New Mapping Tools and the TPB Planning Process

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TPB Regional Bus Subcommittee
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Mapping Tools for the CLRP

How can bus transit maps help inform the CLRP planning process?

- Produce visual representations of regional bus service for:
  - Verification of inputs
  - Long-range planning
  - Assessing LOS goals
- Collection of maps published on a regular basis:
  - Schedule proposed for incorporating bus transit mapping into the CLRP cycle

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Transit Planning Metrics

Metric	Units	Purpose
Availability	"Eichlers"	Verification of Inputs, Long-Range Planning
Transit Capacity	Transit Seat* Miles per Peak Hour	Assessing LOS Goals
Transit Demand	Transit Passenger Miles per Peak Hour	Assessing LOS Goals

*Actual value may reflect vehicle capacity versus seated capacity.

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Bus Transit Availability

- Unitless measure of transit presence
- Used for
  - Validation of inputs to regional travel demand model
    - Availability and routes show bus transit coverage
    - Allows agencies to compare coded bus network to expectations
  - Long-range transit planning
    - Availability illustrates future bus network coverage
    - Can be compared to growth forecasts to highlight underserved areas

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Bus Transit Availability

- Transit Availability is a measure of the amount of transit service that is available within a certain radius.
- It is a function of the headways of bus routes which have stops within the radius.
- Uses GIS density calculations to “sum” headways.
- Resulting values represent relative availability of transit.
- Does not factor in directionality.

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The need for a new measure

- Simply mapping routes gives no indication of where the stops are.
- Stop density is high, such that showing individual stops results in unreadable maps.
- Overlapping stops and routes are difficult to portray on traditional maps.

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Transit Availability Calculation

- An effective headway is calculated by summing the inverse of the headways:

$$H_E = \frac{1}{\sum \frac{1}{H_i}}$$

- Transit Availability is calculated in a similar fashion:

$$A_H = \frac{\sum \frac{1}{H_i}}{area}$$

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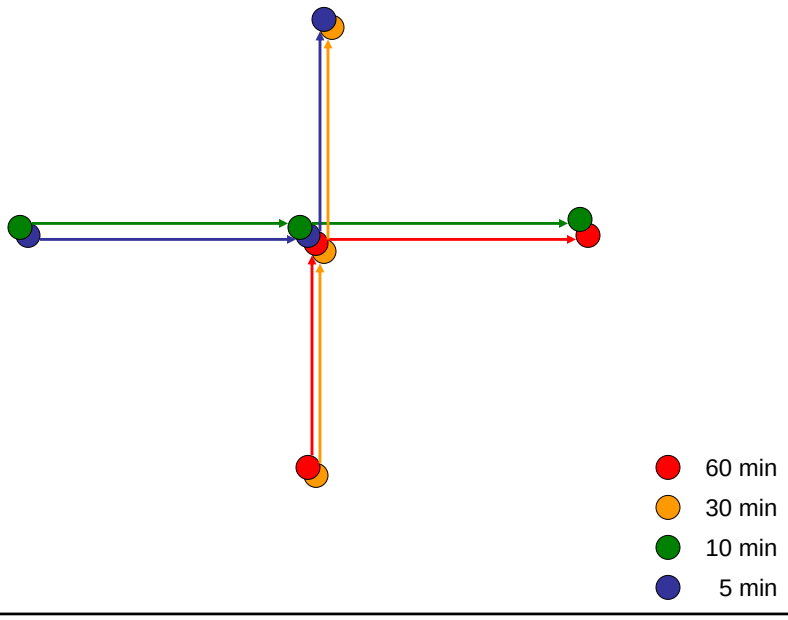
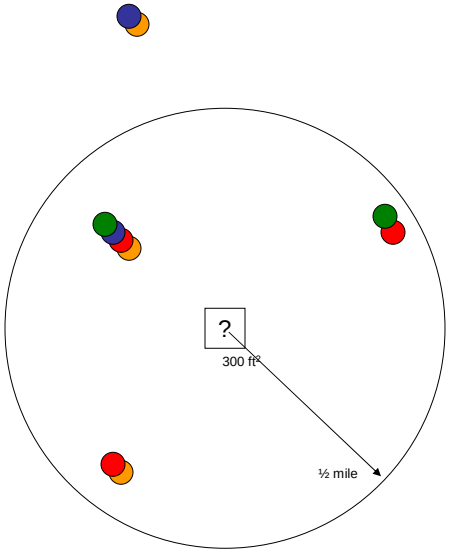
Example: Bus transit routes



Search radius

For any given location, find the bus stops within the search radius.



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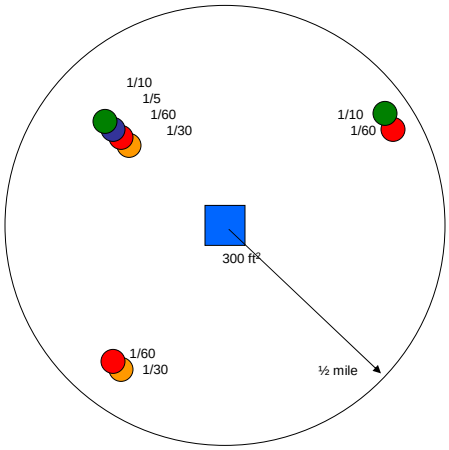
Calculate the "density" of the headways

$$A_H = \frac{\sum \frac{1}{H_i}}{area}$$



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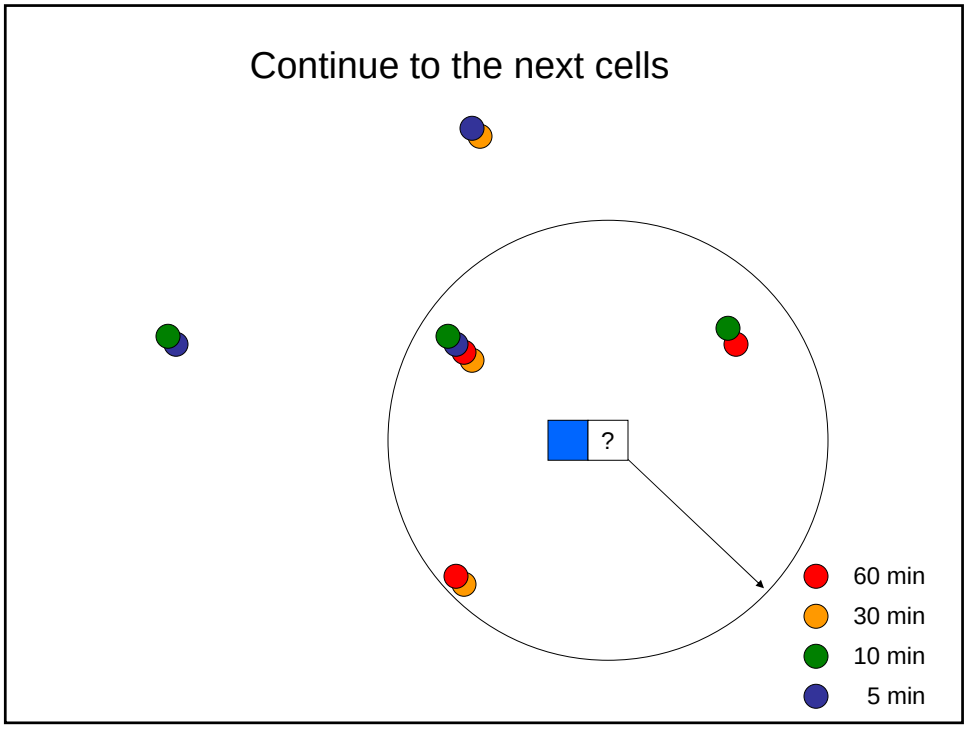
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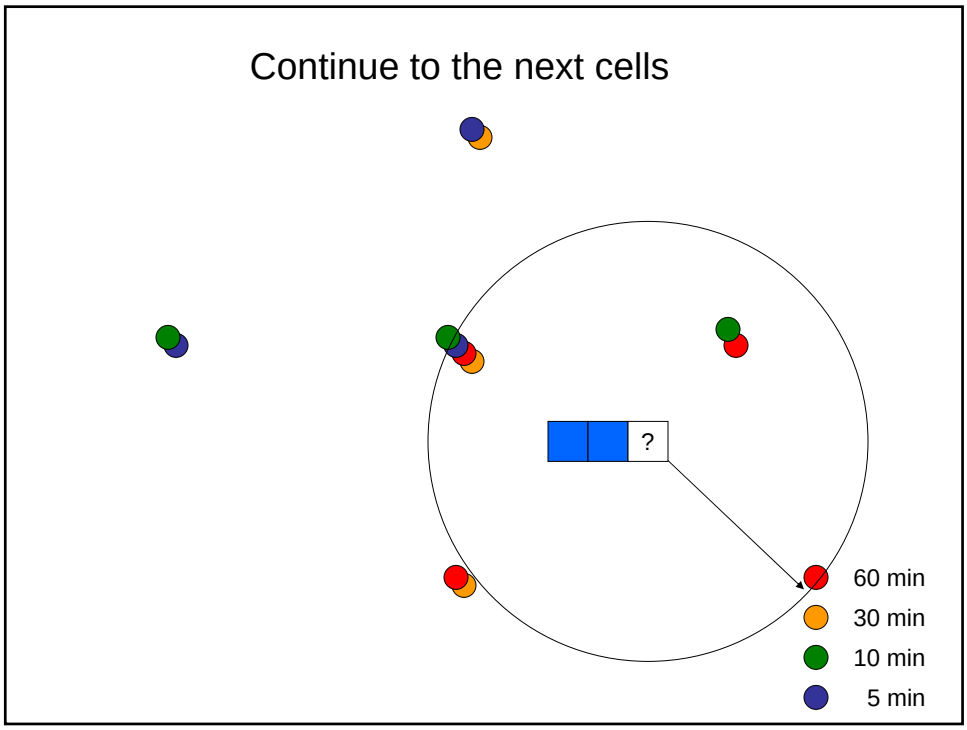
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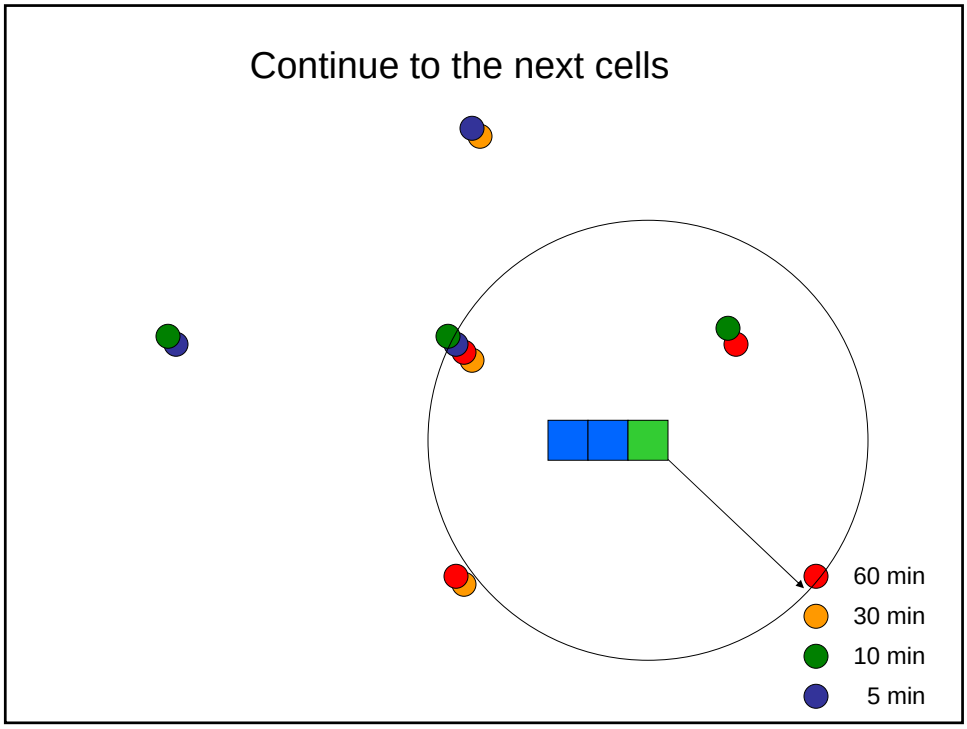
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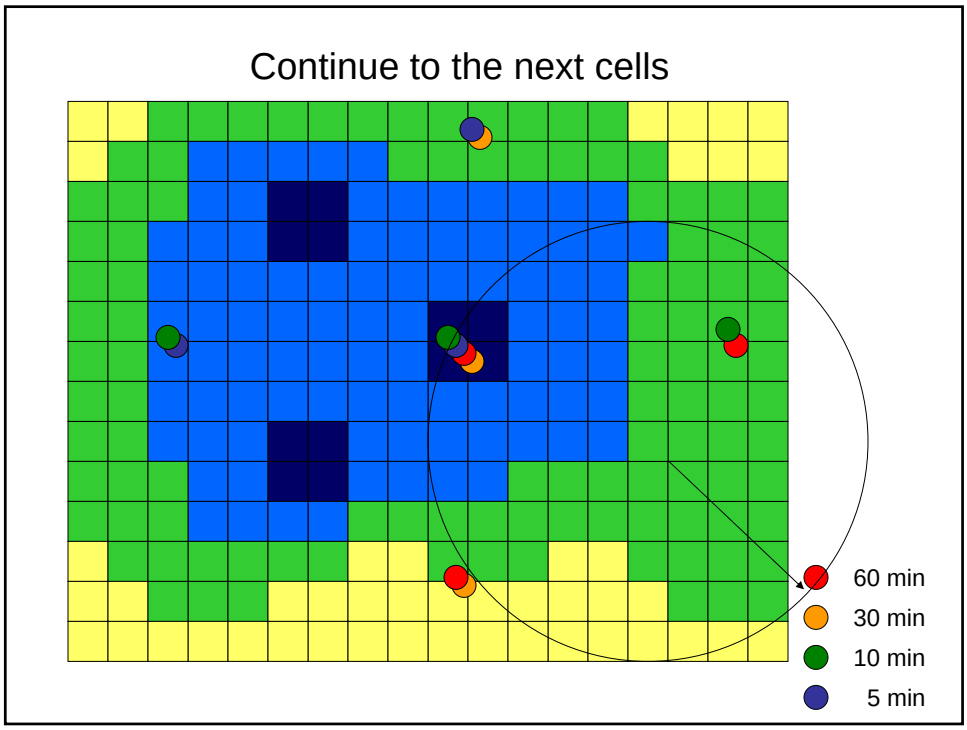
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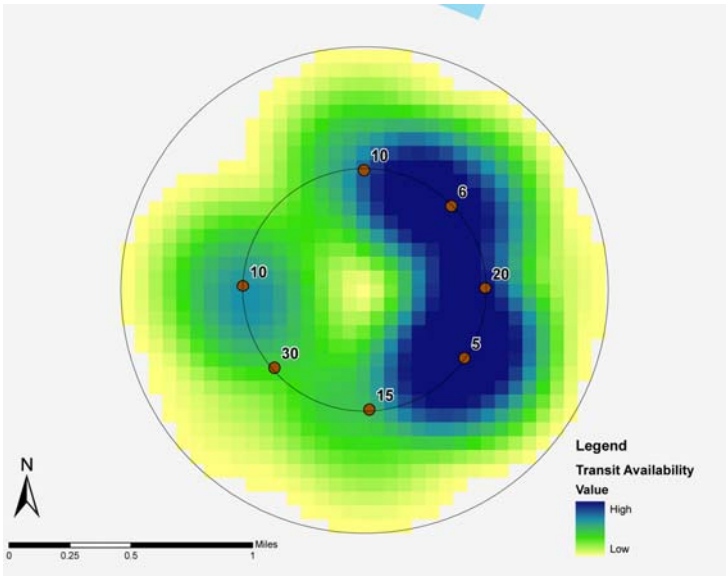
Actual density calculation uses a smarter algorithm

--Factors in distance from bus stop as well as headway.



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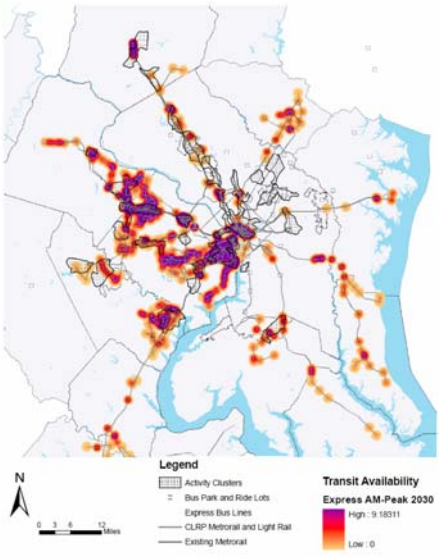
Example: Bus Transit Availability

- Maps show areas of dense bus service.
- Illustrate relationships between transit service and land use:
  - Activity Centers/Clusters
  - Land Use Projections



Many factors to map

- 2010 vs. 2030 vs. Difference
- Peak vs. Off Peak
- Local vs. Express
- Activity Clusters vs. Household Density vs. Change in Households

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Transit Capacity/Demand

- Transit Capacity
  - Can be calculated by regional travel demand model, but only if transit assignment is performed
  - Could be supplied by transit agencies
- Transit Demand
  - Can use regional LOS standards based on household and employment densities
    - *Density sufficient to support fixed route transit: 3 households per acre or 4 jobs per acre.**
- Transit Demand/Capacity
  - Unitless metric (percentage) which identifies whether LOS goals are being met

** From the WMATA Regional Bus Study, September 2003, also used by the NVTA TransAction 2030, April 2006*

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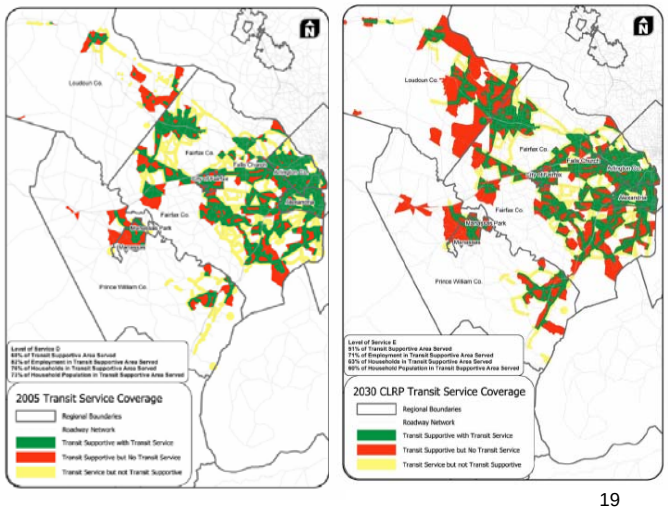
Example: Assessing LOS Goals

- Example maps from TransAction 2030 use simple LOS D threshold
- Could provide richer regional LOS standards based on land-use…



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Transit-Supportive Densities

- Subcommittee to establish regional LOS goals for household and employment density ranges

Density Level	Service or Benefit	
4-6 units / acre	Minimal bus service (subsidized)	1 hour headway
6 units /acre	Neighborhood Convenience Store (2400 households w/in 1/4 mile radius)	In walking distance
6-7 units / acre	Vehicular Use Walking Transit use (For a comparison of how these uses change at higher densities see 50 units/acre below)	5.0 daily trips/household 0.6 daily trips/household 0.2 – 0.3 daily trips/household
7-8 units / acre	Intermediate bus service	30 minute headway
9-10 units / acre	Light Rail	5 min peak headway 25 – 100 sq. mile corridor
12 units / acre	Rapid Transit	5 min. peak headway 100 – 150 sq. mile corridor
	Shopping Center w/Supermarket (4800 households w/in 1/4 mile radius)	In walking distance
15 units/ acre	Frequent bus service High multi-modal potential	120 buses / day
50 units / acre	Vehicular Use Walking Transit use	1.2 daily trips/household 1.5 daily trips/household 1.3 daily trips / household

Source: Lincoln Land Institute: http://www.lincolninst.edu/subcenters/VD/goodthings/thresholds.pdf

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Proposed Schedule *

- Step 1: New Projects and Inputs
  - Assemble schedules
  - Long-Range Planning (Plan Inputs): **Transit Availability Maps including Land Use**
- Step 2: Review of Inputs
  - Verification of Inputs: **Transit Availability Maps**
- Step 3: Conformity Run
- Step 4: Analysis of Model Outputs
  - Assess LOS Goals: **Transit Supply/Demand Maps**
  - Assessment of Plan Performance

*TPB is considering changing the CLRP cycle, moving plan approval from October to July. 21