Character and Form

distinct

Overview

Indicator name	**Legibility**		
Indicator number	35	**Indicator type**	Supplementary
Objective	To measure the legibility of a street, which is an indicator of a street network's coherence, walkability and pedestrian ease of navigation		
Application guidance	How street orientation changes can affect the cognitive perception of an area to a user. Areas of similarly oriented street grids (or lack of a coherent street grid) are more likely to be 'districts of common character'. Street legibility is measured here as a factor of street length, connectivity andthe variance in bearing. This indicator will support practitioners to understand the street hierarchy, visual interest andcoherence of a street network. Based on the outcome of the assessment, practitioners can determine whether considerations on road layout should be made in their project or design. Practitioners can use the *street legibility* metric to measure the legibility of a street by assessing the factors of length, connectivity and straightness.		

Metric

Street legibility

Related indicators

Access and Connection
2 Walking paths
7 Equitable access

Comfort and Safety
24 Pedestrian crowding

Character and Form
31 Street enclosure
32 Street space for pedestrians

Recommendation

- To enhance the analysis and calculation of straightness, 3D road lines can be used to help understand the impact of pedestrian and bicycle riders' sight lines, which accounts for changes in horizontal alignment
- There are several factors that could be incorporated into a metric measuring legibility, including street grids, the size and scale of city blocks, the context of the built and natural environment, and urban design

Metric – Street legibility

Metric unit	Street legibility level
Description	To measure the street legibility level using weighted multicriteria overlaying analysis through the factors of length, connectivity and straightness
Spatial coverage	Applicable to all NSW
Spatial application	This metric is most suitable for link-based analysis based on the road network

Calculation methodology

Determine road length

1. Use TfNSW Road Track Path Network to select roads is accessible to pedestrians and bicycle riders
2. Combine road segments of the same road ID and Function Type, splitting along intersections with majorroads (distributor road, sub-arterial road, arterial road, motorway), and find the total length of each combined segment
3. Assign a value L to the road segment based on the following legend:

Road length	0 – 200m	200 – 400m	400m – 600m	600m – 800m	800m – 1km
L Value	1	2	3	4	5

Determine road connectivity

4. Create intersection points
5. Assign a value C to the road segment based on the following legend:

Connections	0 – 2	2 – 5	5 – 10	10 – 20	20+
C Value	1	2	3	4	5

Determine road straightness

6. Calculate the length ratio based on the street lengths (L1) and actual lengths (L2) along centrelines and between intersections, as above
7. Divide L1/L2 to get a ratio between 0 and 1
8. As the ratio falls closer to 0, the road is more curvy/meandering, and closer to 1 identifies roads that are more straight

Ratio	< 0.3	0.3 – 0.5	0.6 - 0.7	0.8 - 0.9	> 0.9
S Value	1	2	3	4	5

Determine street legibility of corridor

9. Calculate legibility factor by the following formula, which is weighted to reflect the importance of the different factors when considering legibility:

$$Street\ legibility = 0.2 \times L + 0.5 \times C + 0.3 \times S$$

Data representation

10. Assign colour based on the classification below
    - Low values represent more rigid grids and higher values reflect more organic structures

Unit: Street legibility level

Metric – Street legibility (Cont.)

Assumption	• Cul-de-sacs will be excluded from counting the connectivity points • The longer, more continuous a street is, the easier it will be to navigate • If streets comprise a high variance in bearing, the onward journey is not as visible and therefore is less legible • The more roads that intersect with a given street enhance wayfinding opportunities and contribute to the legibility of the network • Connectivity has been weighted higher in the calculation formula because it provides users with more route options and enhances connectivity within and between areas
Limitation	• Road links between intersections is assumed to be a fair proxy for the area within a pedestrians' visual field. The ROW centreline is the average of the footpath curvature on each side, but pedestrian experience on each side of a curved road may be different when disaggregated. • GIS data does not include road elevation, so when splitting road segments along intersections along major roads errors will occur at grade separated intersections (tunnels, under/overpasses). These will need to be accounted for manually. • Type of intersection (ie. roundabout, signalised) is not considered in the analysis
Data source	TfNSW Road Track Path Network

Reference

- TfNSW, Walking Space Guide (2020): roads-waterways.transport.nsw.gov.au/business-industry/partners-suppliers/documents/guides-manuals/walking-space-guide.pdf
- Transport for London, Pedestrian Comfort Guidance for London (2019): content.tfl.gov.uk/pedestrian-comfort-guidance-technical-guide.pdf
- Mavoa et al, The Australian National Liveability Study Final Report (2016): preventioncentre.org.au/wp-content/uploads/2015/01/FINAL-The-National-Liveability-Study-Report.pdf (note: this indicator relates to recommended liveability indicator 5 on pp19-20)