Accessibility Instruments in Planning Practice

Spatial Network Analysis for Multi-Modal Transport Systems (SNAMUTS): Adelaide

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Rail infrastructure development:
Electrification of entire network (except Belair line)
CBD rail tunnel Adelaide Central - Keswick
All-day 15-minute frequencies per line, with 2-3 lines overlapping on the trunk routes.
Tram extension from Bowden to West Lakes and Semaphore, partially using heavy rail tracks.

Boosting bus services:
Focus on orbital and east-west routes.
15-minute (or better) frequencies to access all sub-centres and activity corridors identified in metropolitan strategy.
Some rerouting of lines away from the CBD area.
Number of vehicles/train sets required in simultaneous operation for the minimum standard network (20 min weekdays, 30 min weekends for trams and buses, 30 minutes weekdays for trains)

- Trains: 18
- Trams: 10
- Buses: 191

**total: 219**

17.9 per 100,000 pop (2011)
adelaide: service intensity

Number of vehicles/train sets required in simultaneous operation for the minimum standard network (20 min weekdays, 30 min weekends for trams and buses, 30 minutes weekdays for trains)

- Trains: 39
- Trams: 20
- Buses: 255

**Total:** 314

18.0 per 100,000 pop (2040)
6 key metrics indicators

- **Closeness Centrality**
  - ‘Ease of Movement’

- **Degree Centrality**
  - ‘Transfer Intensity’

- **30-minute Contour Catchment**

- **Betweenness Centrality**
  - ‘Geographical Distribution of Travel Opportunities’

- **Network Stress**
  - ‘Identifying Squeeze Points and Underused Potential’

- **Nodal Connectivity**
  - ‘Attractiveness for PT-oriented Land Use Intensification’

**Composite Index**: combines all 6 measures by allocating between 0 and 10 points to each (maximum 60)
What is the ease of movement across the network?

[smaller values indicate better accessibility performance]
degree centrality

What is the transfer intensity of the network? [smaller values indicate better accessibility performance]
Some assumptions:

One transfer is allowed within 30 min, but only between services that both run at least every 15 min

A flat deduction applies for making the transfer, equivalent to the actual average transfer time across the network (usually between 6 and 8 minutes)
Betweenness centrality defines preferred travel paths between each pair of nodes, and counts them at nodes and route segments to determine their strategic significance.

How are travel opportunities distributed across the network?

Betweenness centrality defines preferred travel paths between each pair of nodes, and counts them at nodes and route segments to determine their strategic significance.
Adelaide 2011
Min Service Standard:
Weekday interpeak 30 min, Sat/Sun 30 min (bus)
Weekday interpeak 30 min, 7-day service (rail, tram)
Train
Tram
Bus
Some segments also contain bus routes
Segmental Betweenness
Index for number of network paths that pass through route segment, weighted by combined activity node catchment and cumulative impedance
Percentage of Rail/Tram/Bus segments: 21.3%/5.0%/73.7%
Percentage of CBD segments: 62.0%

Adelaide 2040
Min Service Standard:
Weekday interpeak 30 min, Sat/Sun 30 min (bus)
Weekday interpeak 30 min, 7-day service (rail, tram)
Train
Tram
Bus
Some segments also contain bus routes
Segmental Betweenness
Index for number of network paths that pass through route segment, weighted by combined activity node catchment and cumulative impedance
Percentage of Rail/Tram/Bus segments: 31.2%/7.3%/61.4%
Percentage of CBD segments: 46.4%
To what extent do network nodes function as hubs for movement?

The connectivity index measures each node’s connectedness to other nodes, and its capacity for making transfers or stopovers.
Good, average and poor public transport accessibility on a scale map
adelaide 2040: what are we achieving?

Network coverage: increases from 48% to 59% of metropolitan residents and jobs.

Operational input: comparable to the status quo relative to population (provided the growth projections materialise!)

Better integration of modes in the CBD by penetrating the central area with rail, and making the bus system more legible.

Addition of orbital lines at minimum 15-minute frequencies allows for easier travel along geographical desire lines.

Integration of rail and bus improves particularly in the northern suburbs (Islington and Woodville as major rail-bus transfers).

Significance of the CBD drops from 62% to 46% of travel opportunities (still high compared to other cities though)