

# Traffic Analysis and Simulation System (TRANSIMS): Overview and ITS Analysis Possibilities

L.R. Rilett, Ph.D., P.Eng.

E.B. Snead II Associate Professor  
Department of Civil Engineering, TAMU  
Texas Transportation Institute

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ITS Texas



Transportation Operations Group

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- Mode, links, time of departure, ...

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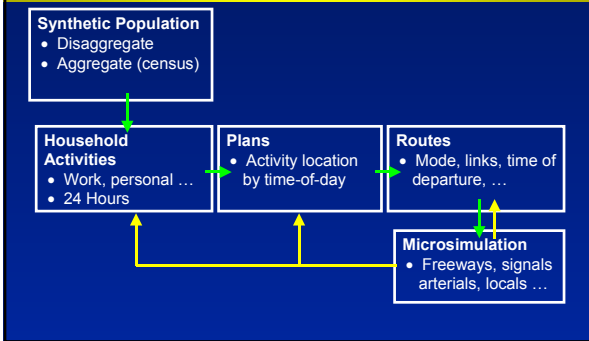
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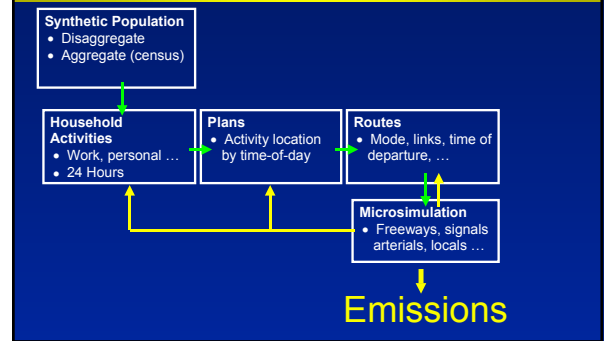
### Microsimulation

- Freeways, signals arterials, locals ...

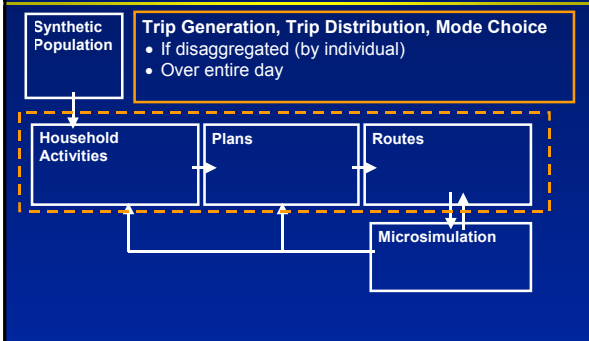
## Feedback



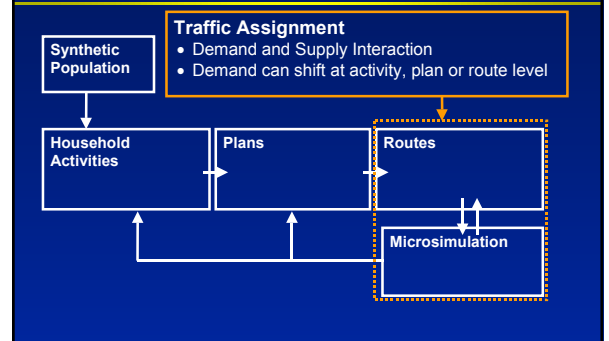
## Note .....



## Four Step Demand Analogy (1)



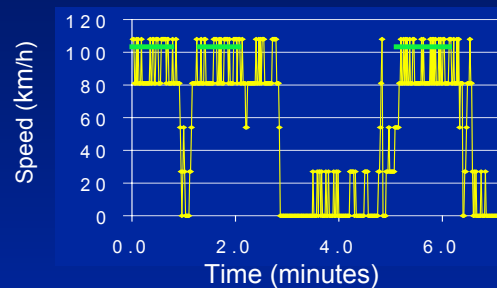
## Four Step Supply Analogy (2)



## 2) Microsimulation Overview

- Roadway is composed of cells (7.5 m)
  - cell either empty or occupied
  - vehicles are moved through network by set of rules
  - $p_{noise}$ 
    - acceleration, deceleration, ...
- Velocity is integer number
  - 0, 27, 54, 81, 108, 135 km/h

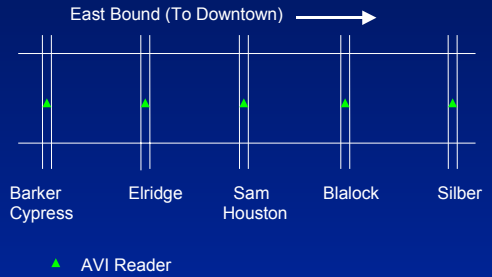
## Vehicle Speed-Time Plot



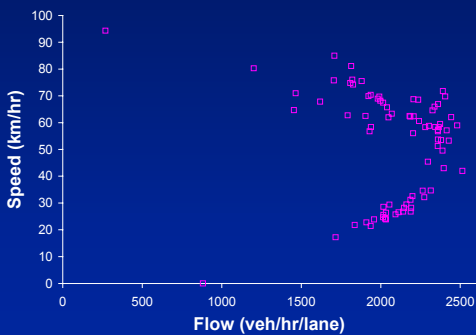
## Lessons Learned

- TRANSIMS Microsimulation
  - granular (integer) movement
  - results will need “translation”
    - aggregation
    - pollution models

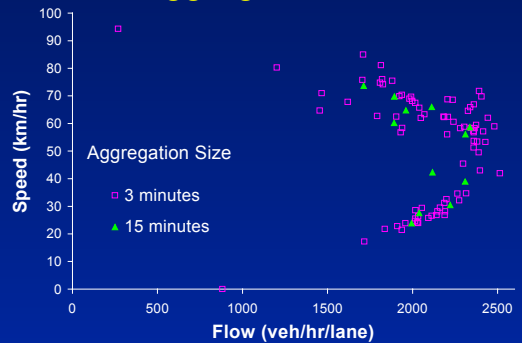
## 3) Interstate 10 Houston, Texas



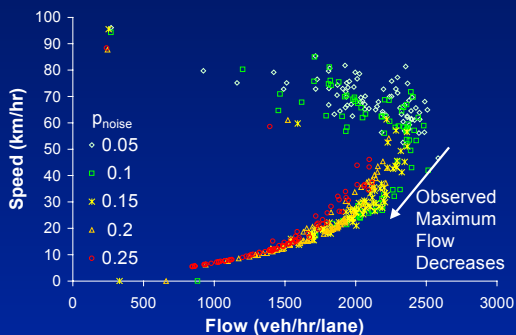
## Typical Speed-Flow Diagram



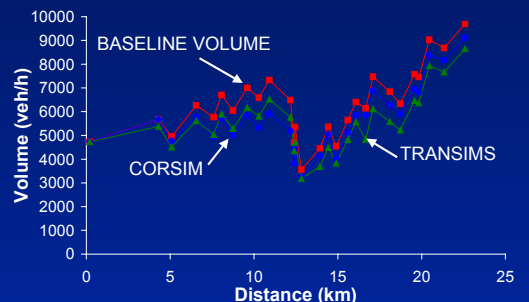
## Maximum Flow - Aggregation Issues



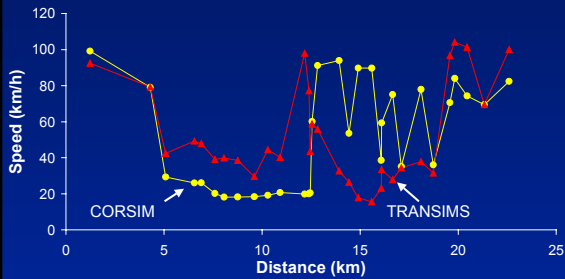
## Effect of $p_{noise}$



## Volume - Distance Profile: AM Peak ( $p_{noise}=0.1$ )



## Speed - Distance Profile : AM Peak



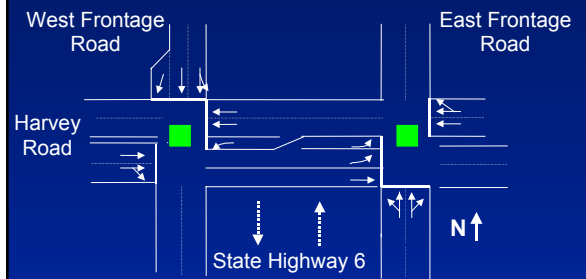
## Lessons Learned

- Planning Models ==> Micro-simulation
  - fundamental supply properties
    - similar to traffic operations
      - temporal aspect (HCM)
    - capacity is emergent
  - need to know how parameters ( $p_{noise}$ ) affect emergent properties

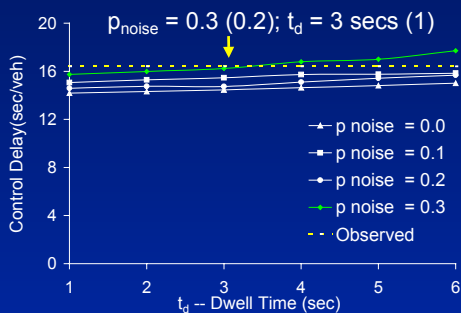
## Lessons Learned

- TRANSIMS / CORSIM roughly similar in ability to replicate baseline volumes
- Speed profiles markedly different
  - CORSIM lower speed, TRANSIMS higher speeds
  - $P_{noise}$ : 0.1

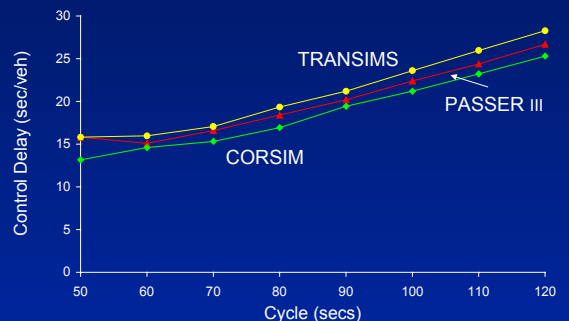
## 5) Calibration: Diamond Interchange



## Calibration Parameters: $p_{noise}$ and dwell time



## Sensitivity: Cycle Length



## Lessons Learned

- Signal Timing (Fixed)
  - two parameters (dwell time,  $p_{\text{noise}}$ )
    - gap acceptance (permitted)
  - calibrate to local conditions
  - similar results to high fidelity CORSIM
    - TRANSIMS ten percent higher control delay

## 6) Concluding Remarks

- TRANSIMS
  - simulation (dynamic / stochastic)
  - disaggregate (traveler)
- Microsimulation
  - emergent behavior
    - capacity  $\sim f(\text{demand, geometrics, etc.})$
  - calibration issues ( $p_{\text{noise}}$ , dwell time)

## Opportunities

- Potential combination of transportation planning and operations modeling
  - planning: more realistic supply
  - operations: more realistic demand
  - fidelity
- Education, organizational impacts

## Tool for ITS Analysis?

- Demand
  - change activity
  - change activity location
  - change departure time
  - change route
- Supply
  - microsimulation, emissions
- Potential: capacity improvements vs ITS



ANY QUESTIONS?