

TRANSPORTATION CONFERENCE 2026 PRACTICE PAPER

Shaping Resilient Cities: Safe Speed Platforms and People-Centred Movement in Ōtautahi

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ABSTRACT

Creating way safer streets is at the heart of Christchurch City Council's transport safety programme. We create streets that support not only resilience for the future but also safer, more accessible everyday journeys for everyone. We focus on designing transport networks where people can move freely and confidently, whether walking, cycling, scooting, or driving.

But as Ōtautahi Christchurch grows, we need to ask: how can our transport system evolve in ways that supports resilience, not just in infrastructure, but in communities too? We're not just managing today's challenges; we're building a system that can withstand future challenges, environmentally, economically, and socially. By bringing together speed management and infrastructure improvements, we aim to reduce harm while enhancing how people experience and share our streets.

Safe speed platforms (SSPs) at high-risk intersections have been a key component of this initiative. These interventions encourage safer speeds, which directly decrease the likelihood of severe crashes. So, can physical street design shift driver behaviour in a way that makes meaningful, lasting change? Early results suggest yes. Installed at eight major intersections, SSPs aim to reduce speeds to 30–40 km/h, levels that align with international survivability thresholds. Preliminary data from two Shirley Road intersections, where speeds have dropped by 6-7 km/h, suggest this type of intervention can create safer and more pleasant journeys.

These high-risk intersections sit within thriving urban centres, with people travelling by all modes to school, the local shops or across the community. These areas are frequently used by children, the elderly and those with visual or mobility challenges, further prioritising the need for increased safety and comfort when using these intersections.

This paper explores and evaluates a programme, which is ultimately about fostering resilience, creating way safer streets, and designing a transport system that prioritises people's ability to move freely, safely, and sustainably.

INTRODUCTION

Resilient cities are increasingly defined not just by their ability to withstand environmental and economic shocks, but by their capacity to foster human well-being, social cohesion, and everyday joy. In the context of transport, resilience extends beyond the robustness of physical infrastructure because it's also about ensuring that streets and networks continue to function safely and equitably during disruption, while supporting the daily well-being of the people who use them. In this way, resilience encompasses both the community's ability to thrive and the system's ability to endure, creating a transport environment that protects, connects, and sustains people through every day and extraordinary events alike.

At the heart of this evolution is people-centred design, an approach that prioritises how individuals experience, move through, and connect within urban spaces. Street and public space design has a

considerable impact on our happiness and how we engage with our environment (Montgomery, 2013). Research shows that walkable neighbourhoods and well-connected public transport systems encourage higher levels of physical activity and community engagement (Ken, Ma & Mulley, 2017; Carmona, 2019; Edwards & Tsouros, 2006; Lee & Moudon, 2008; Van Dyck et al., 2010). Greater levels of physical activity from enabling residents to walk has substantive public health benefits including lowering cardiovascular disease risk, obesity and the health impacts of air pollution (Logan et al., 2022; Celis-Morales et al., 2017; Lindsay et al., 2011). These insights underscore the importance of designing urban landscapes that support movement, health and inclusion, particularly for children, older adults, and those with mobility challenges.

The National Association of City Transportation Officials (NACTO, 2013) advocates for designing slower, safer streets that prioritise people over vehicles. Their Urban Street Design Guide reframes streets as public spaces that support walking, cycling, transit, and social interaction and not just traffic flow. This ethos is also reflected in Ōtautahi Christchurch's Future Transport Plan 2024–2054 (Christchurch City Council, 2024), which commits to creating a safe, sustainable, and people-focused network that supports well-being and resilience.

Cities around the world are making similar shifts. London's Vision Zero for London programme demonstrates that reducing speeds to survivable levels dramatically reduces fatalities without compromising efficiency (Transport for London, 2023). Oslo, for example, has eliminated pedestrian deaths through design-led speed management and modal prioritisation.

By integrating survivability thresholds into street design, such as SSPs at high-risk intersections, Ōtautahi Christchurch is not only reducing harm but also fostering environments where people can move freely and confidently. This paper explores how physical interventions can shift driver behaviour and enhance community resilience. It reasons that resilient transport systems are those that prioritise people's ability to move safely, sustainably, and with dignity, and that by designing for well-being, cities can build stronger, healthier communities from the street up.

In this paper, community resilience is examined primarily through the lens of safety, accessibility, and system reliability, rather than through direct measurement of public perception.

SAFER STREETS BY DESIGN

Creating safer streets is not just about reducing harm, it's about designing environments where people feel confident, welcome, and free to move. The Safe System approach is a globally endorsed framework that acknowledges human error and vulnerability, aiming to eliminate death and serious injury through system-wide design and management (PIARC, ND). It is built on five key principles:

1. Death and serious injury are unacceptable
2. Humans make mistakes
3. Humans are vulnerable
4. Responsibility is shared
5. Safety is proactive and redundant

In Ōtautahi Christchurch, this principle is embedded in the city's transport safety programme, which recognises that people make mistakes, but those mistakes should not cost lives. By designing for human vulnerability, we can create a transport system that protects everyone, especially those walking, cycling, scooting, or using mobility aids.

A key component of this approach is the use of SSPs also known internationally as raised safety platforms (RSPs). These are raised sections of carriageway installed at intersections or pedestrian crossings to physically slow vehicles and improve visibility. Unlike traditional speed humps, RSPs and SSPs are designed for higher-speed environments, including arterial roads and signalised

intersections. The gentle ramp profiles allow smoother passage for all vehicles while still encouraging drivers to reduce speed to survivable levels, typically 30 - 40 km/h (GDCI, 2025). Ōtautahi Christchurch has delivered some of the most substantial SSPs in Aotearoa, including at large, signalised intersections with six or more lanes, demonstrating that Safe System principles can be successfully applied in complex, high-volume urban environments.

Global research supports their effectiveness. The *Effectiveness of Raised Safety Platforms on Urban Arterials* report by Austroads (2022) found that SSPs reduce operating speeds on urban arterials without compromising traffic flow. In the United Kingdom and Europe, raised crossings are widely used in town centres and school zones to increase safety and calm traffic. In Australia, a 2025 Safe System Snippet by Safe System Solutions found that SSPs at signalised intersections reduced serious injury risk by 18–56%, with pedestrians being the primary beneficiaries. These findings support the use of SSPs in high-volume, multimodal environments and align with the principle of designing for human vulnerability.



Figure 1: Approach safe speed platforms at New Brighton/North Parade/Marshland/Shirley intersection

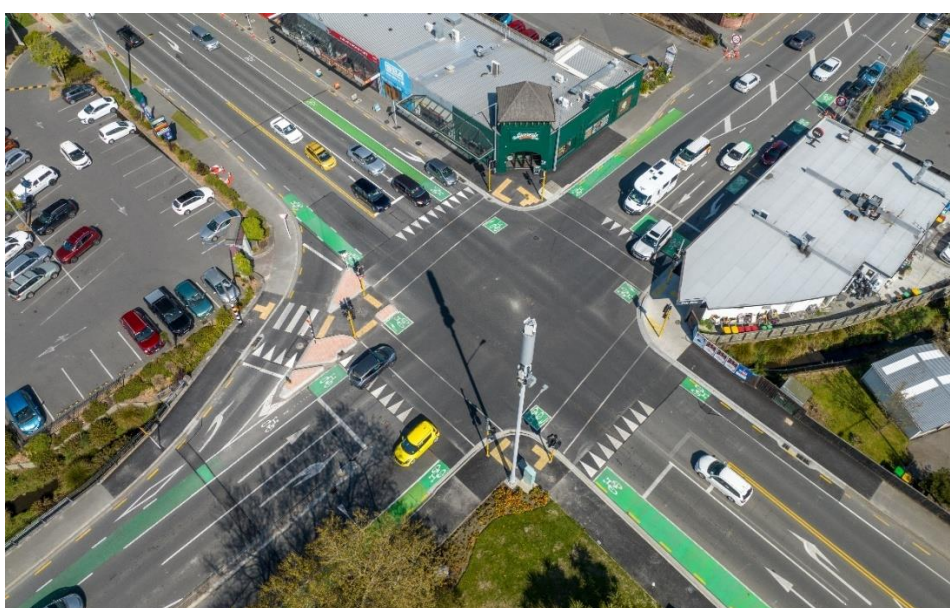


Figure 2: Safe speed platform at Hills/Shirley/Warrington intersection

This also aligns with the Aotearoa Urban Street Planning and Design Guide (Waka Kotahi, 2024), which reframes streets as “places for people” where movement and place are designed together. The guide, like the Global Designing Cities Initiative (GDCI) framework, emphasises *self-enforcing design*: geometry that cues safe behaviour without reliance on enforcement.

Approximately 55% of serious crashes in Ōtautahi Christchurch occur at intersections, many of which sit in the heart of communities near schools, shops, libraries, and local centres. Slowing traffic in these areas is not only a safety measure but a way to support vibrant, healthy communities.

Research consistently shows that even small reductions in vehicle speed can significantly improve safety outcomes by reducing the likelihood and severity of a collision. As kinetic energy increases with the square of speed, a reduction of just a few kilometres per hour can dramatically reduce crash severity and fatality risk (FHWA, 2018; Elvik, 2009; Rosén et al., 2011; Vision Zero Network, 2023).

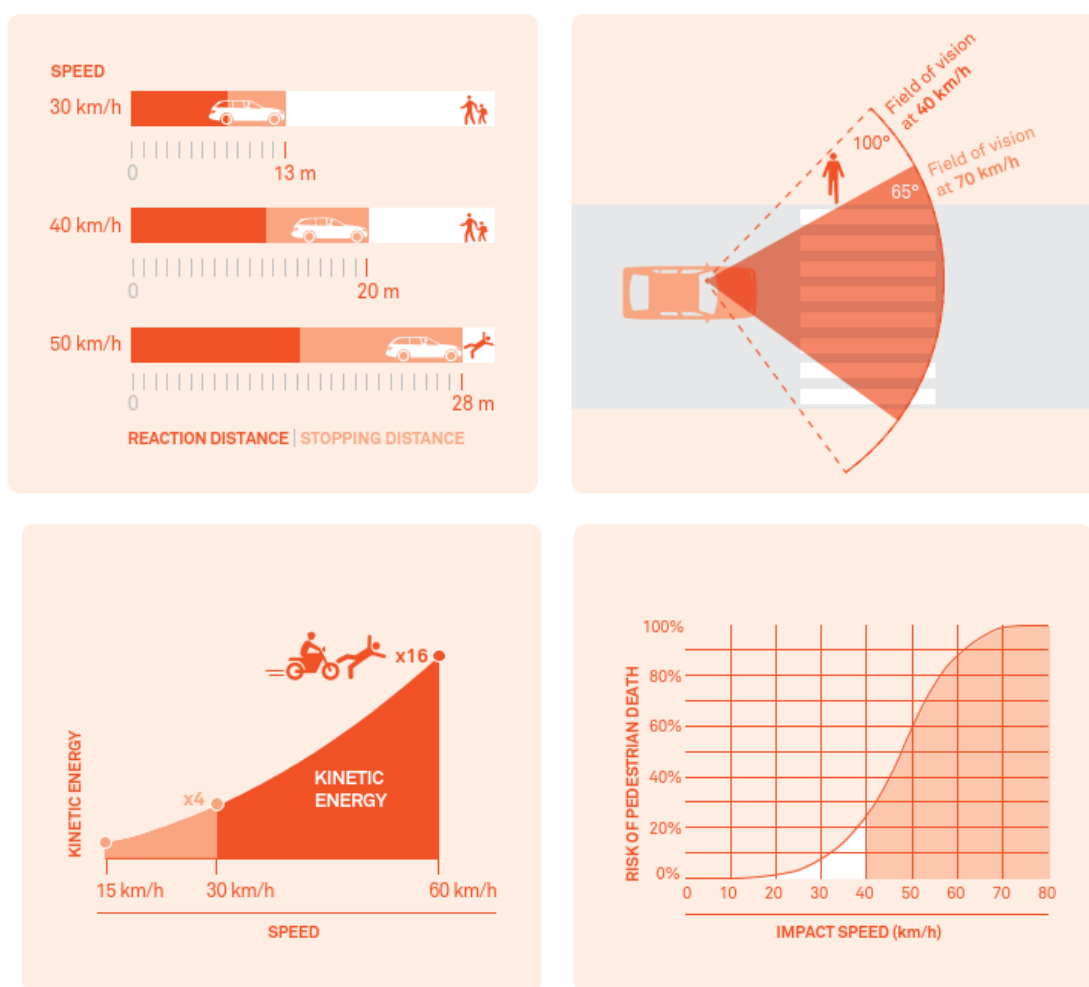


Figure 3: Images from Designing for Safe Speeds (Global Designing Cities Initiative, 2025)

Slower speeds have a profound impact on survivability. As illustrated in Figure 3, the likelihood of a pedestrian surviving a crash decrease sharply as speed increases, with survival rates around 90% at 30 km/h but falling to only about 20% at 50 km/h (Vision Zero Network, 2023); noting that survival at lower speeds may still involve a high risk of serious or life-altering injury. But the benefits extend far beyond crash statistics. Beyond reducing crash severity, design-led speed management creates a feedback loop: calmer traffic makes streets feel safer and more welcoming, encouraging more people to walk, cycle, and use public transport. This in turn supports healthier,

more connected communities and reinforces the city’s goals for accessibility and sustainability.

This feedback loop is visible in large suburban centres around Ōtautahi Christchurch, where SSPs have been installed at key intersections such as Aldwins Road/Ensors Road/Ferry Road and Barrington Street/Lincoln Road/Whiteleigh Avenue intersections. These suburban centres are used daily by people travelling to school, work or for social connection and exercise.

People of all ages and abilities use these centres. People walking tend to move slower, especially children, older adults, and people with temporary or permanent disabilities. At large, multi-lane intersections, longer crossing distances increase exposure time and the likelihood of conflict with vehicles, heightening risk for slower-moving users. By deterring late, high-speed movements, safe speed platforms reduce impact speeds and exposure risk, improving safety for people walking an crossing the road.

METHOD

This study evaluates the impact of SSPs on vehicle speeds and intersection safety using a combination of crash data analysis and predictive modelling at eight sites in Ōtautahi Christchurch. Following feedback received from the public on the first safe speed platform at the Barrington Street/Lincoln Road/Whiteleigh Avenue intersection, where raised medians already exist, approach only platforms have been provided at large intersections. There was an exception at Hills Road/Shirley Road/Warrington Street intersection due to geometry.

Research and guidance by VicRoads, Auckland Transport, NZTA and Queensland Walks suggests that full SSPs are generally more effective than approach-only platforms at sustaining lower speeds and enhancing pedestrian safety across entire intersections, especially in high-volume urban settings. However, the realities of working within a political environment including budget constraints and community engagement, often require compromise. In such contexts, progress over perfection can be a pragmatic approach; even partial treatments like approach-only platforms represent meaningful steps toward safer, more people-centred streets.

Table 1: Intersections and Treatment Types

Intersection	Treatment Type	Location/context
Barrington/Lincoln/Whiteleigh	Full platform	Entrance to shopping centre and stadium
Briggs/Lake Terrace/Marshland	Approach-only	Big box retail centre
Hills/Shirley/Warrington	Full platform	Shopping Centre
New Brighton/North Parade/Marshland/Shirley	Approach-only	Shopping Centre, Intermediate school
Aldwins/Buckleys/Linwood	Approach-only	Shopping Centre
Aldwins/Ferry/Ensors	Approach-only	Adjacent to Te Aratai High School
Hansons/Riccarton/Waimairi	Approach-only	Shopping Centre
Main South/Riccarton/Yaldhurst	Approach-only + new signals	Shopping Centre

The methodology being used is grounded in the Safe System approach, which recognises that human error is inevitable, but death and serious injury are not. It is further informed by Haddon’s Matrix (Haddon, 1972), a foundational framework in injury prevention that categorises risk factors across three phases of a crash; *pre-crash*, *crash*, and *post-crash*, and three domains; *human*, *vehicle*, and *environment*. While vehicles offer some protection to occupants during a crash, people walking, particularly children, older adults, and those with disabilities have no physical protection. This underscores the importance of designing intersections that reduce impact speeds and prioritise people walking, cycling, scooting or by motorcycle. The matrix below illustrates how safe speed platforms mitigate risk across all dimensions.

Table 2: Haddon’s Matrix for Safe Speed Platforms

	Human	Vehicle	Environmental
Pre-crash	Driver awareness and speed	Braking capability	Raised platform geometry cues slower speeds
Crash	Reduced impact force	Energy absorption	Lower kinetic energy due to reduced speed
Post-crash	Injury severity reduced	Vehicle integrity maintained	Easier access for emergency response

This structured approach highlights how design-led interventions like SSPs address multiple layers of risk simultaneously, reinforcing the Safe System principle that no single factor should bear the burden of safety. SSPs are effective because they:

- Modify the environment to cue safer behaviour (pre-crash)
- Reduce kinetic energy (crash)
- Improve survivability (post-crash)

Through substantial research, models have been developed that provide guidance on the estimated impact from a change in speed. The Power Model, originally proposed by Göran Nilsson and later refined by Rune Elvik, describes the relationship between changes in speed and changes in the number and severity of road crashes (Nilsson, 2004; Elvik, 2009). The model identified that a 1% increase in average speed results in approximately a 2% increase in injury crash frequency, a 3% increase in severe crash frequency, and a 4% increase in fatal crash frequency. Reductions in speed lead to equally substantive reductions in deaths and injuries.

More recent research has led to refinements in these models, with the most recent iteration being developed by Rune Elvik and colleagues based on an Exponential Model (Global Road Safety Facility (n.d.)).

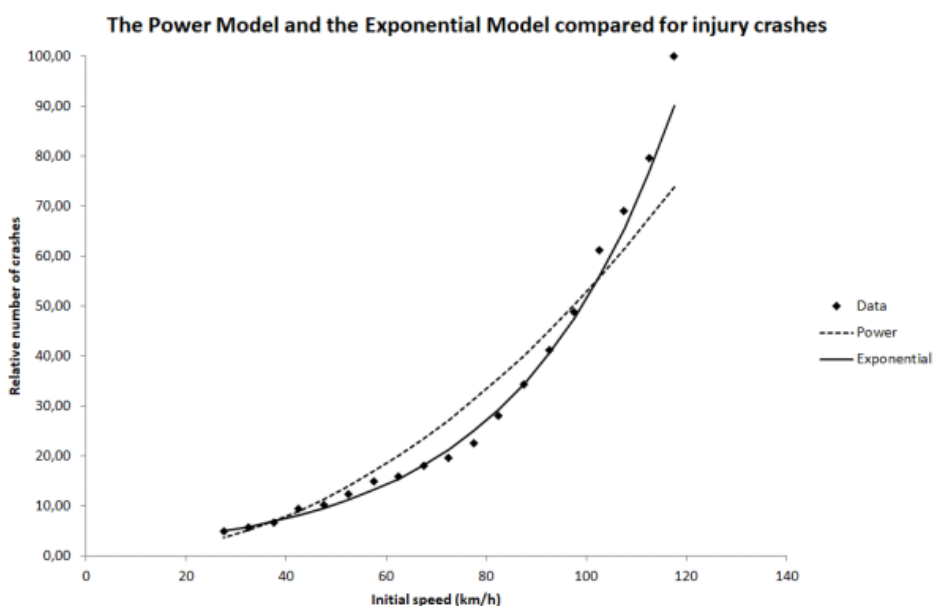


Figure 4: Comparison of the power model and the exponential model for injury crashes (based on Elvick (2013) from the European Commission

Figure 4 above (European Commission, 2020) compares the Power Model and the Exponential Model against observed data to illustrate how injury crash frequency increases with vehicle speed. Both models show a steep upward trend, confirming that higher speeds are associated with more injury crashes. However, the Exponential Model fits the observed data (solid line) more closely than the Power Model (dashed line), particularly at higher speeds. This suggests that the Exponential Model may offer a more accurate and flexible representation of crash risk, especially when accounting for variations in initial speed. The figure supports Elvik’s refinement of speed-risk

modelling, showing that even modest increases in speed can lead to disproportionately higher crash rates.

Therefore to assess the safety benefits of the SSPs in Ōtautahi Christchurch, the Elvik exponential crash–speed relationship was applied (Elvik, 2009). Elvik’s model is traditionally expressed in terms of mean travel speeds. However, at signalised intersections or locations where vehicles frequently stop or queue, mean speeds can under-represent the speeds at which conflicts occur.

To better reflect operating conditions relevant to crash risk, this assessment used 85th percentile approach speeds derived from TomTom data. While this data does not capture every vehicle movement and represents an indicative measure rather than a precise point speed, it provides a robust and widely used proxy for free-flow operating speeds across large samples. Its use is appropriate for comparative before-and-after analysis, where relative changes in speed are more critical than absolute precision. Speeds were measured over 50–100 metre segments on each intersection approach, including the stop line, to capture typical free-flowing vehicle behaviour before any deceleration caused by traffic signals or geometry. The 85th percentile speed, representing the speed at or below which 85% of vehicles travel, provides a more accurate indicator of crash severity by avoiding skew from queued or slow-moving traffic. This approach aligns with GDCI’s emphasis on impact speed and Waka Kotahi’s Safe System principles.

These reductions in operating speeds were then applied to the historic crash records for each site to estimate the number of injuries likely to be prevented per year. Crash data was sourced from NZTA Waka Kotahi Crash Analysis System (CAS). A 50-metre radius around each intersection was used, which appears to be a general application when using Elvik’s model. Table 3 summarises:

- Predicted percentage reductions in fatal, serious, and minor injury risk,
- Estimated injuries prevented, by severity, and
- Total injury savings per site (the sum of all severity levels).

Table 3: Intersections and Crash Reductions

Site	Crash period studied	85th percentile speeds		Injury crashes before			Estimated savings			
		85th percentile (Before)	85th percentile (After)	Fatal Injuries	Serious Injuries	Minor Injuries	Fatal Injury	Serious Injury	Minor Injury	Injuries Saving
Barrington/Lincoln/Whiteleigh	2017-2022	46.50	35.75	0	3	4	0.0	1.4	1.3	2.5
Briggs/Lake Terrace/Marshland	2018-2023	43.75	37.25	1	3	8	0.4	0.9	1.7	2.8
Hills/Shirley/Warrington	2019-2024	40.50	35.00	0	2	6	0.0	0.6	1.3	1.9
New Brighton/North Parade/Marshland/Shirley	2019-2024	41.75	35.50	0	0	8	0.0	0.0	1.7	1.9
Aldwins/Buckleys/Linwood	2019-2024	41.00	34.75	0	2	11	0.0	0.6	2.3	3.1
Aldwins/Ensors/Ferry	2019-2024	40.00	35.25	0	2	5	0.0	0.5	0.9	1.4
Hansons/Riccarton/Waimairi	2019-2024	36.75	28.50	1	1	6	0.5	0.4	1.6	2.4
Main South/Riccarton/Yaldhurst	2019-2024	43.75	31.50	0	1	2	0.0	0.5	0.8	1.3

The model provides an evidence-based estimate of expected crash reductions, but several important caveats apply:

- Single-variable assumption: The model assumes that the only change influencing crash rates is speed. In practice, other factors such as driver behaviour, enforcement, traffic volumes, geometry, or signal timing may also influence outcomes.
- 85th percentile as a proxy: Using 85th percentile speeds is a pragmatic approach. It does not

perfectly substitute for mean speed but is defensible in signalised environments where mean values are distorted by queuing and stop phases.

- Predicted but not guaranteed: The model provides predictions, not certainties. Real-world results may vary due to stochastic effects, exposure changes, or other concurrent interventions.

These assumptions are consistent with the limitations acknowledged in Designing for Safe Speeds (GDCI, 2025) and Aotearoa Urban Street Planning and Design Guide (NZTA, 2024), both of which emphasise that speed management outcomes should be monitored and refined through iterative evaluation.

At the Barrington/Lincoln/Whiteleigh intersection, the 85th percentile speed reduced from 46 km/h to 36 km/h following the intervention. Applying the Elvik model predicts:

- ~55% reduction in fatal injuries,
- ~45% reduction in serious injuries,
- ~33% reduction in minor injuries.

Five years prior to the intervention, this site recorded 0 fatal, 3 serious, and 4 minor injuries. Accordingly, when applied to the site’s historic crash record the model estimates that approximately 1.4 serious injuries and 1.3 minor injuries (≈ 2.5 total) will be prevented per year. This demonstrates how even in the absence of prior fatalities; meaningful harm reduction can be achieved through speed management interventions that align with Safe System principles.

Across all eight intersections, 85th percentile approach speeds reduced by 6–14 km/h following the installation of SSPs. To estimate the safety impact, the Elvik Exponential Model was applied using a 6–10 km/h reduction band, consistent with published research on injury risk reduction. Within this range, the model predicts reductions of approximately 34–55% in fatal injuries (coefficient 0.08), 25–45% in serious injuries (coefficient 0.06), and 15–35% in minor injuries (coefficient 0.04), reflecting the model’s sensitivity to injury severity (Elvik, 2013). These reductions translated into estimated savings of 1–3 injury crashes per year per site, with the greatest benefits observed at higher-speed locations such as Aldwins/Buckleys/Linwood. The findings reinforce the effectiveness of targeted speed management interventions in reducing harm, particularly at urban intersections with elevated crash histories and vulnerable road users.

Preliminary monitoring results from CAS below indicate encouraging reductions in injury crashes following the installation of safe speed platforms. Given that less than two years of post-implementation data are available for most sites, these results should be viewed as indicative only. No other major network changes, speed limit adjustments, or signal phasing modifications were implemented at these locations during the evaluation period. While broader background factors such as traffic volume fluctuations or behavioural adaptation cannot be entirely ruled out, the observed trends provide early empirical validation of the positive safety trend anticipated from the Elvik crash modification factors and observed international evidence.

Table 4: Intersections and Crash Reductions

	Crash period before	Number of crashes (excluding non-injury)			Crash period after	Post-implementation crashes (excluding non-injury)		
		F	S	M		F	S	M
Barrington/Lincoln/Whiteleigh	2017-2022	0	3	4	2023-2025	0	0	0
Briggs/Lake Terrace/Marshland	2018-2023	1	3	8	2024-2025	0	0	0
Hills/Shirley/ Warrington	2019-2024	0	2	6	Mid-2024-2025	0	0	2
New Brighton/North Parade/Marshland/ Shirley	2019-2024	0	0	8	Mid-2024-2025	0	0	1

Aldwins/Buckleys/ Linwood	2019-2024	0	2	11	Mid-2024-2025	0	1	2
Aldwins/Ensors/Ferry	2019-2024	0	2	5	These were constructed in 2025.			
Hansons/Riccarton/Waimairi	2019-2024	1	1	6				
Main South/Riccarton/Yaldhurst	2019-2024	0	1	2				

Using the Elvik model provides a robust, evidence-based way to quantify the safety value of achieving safer operating speeds. The analysis confirms that:

- Even modest speed reductions substantially reduce crash severity.
- Targeted design treatments that reduce 85th percentile speeds on approaches to intersections deliver measurable reductions in injury risk.

Preliminary post-implementation monitoring results from Christchurch intersections are consistent with the direction and magnitude of reductions predicted by the Elvik crash modification factors, with early CAS data showing few or no reported injury crashes at treated sites. While these observations provide encouraging empirical support for the modelled benefits, the short monitoring periods mean that the findings should be interpreted as indicative rather than statistically conclusive.

The Elvik model nevertheless offers a credible and transferable framework for quantifying expected safety gains, especially where long-term datasets are not yet available. Future work could incorporate Bayesian or Monte Carlo simulation to express uncertainty ranges and to integrate observed crash outcomes as more years of post-implementation data become available

DISCUSSION

The initial results confirm that physical street design can shift driver behaviour in meaningful and lasting ways. While this evaluation represents an initial assessment within an incomplete five-year monitoring period, early results demonstrate that modest reductions in operating speed have been achieved at all sites, leading to measurable reductions in predicted injury outcomes. These findings align with international evidence showing that even small reductions in operating speed translate to substantial safety gains. This supports the *Designing for Safe Speeds* principle that “street design is the most effective form of speed management” (GDCl, 2025).

Early findings from Ōtautahi Christchurch mirror the direction of international best practice. Vision Zero for London (TfL, 2023) shows that reducing speeds through design and system management cuts deaths and serious injuries dramatically. Likewise, the *Aotearoa Urban Street Planning and Design Guide* (Waka Kotahi, 2024) embeds a “movement and place” framework, recognising that creating safe, attractive places requires reducing traffic dominance and designing for people.

At lower operating speeds, drivers have more time to react and brake, often reducing collision speed below free speed. For example, a vehicle travelling at 40 km/h may impact at 30 km/h due to braking. This further enhances survivability and supports the observed crash reductions. Design-led speed management also strengthens resilience. Fewer crashes mean less disruption, reduced economic cost, and safer continuity of movement across the network. It promotes equity, ensuring that all users, children, older adults, and those with disabilities, can travel safely and confidently.

Community feedback received through the Council’s community reporting system, has been largely positive at Barrington/Lincoln/Whiteleigh intersection, with residents reporting that the intersections feel calmer and more comfortable to cross. This aligns with international findings that design-led speed management improves perceived safety and encourages active travel (GDCl, 2025). No crashes have been recorded since the platform was installed in October 2022, reinforcing the model’s predictive validity.

By combining the predictive power of the Elvik model with real-world implementation data, Ōtautahi Christchurch is taking an evidence-led approach consistent with the *Future Transport Plan's* "Monitor and Review" principle. This represents a shift from reactive crash mitigation to proactive, design-led safety.

However, challenges remain in delivering safe speed platforms at high-risk intersections, including balancing construction costs, network efficiency, and public expectation, but the results show clear and sustained benefits.

To achieve equitable road safety outcomes, we must transform our intersections. Most urban arterials in Australia and New Zealand cities remain vehicle-dominated, limiting safe access for vulnerable road users. Christchurch's work exemplifies the necessary shift toward people-centred design, especially in areas with high active mode usage.

Recent global and Australasian research reinforces the effectiveness of Safe Speed Platforms (SSPs) as a cornerstone of Safe System-aligned street design. A 2024 meta-analysis presented at the Australasian Transport Research Forum (Golbabaei et al., 2024) reviewed over 50 studies and confirmed that SSPs significantly reduce operating speeds and crash rates, particularly in urban areas with high pedestrian and cyclist activity. International examples from cities such as Amsterdam, Oslo, Melbourne, and Hamilton further demonstrate the versatility of this treatment across diverse contexts as part of broader Vision Zero strategies (APRSo, 2025). Collectively, this body of evidence reinforces that Christchurch's outcomes align with a global movement toward design-led, self-enforcing safety that prioritises human vulnerability and survivability.

The 2024 update to the Aotearoa Urban Street Planning and Design Guide further strengthens the case for SSPs. It promotes self-enforcing design and encourages 30 km/h design speeds in areas with high active mode use. The guide's emphasis on "He Whenua, He Tāngata" (the land and the people) reflects a shift toward designing streets that prioritise community well-being, equity, and resilience (NZTA, 2024).

These developments affirm that Christchurch's approach is not only evidence-based but also aligned with global best practice. By embedding SSPs into the urban fabric, the city is advancing a transport system that is safer, more inclusive, and future ready.

CONCLUSIONS & RECOMMENDATIONS

This paper began by asking whether physical design can create meaningful, lasting change. The evidence presented, both modelled and observed, indicates that it can.

The SSPs implemented in Ōtautahi Christchurch as part of the Minor Road Safety Programme demonstrate that design-led interventions can meaningfully and measurably reduce harm. By embedding Safe System principles into intersection geometry and operational speed management, the city is proactively shaping a transport network that is safer, more reliable, and more resilient. In this context, resilience is twofold: it is about the system's ability to continue functioning safely during disruption, such as extreme weather or crashes, and the community's capacity to thrive through enhanced safety, accessibility, and social connection. Together, these dimensions build a network that not only withstands stress but also supports everyday well-being.

In this way, SSPs demonstrate that resilience is not just about withstanding shocks, but about designing environments that sustain safety, accessibility, and well-being every day.

The initial analysis confirms that even modest reductions in operating speed, particularly at high-risk intersections, yield substantive safety benefits. The early findings in this paper are consistent with research, including predictive modelling and survivability thresholds in PIARC and GDCI.

Beyond safety, the interventions support broader co-benefits, including, increased physical activity, improved accessibility, and enhanced community well-being. Ōtautahi Christchurch's approach demonstrates that resilience is not just about recovery after disruption; it is about designing streets that sustain and strengthen communities every day. While this study focuses on early safety outcomes, the long-term success of SSPs will ultimately depend on community acceptance, political durability, and context-sensitive application. These are factors that warrant dedicated qualitative research alongside ongoing quantitative evaluation.

SSPs are proving to be a highly effective tool for reducing harm and supporting Christchurch's transition to a safer, more sustainable transport system. The initial analysis confirms that design-led interventions can reduce serious injury risk, reinforcing that the way streets are shaped determines how safely they function. By embedding safety into the fabric of our streets, Ōtautahi Christchurch is building a transport system that protects, connects, and empowers its communities.

Recommendations from this work, include:

1. Continue prioritising self-enforcing, design-led treatments in high-risk and high-activity areas, especially near schools, shops, and community hubs.
2. Maintain consistent monitoring and evaluation of operating speeds and crash outcomes to refine interventions and support evidence-led policy, recognising that early-stage evaluation may rely on available network-level data sources, with more detailed site-specific methods introduced over time as resources and data access allow.
3. Undertake further research to determine if raised platforms tend to produce more consistent speed reductions across the entire intersection, and if approach platforms result in more variable speeds especially if drivers accelerate after crossing the initial ramp. Thereby being more effective in reducing kinetic energy across the entire conflict zone. Incorporate more in-depth statistical analysis and longitudinal data collection into future evaluations to strengthen the evidence base and quantify the significance of observed changes in speed and safety outcomes.
4. Communicate co-benefits including safety, health, equity, and resilience, to sustain political and community support for speed management and street transformation.
5. Integrate Safe System principles from PIARC, GDCI, and Waka Kotahi NZTA into all new projects, ensuring survivability thresholds and human vulnerability guide design decisions. It is acknowledged that this currently is more difficult following the change in direction in the most recent Government Policy Statement on Transport (2024).

AUTHOR CONTRIBUTION STATEMENT

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