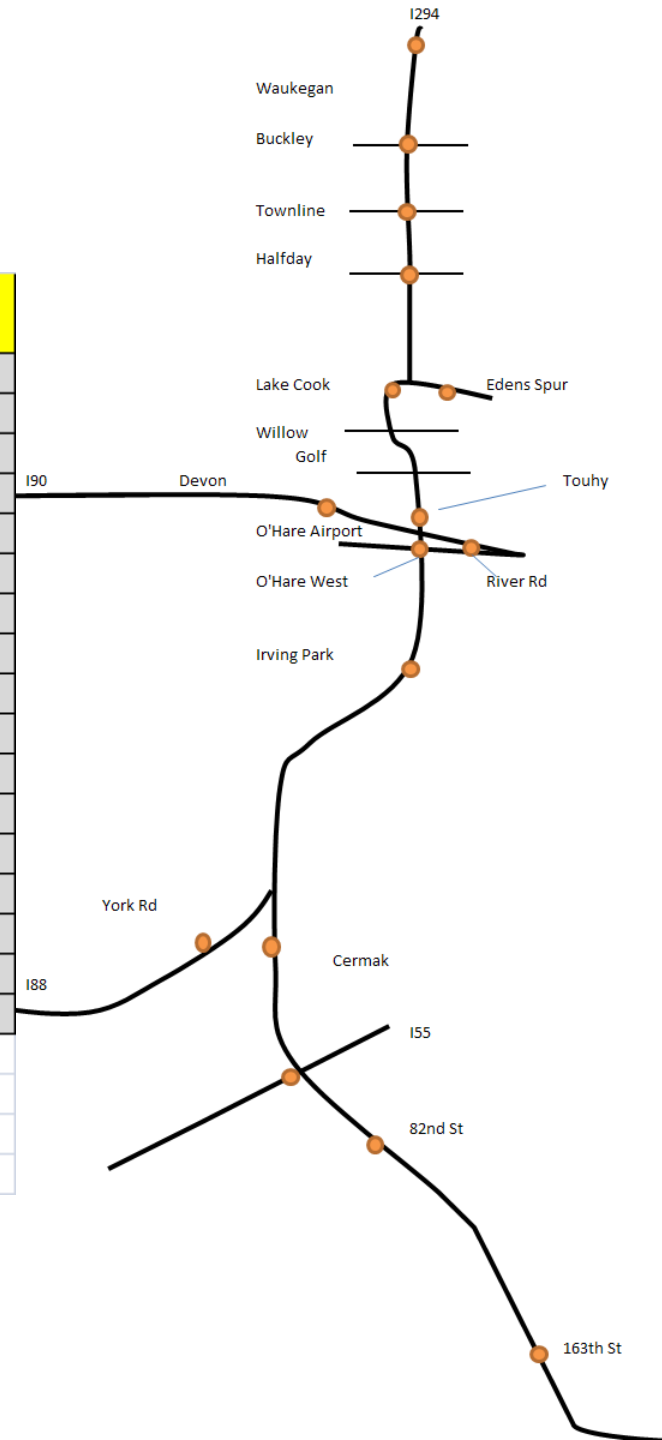


Transactions Data Example 2

(Second round adjustment)

ENGINEERS PLANNERS ECONOMISTS

FROM	TO	TRANSACTIONS *	MODEL	% DISTRIBUTION		
				TRANS.	MODEL	
PLAZA 21, WAUKEGAN, SOUTHBOUND, AM PEAK 6-8 AM	Buckley Rd	1122	1312	24%	14%	
	Townline Rd	875	978	19%	11%	
	Half Day Rd	513	562	11%	6%	
	Edens Spur	383	1068	8%	12%	
	Lake Cook Rd	615	369	13%	4%	
	Willow Rd	277	356	6%	4%	
	Golf Rd	112	320	2%	3%	
	O'Hare West	105	326	2%	4%	
	Irving Park Rd	182	1621	4%	18%	
	Cermak Rd	47	615	1%	7%	
	82nd St	20	354	0%	4%	
	I55	96	205	2%	2%	
	163rd St	84	233	2%	3%	
	Devon Ave	154	316	3%	3%	
	River Rd	55	204	1%	2%	
	York Rd	77	387	2%	4%	
	SUM		4718	9227	100%	100%
	PLAZA TOTAL **		5532	9337		
* PROCESSED I-PASS TRANSACTIONS DATA						
** ALL TRANSACTIONS INCLUDING CASH						

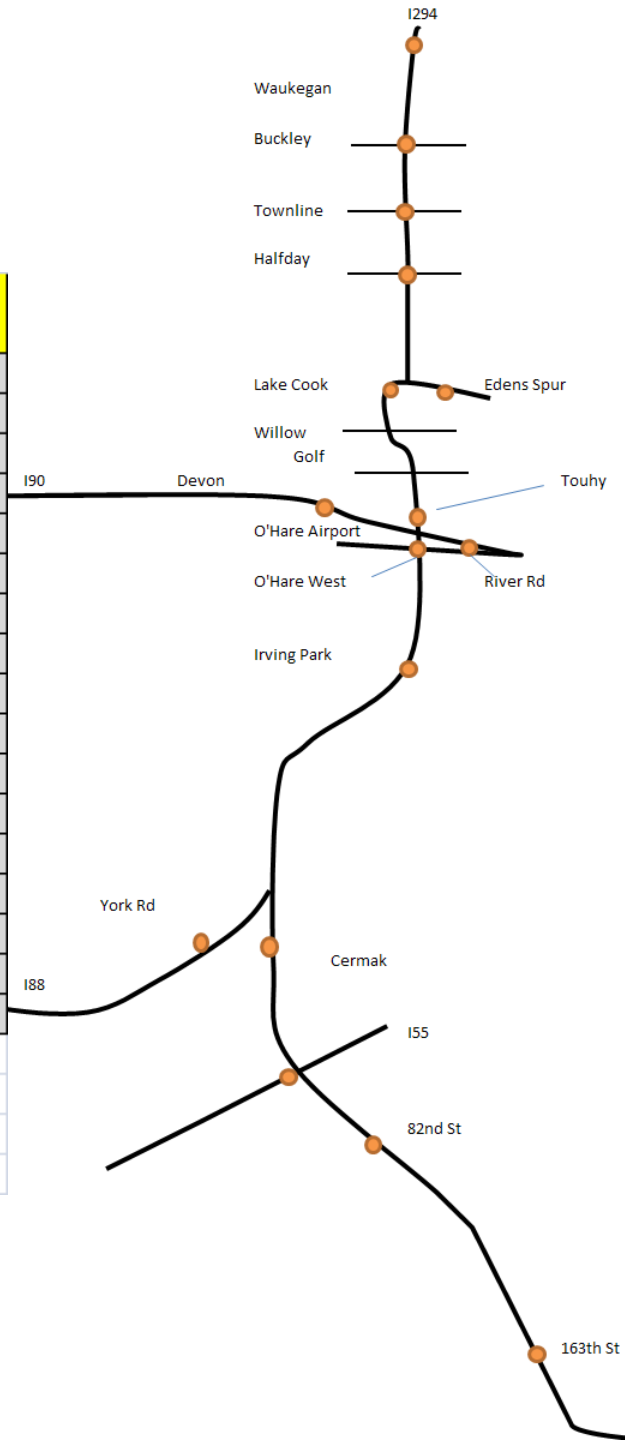


Transactions Data Example 2

(Third round adjustment)

ENGINEERS PLANNERS ECONOMISTS

FROM	TO	TRANSACTIONS #	MODEL	% DISTRIBUTION	
				TRANS.	MODEL
PLAZA 21, WAUKEGAN, SOUTHBOUND, AM PEAK 6-8 AM	Buckley Rd	1122	1409	24%	19%
	Townline Rd	875	1091	19%	14%
	Half Day Rd	513	444	11%	6%
	Edens Spur	383	1072	8%	14%
	Lake Cook Rd	615	396	13%	5%
	Willow Rd	277	389	6%	5%
	Golf Rd	112	329	2%	4%
	O'Hare West	105	331	2%	4%
	Irving Park Rd	182	636	4%	8%
	Cermak Rd	47	288	1%	4%
	82nd St	20	174	0%	2%
	I55	96	98	2%	1%
	163rd St	84	125	2%	2%
	Devon Ave	154	387	3%	5%
	River Rd	55	203	1%	3%
	York Rd	77	159	2%	2%
	SUM		4718	7530	100%
PLAZA TOTAL **		5532	8712		
* PROCESSED I-PASS TRANSACTIONS DATA					
** ALL TRANSACTIONS INCLUDING CASH					

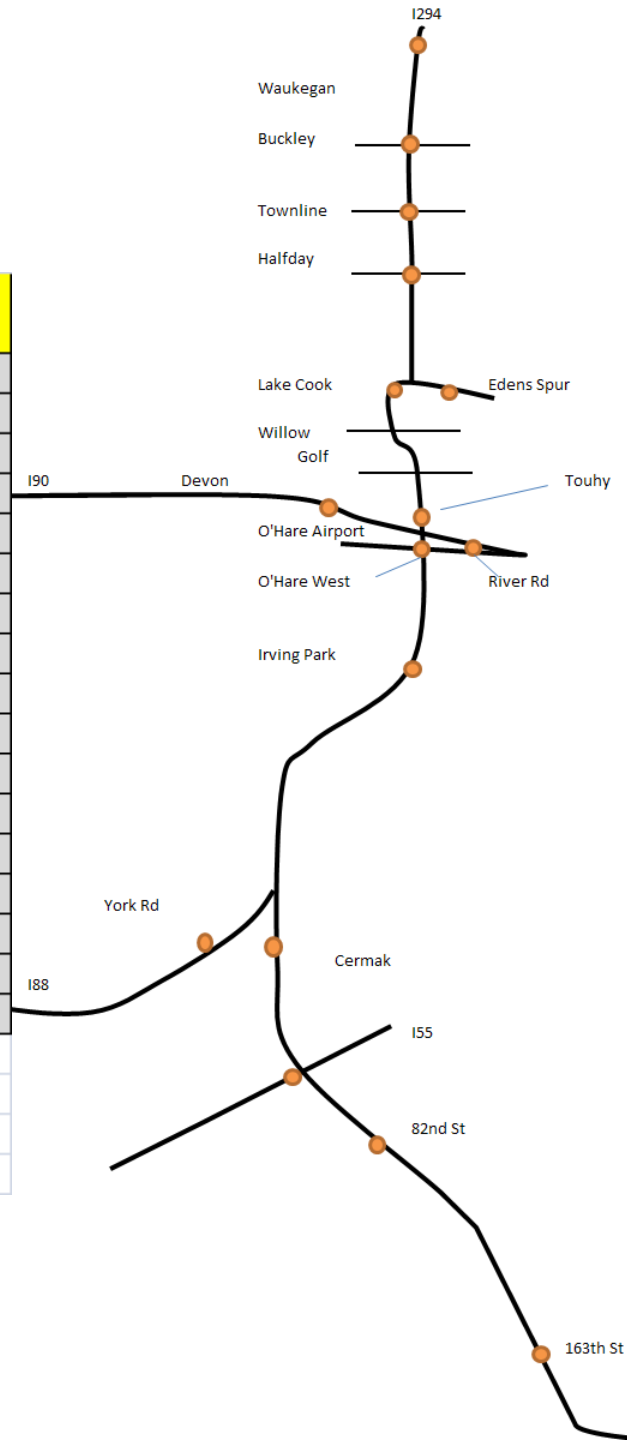


Transactions Data Example 2

(Final adjustment)

ENGINEERS PLANNERS ECONOMISTS

FROM	TO	TRANSACTIONS *	MODEL	% DISTRIBUTION		
				TRANS.	MODEL	
PLAZA 21, WAUKEGAN, SOUTHBOUND, AM PEAK 6-8 AM	Buckley Rd	1122	1133	24%	15%	
	Townline Rd	875	788	19%	10%	
	Half Day Rd	513	371	11%	5%	
	Edens Spur	383	850	8%	11%	
	Lake Cook Rd	615	299	13%	4%	
	Willow Rd	277	275	6%	4%	
	Golf Rd	112	236	2%	3%	
	O'Hare West	105	214	2%	3%	
	Irving Park Rd	182	492	4%	7%	
	Cermak Rd	47	202	1%	3%	
	82nd St	20	125	0%	2%	
	I55	96	67	2%	1%	
	163rd St	84	88	2%	1%	
	Devon Ave	154	321	3%	4%	
	River Rd	55	117	1%	2%	
	York Rd	77	148	2%	2%	
	SUM		4718	5724	100%	76%
	PLAZA TOTAL **		5532	6622		
* PROCESSED I-PASS TRANSACTIONS DATA						
** ALL TRANSACTIONS INCLUDING CASH						



Issues and Comments

1. Manual demand adjustment “disturbs” the original trip tables
2. Transactions data is quite reliable
3. Risk of “overkill”
4. Important to check screen line before adjustment

Future Prospects

1. Improved methods of data use will evolve
2. Extensive applications in “Dynamic Assignment”
3. “Geo-temporal” adjustment to trip tables
4. Lane level data possible. Can be used for micro-simulation

Thank you !

Questions ?