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Shade Networks Lower Midday Heat at Neighbourhood Bus Stops

A matched-route field study across three summer weeks

Evelyn Clarke[A1] 0000-0000-0000-0000 (sample) Noah Bennett[A1] 0000-0000-0000-0000 (sample)

A1 Harbourlight Institute for Urban Systems

Corresponding author: *Evelyn Clarke evelyn.clarke@example.org*

Version	Date	Short title
Version of record	2026-05-18	Shade networks and bus-stop heat

Abstract

Matched sensors at 24 fictional bus stops showed that linked shade structures reduced median midday surface heat while preserving pedestrian circulation.

Keywords

- urban heat
- public transport
- shade design

Highlights

- Paired stops were observed on the same routes and dates.
- Continuous shade produced the largest thermal reduction.

Introduction

Transit riders experience concentrated heat during short waits, yet stop-level evidence often separates temperature from street design. We tested whether connected overhead shade changes exposure along otherwise comparable routes [1].

Methods

Temperature loggers sampled every minute at 12 shaded and 12 matched unshaded stops from 11:00 to 15:00 over 15 dry days. Route, pavement, and observation window were paired before analysis.

$$\Delta T_i = T_{\mathrm{unshaded},i} - T_{\mathrm{shaded},i}$$

Results

Continuous canopies produced a median 3.1 °C surface-temperature difference; partial tree shade was less stable near solar noon.

Thermal comparison

Shade condition	Stops	Median reduction
Continuous canopy	8	3.1 °C
Intermittent tree shade	4	1.7 °C

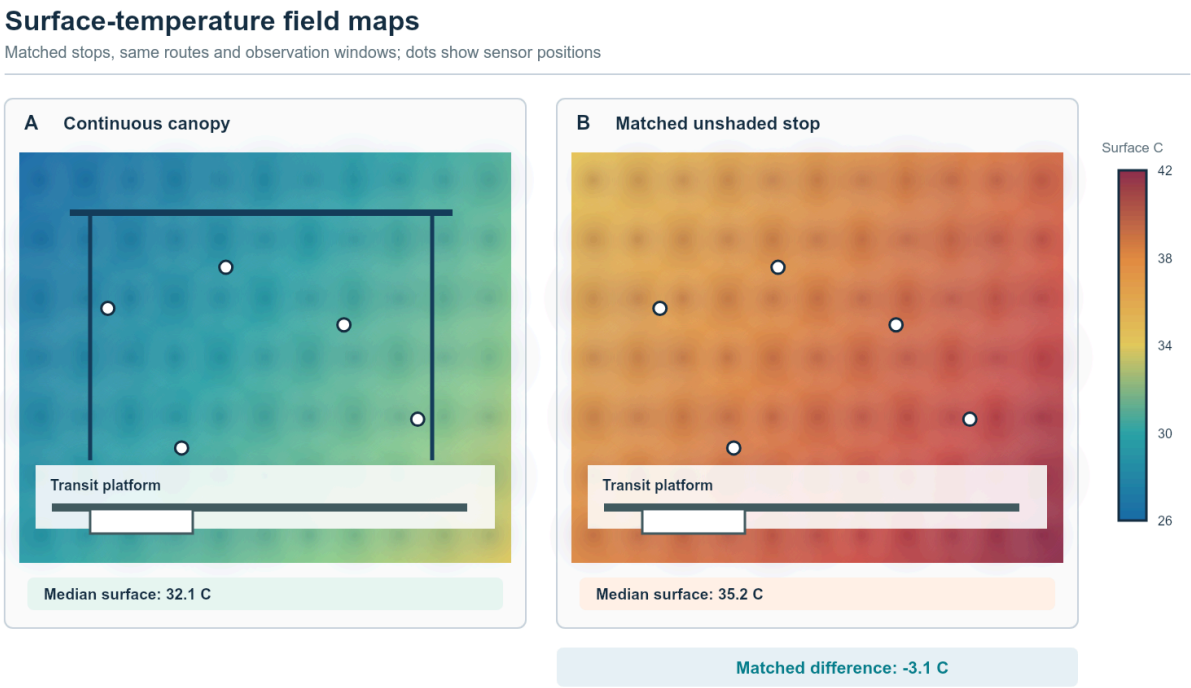

Figure 1 Shade networks and bus-stop heat

Figure 2 Workflow: Shade networks and bus-stop heat

Paired stops were observed on the same routes and dates.[1]

Observation records

Stop	Site	Shade	n	T0 (°C)	T1 (°C)	ΔT (°C)	QC
S-08	west	canopy	8	35.2	32.1	-3.1	included
S-12	east	trees	4	34.6	32.9	-1.7	included

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condition,median_reduction_c
continuous_canopy,3.1
```

Discussion

Linked shade can improve brief waiting conditions without enclosing the platform. The matched design supports a local association, while one summer season limits broader climate inference.

References

[1] Harbourlight Institute for Urban Systems. Neighbourhood heat field protocol. Methods Note 6, 2026.

1. De-identified sensor readings accompany this illustrative article. ↩

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Competing interests

The authors declare no competing interests.

Data availability

De-identified sensor readings accompany this illustrative article.

Acknowledgments

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Author contributions

E.C. designed the study; N.B. curated data; both authors analysed results and approved the article.

Ethics statement

Environmental observations only; no people or personal data were recorded.

Code availability

Analysis scripts accompany this illustrative article.