

Transit New Zealand and Urban Design – embracing a context sensitive approach

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ABSTRACT

Transit's implementation of urban design has in the past been mainly implicit and limited to environmental or visual enhancements. More recently, the delivery of urban design has become more explicit as Transit recognises how it can improve the benefits it provides to road users and communities.

Urban design is an approach that manages Transit's responsibilities and opportunities in urban, rural and natural environments. It is about how transport influences the quality of people's living environments. It takes into account economic, engineering, environmental and social requirements to produce context sensitive solutions. It can also help achieve Transit's statutory objective under the Land Transport Management Act 2003.

This paper explores how urban design provides Transit with an opportunity to influence the form and function of urban and rural areas. It will explore how, if addressed early, it contributes to meeting our economic, engineering, environmental and social objectives in a cost effective manner.

I. INTRODUCTION

Urban design for Transit means a 'context sensitive' approach to the way we plan, build and operate the state highway network.

Good urban design integrates the concern for function, land use and visual quality with economic feasibility and public process in order to shape towns and cities that are attractive, liveable and sustainable. It is about bringing together form, function and fit at the concept planning stages of projects to enhance value in social, economic and environmental terms.

Transit recognises the role it plays in how urban and rural areas form and function. Transit believes that by being a signatory to the Protocol and committing to urban design, Transit through its role as the state highway provider can have a positive influence on the future form and function of urban and rural areas.

This paper explores how Transit is implementing urban design nationally and how this is influencing Transit's projects through selected case studies.

I.1 TRANSIT AND THE PROTOCOL

In March 2005, Transit became one of the early signatories to the New Zealand Urban Design Protocol (the Protocol) to improve its performance with urban design. The Protocol is a key Government programme of action addressing how good urban design can better contribute to the development of New Zealand towns and cities.

The Protocol identifies seven essential design qualities that together create quality urban design being: context, character, choice, connections, creativity, custodianship and collaboration. The objective of the Protocol is to promote and encourage high quality urban design by influencing government and private sector activities as they interface with design issues.

Transit signed the Protocol because it considers urban design will assist in the identification and integration of key issues early in the project development process to ensure Transit meets its statutory objective. This then allows Transit to identify its funding needs more accurately in the design and construction phase of a project through to providing ongoing maintenance post construction.

Transit's primary contribution to the Protocol is the delivery of a state highway network that possesses a high level of functionality that promotes prosperity and economic growth, which is also sympathetic to the natural, built and social environment. Some urban design components are outside of Transit's core business as an infrastructure provider. In these instances Transit has the ability to collaborate with other stakeholders and advocate for quality design initiatives, which will often require local authority and community commitment and funding.

I.2 A 'CONTEXT SENSITIVE' APPROACH

State highways are a key determinate of urban form and a key influence on the form of rural areas. As such Transit needs to take a context sensitive approach to ensure that new state highway work is integrated into the surrounding area.

Therefore, all environmental treatments (such as storm water facilities), economic development (such as access for businesses, services), engineering factors (such as road design being safe and functional) and social requirements (such as avoiding social severance, providing pedestrian and cycling linkages) need to be incorporated into the design of the state highway from the outset. By providing a context sensitive approach, early in the planning process Transit can deliver on its commitments to the Protocol in a cost efficient manner.

2. PROGRESS WITH IMPLEMENTATION

The Transit Board has approved a set of *Urban Design Implementation Principles* to help guide Transit in implementing urban design. These principles are consistent with Transit's commitment to the Protocol and the broader concept of sustainable transportation.

An Urban Design Team at National Office has been established to support the implementation of urban design. The team helps ensure that urban design is an appropriate part of each aspect of Transit's business, from transport planning to capital projects and network operations.

Transit's urban design initiatives have long-term goals that are aimed at contributing to and shaping more liveable communities, whether they be rural or urban. To reinforce this approach, Transit has looked to the Roads and Traffic Authority, New South Wales for guidance on urban design and its relationship with the transport system.

In May 2006, Transit's first series of urban design workshops were conducted in Transit's four main regional offices. The purpose was to help close the gaps between policy and practice so that quality urban design can be delivered throughout Transit's business. The workshops were very successful and Transit will continue to provide training for staff in the future.

2.1 WHERE IS TRANSIT GOING WITH URBAN DESIGN?

Urban design is a learning and evolutionary process for Transit. The importance of considering opportunities early and avoiding (to the extent reasonable) effects 'beyond the pavement' is continuing to be embedded alongside the key drivers of safety, efficiency and affordability.

The Protocol provides Transit with a tool to work with other signatories, such as Land Transport New Zealand and local authorities, to produce good urban design outcomes. By incorporating urban design at the outset of a project, Transit is able to ensure that the proposed transportation solution effectively incorporates environmental, social, engineering and economic elements into the project. The project scope can then be valued by using quantitative and qualitative values to ensure it will provide value for money and meet the statutory requirements of Transit and Land Transport New Zealand.

This can then be assessed by Land Transport New Zealand through their funding approval process assessing the project not only against the Benefit Cost Ratio, but also against:

- the seriousness and urgency of the issue or problem being addressed; and
- the effectiveness of the proposed solution in contributing to Land Transport New Zealand's objectives and the outcomes of the Land Transport Management Act.

All of these planning and funding requirements provide Transit with the opportunity to ensure that state highways are planned, built and operated with a context sensitive approach that positively influences the form and function of urban and rural areas. To ensure this happens, Transit is currently amending its professional services manual in order for the urban design expectations to be explicit in the tendering of contracts for the different phases of project development.

A professional services guide on urban design is also being developed, to provide direction to Transit project managers and their teams on how and where to implement urban design in the planning, design and maintenance of any state highway work.

Transit is also providing urban design advice to Transit project managers on major projects and is beginning to do this on smaller projects (block projects).

2.2 OPPORTUNITIES AHEAD

Transit's work plan for 2006/2007 will focus on:

- continuing to develop Transit's position that urban design is a context sensitive approach to highway planning, construction and maintenance;
- working with local authorities, community groups and other stakeholders to ensure common goals are reached in the management of the state highway network and co-funding is achieved where appropriate;
- amending professional services manuals to ensure urban design is incorporated appropriately into Transit's contract specifications;
- continuing to review and work with regional Transit staff on transportation studies and capital projects to ensure urban design is appropriately considered;
- working with Land Transport New Zealand that urban design is further integrated into the funding application process. For example by including urban liveability in the assessment criteria;
- learning from and developing on local and international best practice; and
- developing Transit specific guidance and training on urban design for Transit staff and suppliers.

The challenge for Transit is to incorporate urban design into all of its business practices early on to ensure a context sensitive approach can be provided in cost effective ways.

The following case studies focus on particular context sensitive elements that contribute to delivering good urban design from three large projects in Auckland. These case studies are the Newmarket Viaduct, ALPURT B2 and the Northern Busway.

A context sensitive approach for the Newmarket Viaduct has seen a focus on the urban fabric beneath the Viaduct, for ALPURT B2 this has been highlighted through how the project has responded to the sensitive receiving environment through which the route traverses and for the Northern Busway it has been about Transit responding to a community's needs by providing travel choice.

3.0 CASE STUDIES

3.1 NEWMARKET VIADUCT

Urban design has become one of the key elements of the Newmarket Viaduct project. The Viaduct sits within a complex urban area, steeped in history with a variety of land uses from historic residential villas to modern car yards, boutique retail outlets and thriving commercial activities.



Newmarket Viaduct

The Newmarket Viaduct project is part of wider works being undertaken to reduce congestion on Auckland's Central Motorway Network. The project involves replacing the existing Viaduct structure and adding a fourth southbound lane between Gillies Avenue and the Green Lane Interchange.

Transit is taking a context sensitive approach to the project. This is achieved by not only being concerned about the structure and aesthetics of the new Viaduct, but also the urban form and use of land under the Viaduct to allow greater community connectivity and flow between north and south Newmarket.



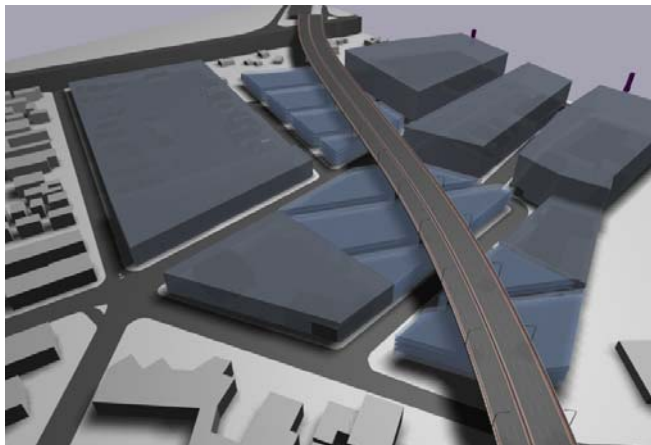
Existing landuse under Viaduct

3.1.1 Urban Design Assessment

Transit commissioned an Urban Design Assessment of the project, consistent with its Urban Design Implementation Principles. The Urban Design Assessment included a workshop with the Project Team and an external peer review.

The workshop looked at both the aesthetics of the Viaduct and the landuse beneath. In terms of aesthetics, it was agreed that the new Viaduct be a slim and elegant structure similar in form to the existing structure. For the landuse beneath the Viaduct, it was agreed that four different scenarios be explored as potential urban design solutions, including:

1. Urban infill;
2. Urban infill with open space beneath the Viaduct for maintenance access;
3. Open space; and
4. Do minimum e.g. improve existing carparking area.



A landuse option for under the Viaduct

In helping to assess each option, photo montages and interactive modelling were used.

3.1.2 Notice of Requirement

The Urban Design Assessment was documented and used to support the project's Notice of Requirement. The hearing to consider the Notice of Requirement was held in July 2006. An outcome of that hearing was that a number of urban design conditions have been attached to the designation. These include the development of an urban design framework by an urban design working party, comprising Transit, Auckland City Council and iwi. This condition formalises the urban design initiatives Transit had undertaken prior to the hearing.

Transit is committed to developing this framework with its partners, which will balance the desire for improved urban form under the Newmarket Viaduct with safety and operational requirements.

3.2 ALPURT B2

The ALPURT B2 alignment extends from Orewa to Titiford's Bridge just south of Puhoi. The route passes through a diverse landscape containing steep topography, large tracts of native bush, regionally significant streams and estuaries and areas of pastoral farmland. After assessing the surrounding area and community input, the design and construction solutions for ALPURT B2 were selected to ensure the ecological footprint from the motorway is minimised in order to achieve a context sensitive design. This is particularly important given the sensitivity of the receiving environment.

Given the size of the project, this case study primarily focuses on a number of the structures along the motorway route, namely the eco-viaducts at Nukumea and Otanerua, and twin bridges at Waiwera. The case study also briefly looks at a number of geometric design elements of the project and how through a more measured approach to design, a more context sensitive outcome can be achieved.

3.2.1 Nukumea and Otanerua Eco Viaducts

The Nukumea Eco Viaduct (180m long) will span across the northern arm of the Nukumea Stream. The Otanerua Eco Viaduct (256m long) will span across the northern tributary of the Otanerua Stream and is of similar form and function to the Nukumea Eco Viaduct. Both viaducts provide an ecological corridor under the motorway that enables wildlife to travel unimpeded through the bush and ensure the sustainability of local fauna in an area of significant native vegetation.

The engineering and environmental challenge with the bridges for Transit has been to design and construct the bridges with selected methods that minimise damage to native vegetation while still remaining economic and practical to build. In this regard the piers have been designed with the minimum possible footprint on the valley floor. Once the piers have been constructed, the bridge deck can be erected without further access to the valley floor and rehabilitation of the vegetation beneath the bridge can commence.

The design of the eco viaduct allows for as much preservation of the ecological function of the forest as possible. The design of the bridge is such that in some sections it will enable the forest canopy trees to reach full height. Underneath the bridge, extensive replanting will be undertaken in areas which require removal of vegetation and irrigation will be installed where appropriate to assist plant survival.

Bridge aesthetics on all viaducts have focused on providing a simple design in order to let the surrounding environment be the dominant aesthetic feature.



Otanerua Eco Viaduct – example of a context sensitive approach

3.2.2 Waiwera Viaduct

The Waiwera Viaduct is the largest bridge in the project at 537m long. The Viaduct will be constructed as two independent structures with a separation varying from 2.5m to 11m. The variable separation distance is needed to split the northbound and southbound lanes in preparation for entering the tunnels immediately north of the Viaduct. At its maximum height the Viaduct is 31m above the tidal estuary.

The bridge superstructure will be a pre-stressed concrete box girder. It will be constructed using the pre-cast segmental balanced cantilever method of construction that utilises an overhead gantry. This method of construction has been chosen as it allows the superstructure to be constructed without access from the ground. This is important since some areas under the bridge are inaccessible for ecological and topographical reasons.

Special consideration has been given to maximising the views from the elevated viaduct. This has been achieved with slight adjustments to the relative levels between the northbound and southbound viaducts and by providing edge barriers that can be seen over yet still provide a very high level of crash containment.

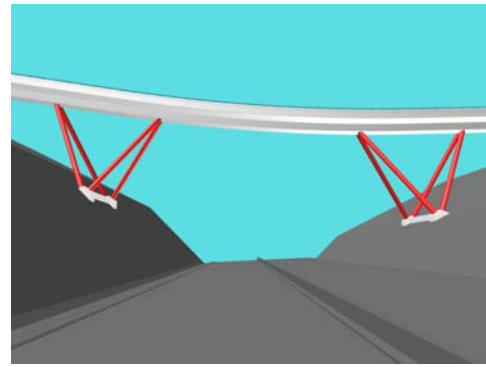
3.2.3 Geometric design

Through innovative design investigation, Transit has also been able to facilitate a more context sensitive approach by providing slopes that are more sympathetic to the surrounding environment and reduce habitat clearance.

Batter slopes of a 3:1 gradient at the initial stage of the project have been reduced to 2:1 and in some cases 1:1, providing cost savings and reducing habitat loss. Further geotechnical investigation at the construction stage has allowed the design team to modify a retaining wall from a concrete panel wall into a grass reinforced slope supported by shear piles. As a result of ongoing design development, a 16 metre retaining wall, which supported the Hillcrest Road Bridge has been deleted and replaced with stabilised ground, which is enhanced by soil nails and drainage. This example is illustrated below.



Left picture: Hillcrest bridge before design changes



Right picture: Hillcrest bridge new design

3.3 NORTHERN BUSWAY

The Northern Busway project is a partnership between Transit New Zealand, North Shore City Council, Auckland Regional Council and Auckland City Council. The project exhibits good urban design practices through improvements to the northern motorway to provide for a Bus Rapid Transit (BRT) system, thus improving modal choice in the North Shore. The busway project, while also addressing a number of environmental challenges, has exhibited a context sensitive approach by responding to the needs of the community for travel choice.

3.3.1 Bus Rapid Transit System

BRT is a city bus system that works in a similar way to a train system, where local services feed into a central network. BRT systems have been implemented all over the world as they provide cost-effective and efficient public transport systems. Countries with BRT systems include Australia, Brazil, Mexico, United States and Canada.

The Northern Busway (busway) will form the 'central spine' of North Shore City's planned BRT system. The project when completed will consist of interconnecting services within North Shore City linking to the high frequency busway and its stations.

3.3.2 Busway Design

The busway comprises a 6 km dedicated two-way roadway for buses in both directions and high occupancy vehicles (HOVs), having southbound access only in the morning peak. Bus stations will be located at Albany, Constellation, Sunnynook, Westlake and Akoranga and will act as transfer stations between the busway roadway and the local street network. The busway has the potential to be converted to light rail in the future, should this be required.



Busway route map

Stations will be the exit and entry point for buses and HOVs, and will cater for passengers arriving by foot, bike, car and bus. Albany and Constellation stations will have park and ride facilities. Passengers will also be able to transfer between bus routes at the stations.



The busway infrastructure of bus lanes and busway stations will provide good integration and connection between a local and regional bus network, which are key elements of good urban design. This will provide an improved passenger transport service both within North Shore City and over the Harbour Bridge to central Auckland via Fanshawe Street. In peak times, buses are expected to run every five minutes along the busway itself and every 15 minutes from most residential areas along main suburban routes.

The busway, related interchange upgrades, and improvements to the public transport services throughout the North Shore will provide a real alternative to private car use and is particularly important for those without access to a car. A choice of transport helps the environment, provides more equitable access and improves the livability of urban areas.



Albany Park and Ride Station

4.0 CONCLUSION

Incorporating urban design into Transit's business will help Transit to scope its projects more effectively and deliver its statutory objectives to help improve the quality of life in New Zealand. It is an evolving long term process that will deliver long term benefits to New Zealand.

Urban design provides Transit with value for money solutions. Adopting an urban design approach has cost benefit advantages in the long term, particularly through savings in long term maintenance and the reduced need for lengthy statutory approvals. However, it needs to be integrated into the planning and design process from the outset, hence Transit's on-going focus on up-skilling staff to recognise opportunities early and act on them.

Ensuring that urban design is integrated from the outset will take time to achieve. Further guidance and training will be developed to help outline how urban design affects Transit's business and complements Transit's Planning Policy Manual and Environmental Plan. Transit aims continues to improve its performance in delivering context sensitive solutions that meet Transit's *Urban Design Implementation Principles* and the New Zealand Urban Design Protocol.