TRANSPORTATION 2023 CONFERENCE

A STORY OF PLACE AND MOVEMENT

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ABSTRACT

As Auckland grows, providing integrated transport corridors has become a primary focus for local authorities and road controlling authorities such as Auckland Council and Auckland Transport. Integrated transport corridors combine aspects of both transport planning and urban design to acknowledge their relative place and movement functions. These concepts can be merged using the Roads and Streets Framework (RASF). The framework is a consistent and systematic methodology for identifying the place and movement functions of a corridor. Since the release of the RASF, Waka Kotahi NZ Transport Agency has released a similar framework called the One Network Framework (ONF). The ONF uses similar principles regarding place and movement. This paper focuses on the RASF and describes the application of the framework within Te Tupu Ngātahi (Supporting Growth Alliance), when developing the future transport network in Auckland's future urban areas. A summary of learnings and areas for improvement are then shared to assist transport planners using the framework in the future.

INTRODUCTION

Historically, New Zealand has had a high reliance on private motor vehicles. During the early importation and manufacture of private vehicles, the country's population was relatively small and rural encouraging an uptake of the transport mode. This reliance has grown significantly since then, as highlighted in the latest 2018 Census, where 70% of Aucklanders noted using a private vehicle to travel to work. Accordingly, this has resulted in the prioritisation of private vehicles in the planning and design of transport networks throughout the country.

By shaping our transport networks to primarily support private vehicles, we have discouraged the use of sustainable travel alternatives and increased the use of non-renewable fuels. In addition, the prioritisation of private vehicles often causes severance within local communities and encourages the development of low-density housing often on the edges of urban areas which are reliant on private vehicle trips. In combination, these impacts have a significant adverse effect on the environmental, social and economic well-being of New Zealand's towns and cities. Addressing these impacts is a key theme of the conference, in particular the themes of Taha tinana (physical health) and Taha whānau (social well-being) as part of the holistic Te Whare Tapa Whā model.

Jones and Boujenko (2009) state that there has been increasing recognition in many countries around the world that transport corridors do much more than simply provide the infrastructure for private vehicles. They also play a vital role in shaping the identity of a city or town. In Australia, Curtis and Tiwari (2008) proposed the development of multi-functional 'Activity Corridors'. This examined the possibility of transitioning Perth's existing arterial network (which had been developed around private vehicle use) to 'Activity Corridors' created on the principles of place-making and accessibility for all modes. In the UK, the Department for Transport and the Department for Communities and Local Government (2007) have emphasised the dual function of transport corridors as both places and conduits for movement when developing transport corridors on its network.

In an Auckland context, the Auckland Plan 2050 encourages integration between land use and transport. The Auckland Plan 2050 is a comprehensive plan to make Auckland the world's most liveable city by addressing the strategic challenges facing Auckland as the city grows in the next 30 years (Auckland Council, 2018). Within the Plan, Focus Area 5 of the Transport and Access outcomes outlines the goal of better land use and transport integration. This identifies that the right balance between a street's transport function and general place making needs to be struck to support high-quality urban environments. This balance can be achieved using Auckland Transport's Roads and Streets Framework as a tool to guide this process.

WHAT IS THE ROADS AND STREETS FRAMEWORK?

In recent years, Auckland Transport, in conjunction with Auckland Council, have been looking at ways to manage Auckland's roads and streets to reflect the full range of modes and functions that each transport corridor has on the network. In early 2020, the two organisations released the Roads and Streets Framework (RASF) (Auckland Transport, 2020). The RASF is provided as a guiding methodology for identifying the place and movement functions of transport corridors on the Auckland network.

Since the release of the RASF, Waka Kotahi NZ Transport Agency (Waka Kotahi) has released a similar framework called the One Network Framework (Waka Kotahi NZ Transport Agency, 2021). The One Network Framework (ONF) can be used to identify the place and movement functions of roads and streets throughout the New Zealand network for both rural and urban environments.

The RASF has been developed using several strategic plans and policies for Auckland. This includes a range of documents including central government policies such as the Government Policy Statement on Land Transport (Ministry of Transport, 2020), which sets the government's priorities for land transport investment over the next ten years, multi-agency partnerships such as the Auckland Transport Alignment Project (Ministry of Transport, 2021), which encourages people to use public transport and active modes, as well as the local policies such as the Auckland Plan 2050 (Auckland Council, 2018). By forming around these strategic documents, the use of the framework ensures that the wider strategic goals of Auckland are met.

There are five key steps within the framework. These are as follows:

1. Information gathering to identify the place and movement functions.
2. Identifying the specific 'typology' of the transport corridor. The 'typology' is a term used to describe the combined place and movement function of the corridor.
3. Identifying the various modes that travel along the corridor. This assessment is completed for three different scenarios, the existing, optimal and future.
4. Completion of a RASF Mandate, which is a summary of the previous steps in one complete document.
5. Use of the RASF Mandate for design development, business cases, and network and operational planning.

For the purposes of this paper, a simplified explanation of each of the steps in the framework is outlined in the subsequent sub-sections. A fuller explanation of each of these steps can be found in the RASF document.

Place and Movement

The framework defines 'place' as the catchment of the road or street and its adjacent land use. It treats the corridor as a destination in its own right and therefore measures place in terms of how far people are willing to travel to go there. It should be noted that the 'place' function is not necessarily connected to the quality of amenities along a corridor.

The framework defines the 'movement' function of a corridor in terms of the strategic function the corridor has in the overall network. It considers how efficiently and effectively the corridor can move people, goods and services between locations and how they can access key destinations.

The movement function is measured based on all modes that travel along the corridor. For example, a road or street may have low traffic volumes, but a frequent bus service that connects to nearby suburbs. Therefore, the more 'strategic' nature of the bus service is the mode which the movement function is based on.

There are three tiers for both the place and movement functions, illustrated in Figures 1 and 2 below.

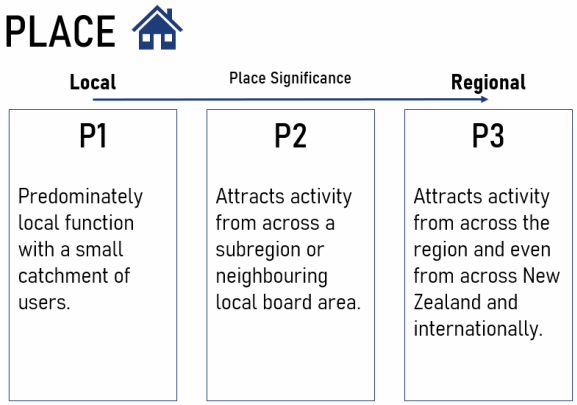

Figure 1: Place Levels Defined by the Roads and Streets Framework

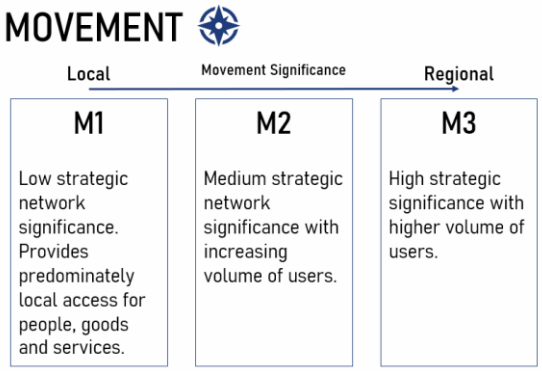

Figure 2: Movement Levels Defined by the Roads and Streets Framework

Typologies

The place and movement functions are then combined to provide a 3x3 matrix (shown in Figure 3 below), each of the blocks within the matrix is referred to as a 'typology'. There are nine different RASF typologies for the Auckland network, each representing a transport corridor's strategic place and moment function. The framework provides more detailed descriptions for each of these typologies. These definitions are not prescriptive and only offer guidance.

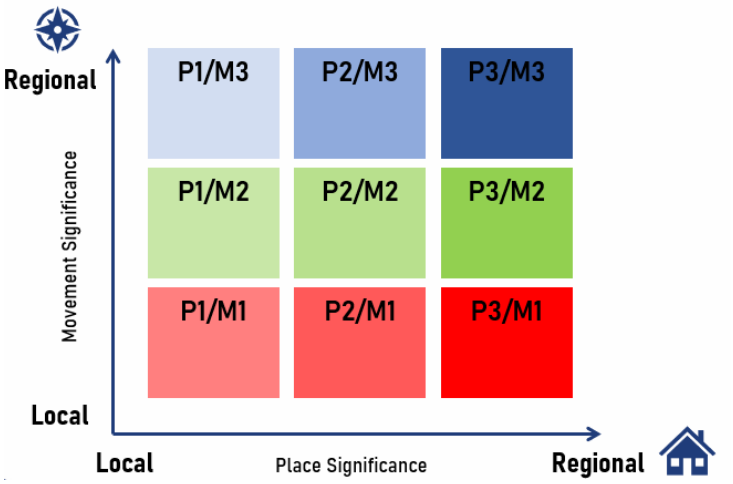

Figure 3: Road and Streets Framework Network Typologies

Two typologies are identified for a corridor, one for the existing function and the second for the future function. The future typology will capture any changes to the catchment size and land use adjacent to the corridor as well as any changes to the strategic function. The purpose of the typology is not to be analytically perfect, but to capture the key place and movement elements of a corridor that support the strategic function.

Modal Priorities

The third step in the framework is assessing the modal priority. This step provides an understanding of the full range of modes that travel along a corridor and how to provide for them. The framework specifies seven different modes, which includes:

1. People on Foot
2. People on Bikes (inclusive of emerging micro-mobility technology)
3. People Using Public Transport
4. Freight
5. People in Private Motor Vehicles
6. Loading and Servicing
7. Parking and Access

The priorities for each of these modes are represented in a modal priority graph. The chart shows each of the modes on the x-axis and the level of priority for each of the modes on the y-axis (scored from lowest to highest). It should be noted that the specific scores assigned to each mode is not the focus of the assessment, rather the relative scores between each of the modes to understand how they compete for priority.

Accordingly, a mode scoring the highest level of priority is considered the most important within the transport corridor. Whereas a mode scoring the lowest indicates that is has less importance relative to the other modes. An example modal priority graph for an existing scenario of a typical residential street is shown in Figure 4 below. The private vehicle and parking priorities are the highest as many residential streets in Auckland currently cater to these modes.

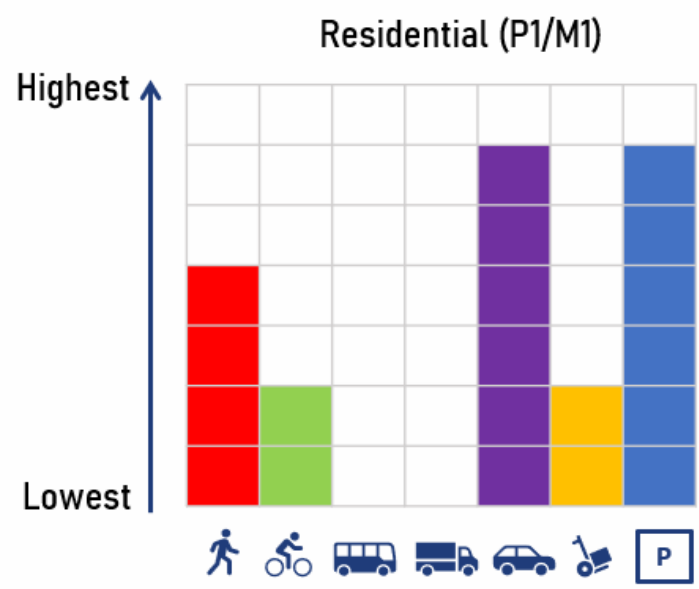

Figure 4: Existing (Observed) Modal Priority Graph for a Typical Residential Street

This modal priority graph is then completed for three different scenarios:

- **Existing (Observed)**: This scenario is based on the current levels of priority for each mode.
- **Existing (Optimal)**: This scenario indicates the ideal levels of priority for each of the modes based on strategic network goals.
- **Future**: Based on the optimal levels of priority plus any changes to future demand and strategic networks.

A key resource when developing the modal priority graphs is Auckland Transport's Future Connect. Future Connect is the long-term network plan for Auckland's transport system, it identifies the most important parts of the transport network and the current and expected levels of service for all transport modes along each connection.

Given the size and scale of the Auckland transport network, some corridors will have the same typology but different modal priority graphs. For example, on a local residential street with a P1/M1 typology the most important modes could be vehicles and parking for an existing scenario. While for an industrial area with a P1/M1 typology, the most important modes could be freight and loading/ servicing for an existing scenario.

RASF Mandates

The above steps are then summarised in a RASF Mandate. The key function of the mandate is to highlight the specific factors that determine the place and movement functions of a transport corridor. The mandate also outlines the key drivers that prioritise each of the modes within the modal priority graphs.

The RASF mandate should form the starting point for any project on a corridor. For example, during a business case or concept level design. While undertaken at the start of the project, the RASF is used throughout the project life-cycle as a reference point to ensure the strategic functions and priorities of a corridor form part of the outcomes of the project.

CASE STUDY: TE TUPU NGĀTAHI (SUPPORTING GROWTH ALLIANCE)

Project Overview

Te Tupu Ngātahi (Supporting Growth Alliance) is an alliance between Auckland Transport and Waka Kotahi NZ Transport Agency. The alliance also includes consultancies Beca and Aecom and legal advisors Bell Gully and Buddle Findlay.

In the next 30 years, Auckland's population is expected to grow by another one million people. A significant amount of this population growth is expected to move into Auckland's future urban zoned areas. These areas have been identified through the Auckland Unitary Plan and include areas such as Warkworth, Redhills, Silverdale, Drury and Paerata.

Te Tupu Ngātahi is responsible for identifying the various transport projects necessary to support this urban growth. This is done through a series of business cases and transport assessments with the fundamental goal of protecting the land necessary for transport projects in the future (i.e. route protection). These projects include new roads and highways, upgraded roads, public transport connections and proposed walking and cycling links. Figures 5 and 6 illustrate the types of corridors recommended to be upgraded within these growth areas.

Figure 5: Typical Urban Corridor Recommended for Upgrade

Figure 6: Typical Rural Corridor Recommended for Upgrade

Use of the Roads and Streets Framework

The expected growth within these future urban areas will place significant strain on the existing transport network. Therefore, providing better travel options is a key step in helping ease this pressure. A significant constraint is that the existing transport network in many of these future urban areas is limited and predominantly rural. This will likely cause competition between modes for space and priority.

Considering these competing modes and functions is necessary to enable the delivery of integrated multi-modal transport corridors, which is a key goal of Te Tupu Ngātahi. Providing integrated transport corridors is a key focus as they play a vital role in developing communities that will be safe, accessible and liveable. Consideration for these factors can be achieved using the RASF.

The framework has been a key part of the development of detailed business cases prepared by Te Tupu Ngātahi, more specifically as part of the transport planning assessments in the development of the future recommended network in these future urban areas. These assessments include the corridor form and function and intersection form and function.

Identifying the form and function of transport corridors is usually the first transport planning exercise when developing the future recommended network of an area. This exercise determines the necessary transport and land use requirements for the corridor and how the space within the corridor will be allocated to the proposed modes utilising the corridor.

After completing the corridor form and function, the second step in developing the future recommended network is the intersection form and function. This exercise aims to identify the intersection forms within the recommended network, this is essential as roundabouts and signalised intersections have different footprints that changes the amount of land required for route protection.

Te Tupu Ngātahi has worked with Auckland Transport to develop intersection assessment principles which are supported by the Roads and Streets Framework. These principles adopt a roundabout first approach which is consistent with the Transport Design Manual (TDM). The TDM is a set of guides, design codes, and specifications outlining engineering best practice for the Auckland region. It should be noted that the roundabout first approach is further tested against a range of criteria to understand the suitability of a roundabout at each intersection.

Benefits of Using the Framework

The RASF assessments completed informed the assessments identified above. Benefits of using the framework for the corridor form and function assessment include:

- **Recognising the place function of existing corridors**: This was particularly useful when assessing existing transport corridors on the network. By recognising the existing place function any opportunities to minimise potential land use impacts were investigated by the project team. This was undertaken to enable the goal of creating a high quality-urban environment without deteriorating the existing urban environment. For example, the town-centre of Don Buck Road in the suburb of Redhills has a high place function due to the adjacent land use. The corridor is expected to have high traffic volumes in the future, which would typically be accommodated with additional traffic lanes. The provision of additional traffic lanes would have a significant impact on the local town centre and significantly deteriorate the urban environment. Therefore, solutions to manage these high traffic volumes were investigated by the project team to balance the place and movement functions of the corridor. Such as encouraging alternative modes of transport through the

provision of active mode facilities and frequent public transport. Additionally, encouraging trips on alternative parallel routes such as State Highway 16 were explored.

- **Highlighting key public transport (PT) links**: Developing modal priority graphs for the recommended network highlighted the need to prioritise public transport along strategic PT links with several competing modes. These corridors were initially identified through PT network maps, developed by Auckland Transport PT specialists in conjunction with Te Tupu Ngātahi. This ensured appropriate facilities, such as bus priority lanes or bus priority at intersections were provided. Providing these facilities is key to preventing bus services from suffering from interrupted and unreliable travel along congested corridors, which can discourage the uptake of public transport.

- **Highlighting key active mode connections**: Similarly, the modal priority graphs developed for the recommended network highlighted the need to prioritise active modes along strategic active mode connections. These corridors were initially identified through active mode network maps, developed by Te Tupu Ngātahi in conjunction with Auckland Transport specialists. This ensured the provision of high-quality active mode facilities along these connections.

- **Identifying conflicts between modes**: For new corridors, this was not a significant issue as there were few constraints in providing for all modes utilising the corridor. However, for existing corridors with limited corridor space and several competing modes this proved to be an issue. Using the future modal priority graph, it was easy to identify these conflicts within a corridor and subsequently provide options to mitigate against them. For example, banning freight movements through the local town centre along Brigham Creek Road in Whenuapai. Brigham Creek Road is a strategic freight route that also has high active mode movements within the local town centre. Therefore, banning freight movements and allowing them along parallel routes with fewer/no conflicts is a good solution to remove the risk of potential conflicts within the local town centre.

- **Gap analysis for recently developed corridors**: For recently developed corridors on the network, the framework was used to identify gaps between the existing and future road environments to understand whether any additional work would be necessary. This assessment used the existing and future modal priority graphs to identify any changes in modal priority. Facilities could then either be retro-fitted along the corridor or the space re-allocated to accommodate these changes. For example, Northside Drive in the suburb of Westgate is a corridor that has recently been developed. The corridor has been developed to generally prioritise general traffic with less priority given to active modes as these movements are currently low. Accordingly, the existing and future modal priority graphs were developed and compared for Northside Drive. The assessment identified increased priority for active modes in the future as Northside Drive will connect to a regional cycle link and the Westgate town centre. The current infrastructure along the corridor includes footpaths and on-road cycle lanes. The RASF process allowed Te Tupu Ngātahi to identify the necessary upgrades likely to be required in the future for this corridor. There is sufficient corridor width along Northside Drive to progress these upgrades in the future when required.

For the intersection form and function assessment, the benefits of using the RASF include:

- **Identifying high priority modes**: The future modal priority graph was a useful tool when identifying the key modes that needed to be prioritised along a corridor. This was then used alongside the internal intersection principles when selecting intersection forms for the future recommended network. For example, Royal Road in the suburb of Massey is a key east-west connection that connects the Redhills community with State Highway 16 (SH16), the North- Western Cycleway and potentially a future Rapid Transit Corridor (RTC) along SH16 from the City Centre to Westgate/Brigham Creek. The future modal priority graph for Royal

Road indicated that public transport and active modes would need to be prioritised in the future, based on the high bus frequencies and community facilities along the corridor. Therefore, how well these modes could be prioritised was a significant contributing factor when determining the intersection forms along Royal Road.

- **Providing good accessibility through the place function**: Intersections play a vital role providing access to key features within the recommended network . By recognising the place function of corridors, the project team was able to select intersection forms which provided good accessibility and enhanced the urban environment. For example, the place function of Royal Road highlighted the large residential development on both sides of the corridor and several community features such as a school, green space and several local churches. Most of these community features are located at the end of low-volume local roads along the corridor. Given that Royal Road is expected to be widened to allow for bus priority, the crossing length at each of these intersections is relatively long. Whereas priority-controlled intersections would typically be provided at these intersections, signalised intersections were provided to allow for safe crossing facilities and improved accessibility for all modes.

Areas for Improvement

Whilst using the framework had several key benefits, the project team noted a few areas for improvement. These include:

- **Limited place and movement tiers**: The number of tiers for the place and movement functions is relatively narrow. These could potentially be extended to allow for greater variety between corridors. For example, when developing the North-West recommended network, multiple corridors had an M3 movement function, such as Coatesville-Riverhead Highway, an important sub-regional connection between SH16 and Riverhead. The corridor is only one of two arterials that provide access to the growth area of Riverhead. In comparison, an M3 movement function was also selected for Main Street (SH16), the main arterial running through the local town centre of Kumeū-Huapai. Within the wider North-West network, the movement function of Main Street is more significant as the corridor is adjacent to the future Rapid Transit Corridor (RTC). It would have been useful if the RASF could capture this slight difference in strategic significance to provide a better understanding of the relative importance of the two corridors within the wider network. A similar planning and design guideline in the UK ('Link and Place: A Guide to Street Planning and Design') has five tiers for place and movement functions as well as the One Network Framework (ONF) for urban corridors.

- **Transference of the RASF into design principles**: Following completion of these initial transport planning assessments, the engineering design of the network begins. This design process is based on the Transport Design Manual (TDM). The RASF indicates use of the TDM as the overarching engineering guide for the subsequent design steps after the initial transport planning assessments. While the RASF indicates that the TDM should be used, there is currently little guidance within the RASF on how the typology and modal priorities of a corridor align with design principles in the TDM. For example, Dunlop Road in the suburb of Redhills has been recently developed with cycling facilities that meet the minimum design requirements. From the gap analysis, it was found that these facilities may need to be upgraded in the future to meet demand. The current cycling facilities along the corridor are buffered on-road facilities, providing less separation with general traffic than dedicated off-road facilities recommended by Te Tupu Ngātahi. It would have been useful if the RASF provided guidance on the preferred cycling facilities, based on the movement function and cycling priority of Dunlop Road, to understand how to best upgrade these facilities in the future. Accordingly, the RASF could align the typology and modal priorities of a corridor with specific facilities outlined in the TDM or other national best practice guidelines.

- **No criteria for street amenity**: As the 'place' function relates to the catchment size and type, there isn't any criteria within the RASF that indicates the importance of amenity. Providing high-quality amenities such as seating, cycle parking and landscaping elements are essential to creating places where people want to live, work, and visit (Nunns & Dodge, 2020). An example of these amenities is illustrated in Figure 7 below. For example, when developing corridors within metro and local town centres (such as Main Street in Kumeū-Huapai). It would have been useful if the RASF indicated the preferred types of amenities to support the place function and modal priorities identified, this could be achieved by linking to industry best practice guidelines. For example, Waka Kotahi's 'Developing Methodologies for Improving Customer Levels of Service for Walking' (Head, et al., 2020) or international guidance such as the Healthy Streets Approach, which is a human-centred framework for embedding public health in transport planning (Healthy Streets, 2022).

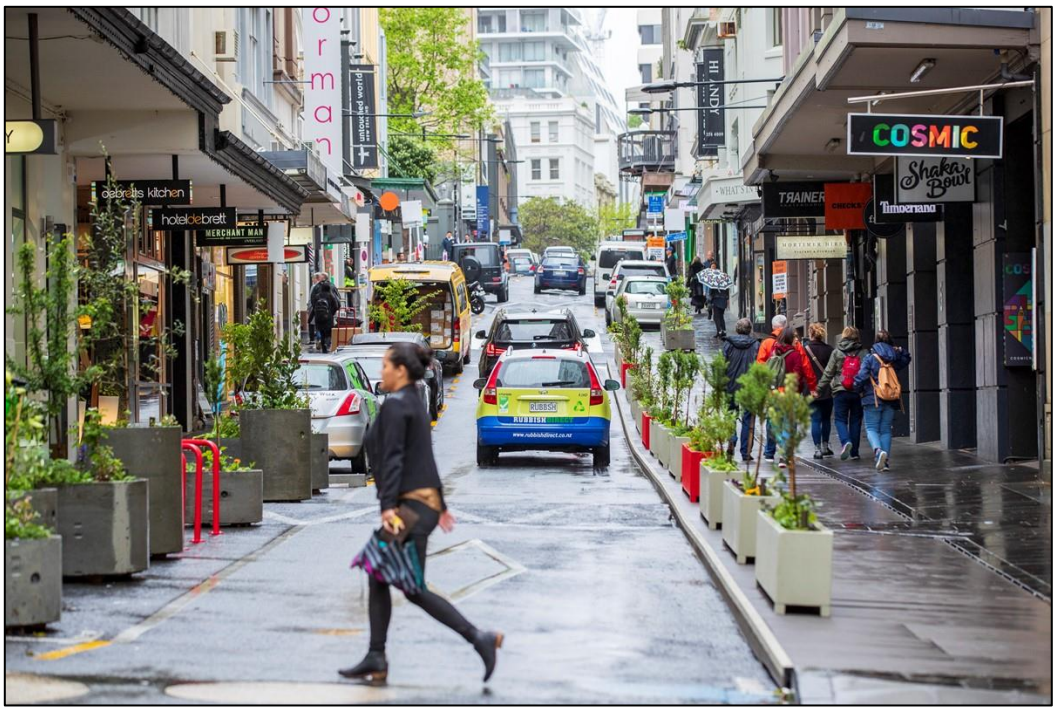

Figure 7: Example of Landscaping Elements and Cycle Parking Amenities on High Street, Auckland (Auckland Council, 2022)

CONCLUSION AND RECOMMENDATIONS

There is a changing perception about the role that transport corridors play in shaping communities around Auckland. This shift in thinking is strongly driven by strategic plans and policies that encourage the development of integrated transport corridors when developing new and existing urban areas. This focus is largely due to the significant environmental, social and economic benefits that integrated transport corridors provide. These benefits link to the conference themes of Taha tinana (physical health) and Taha whānau (social well-being), as part of the holistic Te Whare Tapa Whā model.

One of the tools used to provide integrated transport corridors on the Auckland network is the Roads and Streets Framework developed by Auckland Transport in conjunction with Auckland Council. The framework is typically used for street level planning and design. However, it can also be used for strategic planning projects, as demonstrated by its use in Te Tupu Ngātahi when developing the future transport network in Auckland's future urban areas.

The framework proved to be a beneficial tool for several transport planning assessments within Te Tupu Ngātahi. The key benefits of using the RASF include:

- Recognising the place function of existing corridors.
- Highlighting key public transport and active mode connections.
- Identifying conflicts between modes.
- Gap analysis for recently developed corridors.
- Identifying high priority modes.
- Providing good accessibility to key features.

There are also a few areas for improvement, which include:

- **The framework's limited place and movement tiers**: The number of tiers for the place and movement functions is relatively narrow. These could potentially be extended to allow for greater variety between corridors. A similar planning and design guideline in the UK ('Link and Place: A Guide to Street Planning and Design') has five tiers for place and movement functions as well as the One Network Framework developed by Waka Kotahi for urban corridors.

- **Difficulty transferring the RASF into design principles**: While the RASF indicates that the TDM should be used for design, there is currently little guidance within the RASF on how the typology and modal priorities of a corridor align with design principles in the TDM. It would be useful if the RASF provided guidance on the preferred facilities recommended by the TDM or other national best practice guidelines, based on the movement function and modal priority of a corridor, to understand how to best upgrade these facilities in the future.

- **The lack of criteria for street amenity:** As the 'place' function relates to the catchment size and type, there isn't any criteria within the RASF that indicates the importance of amenity. It would be useful if the RASF indicated the preferred types of amenities to support the place function and modal priorities identified for a corridor. This could be achieved by linking to industry best practice guidelines.

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