# PART A

# Chapter 4 Design Theory

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# Chapter 4 Amendments – June 2013 Revision Register

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# Part A - Chapter 4 Design Theory

# 4.1 Introduction

Design theory provides the basis for the design principles and design objectives which should be incorporated within the transport infrastructure corridor. Final design resolutions and outcomes of a project should clearly reflect this underlying design theory.

Transport infrastructure can play a major role in contributing to the physical and visual aspects of urban and rural areas, and to the quality of human life. The adoption of design theory into road landscape projects fosters exploration of alternative scenarios and incorporation of a wider range of design responses. This has the benefit of generating more creative, high quality and practical design outcomes in often challenging environments.

Considering and incorporating design theory when designing the road landscape reduces possible subjectivity, and personal, individual or group judgements. The theory provides a defensible rationale for decision making. Adopting design theory ensures that road landscape design resolutions are based on proven research, contemporary concepts and techniques, and have a strong theoretical foundation.

Implementing quality landscape and urban design through the integration of design theory provides numerous benefits including:

- the creation of a unique sense of place within communities;
- an improvement in the images retained and remembered of a particular area or location, both for locals and passers-by;
- enhanced amenity and structure within public areas; and
- improved community value of the environment.

Design theory should be applied consistently throughout all phases of a corridor project, including concept, design development, implementation and maintenance phases.

# 4.2 Design Components

Design Components encompass all manufactured road formation, landscape and revegetation, and urban design components (Figure A4-1). It includes soft built landscapes (such as planting works and drainage device treatment) and hard built structures and urban design elements (such as bridges and pedestrian facilities).



Figure A4-1: Road formation, landscape and revegetation, and urban design components within the road landscape

# 4.3 Design Principles

The key landscape and urban design principles include: legibility, form, function, connectivity, way-finding, accessibility and mobility, robustness, place-making and imaging.

The benefits of applying design theory include:

- **Liveability** making places that preserve personal wellbeing and are appealing; that local people enjoy being in and experiencing, whilst also being attractive to tourists.
- Social Inclusion making places secure and safely accessible to all, both physically and psychologically.
- Responsiveness respecting existing landscape qualities and context. This is one of the most desirable qualities in a place as it allows users to engage with and experience places. Responsiveness should however, also include sensitivity not just to people, but also to nature, the surrounding environment, and to place. Design responsiveness requires that design components are sensitive to the immediate and wider road landscape, as well as to the locality's specific character or distinctiveness.
- Uniqueness and Originality ensuring places portray a distinct character which is attractive to wider visitors, yet also gives the local community a strong sense of identity and cohesion. Design schemes should not be too abstract, and need to have meaning with a wide audience.
- Uses and experiences providing a unique experience for the user. Designing the road landscape should always be informed by an understanding of and realisation of different people's needs, activities and views. This will enable for an inclusive experience to be adopted.

# 4.4 Application

This Manual describes the design principles in transport infrastructure context. The definitions illustrate the role that these principles provide within the road landscape.

Design principles are described individually, yet some interact with others and play a significant role when applied together. It is often this interaction between other principles, which achieves high quality outcomes.

# 4.5 Legibility

Legible areas are those where users can identify where they are and how to get to their destination. Legible layouts with an obvious arrangement of spaces and distinct visual patterns (Figure A4-2) ensure that users can read the landscape. Clear and recognisable symbols assist in providing identifiable and memorable points of reference. Legibility allows interpretation of a place, understanding of its purpose and contributes to establishing a sense of order. The structure and arrangement of a space should combine effectively to promote legibility.

Legibility also impacts on user perceptions and positively behaviours and contributes to improving road safety. A legible road landscape is ordered and configured appropriately (Figure A4-3) to match driver expectations to enable accurate prediction of what is ahead. This allows users to plan their actions in advance.



Figure A4-2: Improved legibility through the use of directional pattering in walls and clear signage



Figure A4-3: Improved legibility through feature vertical reference points

There are also other aspects, or visual cues that contribute to the creation of legible spaces. Cues include:

- paths;
- edges;
- precincts;
- nodes; and
- landmarks.

The five visual cues relevant to legibility, all act as individual markers along journeys of travel.

#### 4.5.1 Paths

Paths offer linear places of movement largely for pedestrian users and an organised structure through their directional quality. Paths provide the connecting link from one place to another, creating networks of circulation. Developing a hierarchal system of paths is often required to achieve a cohesive network.

Design components are often arranged along paths and act as strong visual and directional indicators (Figure A4-4). These components, when integrated with the surrounding environment also allow opportunity for observation and contribute to heightening the experience of the journey.

In addition to movement, paths can also be places of social and recreational activities contributing to liveability. Rather than providing direct access, they may be designed to meander (Figure A4-5), allowing for exploratory opportunities. This will depend on the overall functional requirement and design intent of the path. Paths may also be designed wider to accommodate stationary activities such as viewing opportunities for appreciation of the surrounding landscape.



Figure A4-4: Improved legibility reinforced by lighting, walls and overhead structures



Figure A4-5: Improved legibility through path design and integration with surrounding environment

#### 4.5.2 Edges

Edges provide a linear connection or an interlocking area between defined spaces, uniting the separate spaces together (Figure A4-6). Often these interconnecting spaces perform different functions or exhibit a change in physical characteristics. They can also act as linear transitional space where one defined space or area becomes another. Edges are important spatial components, enclosing and separating different areas.

Edges will be either fully or partially permeable, that is, provide some movement through (either physically or visually or both). They can also divide spaces, forming an impenetrable barrier where this is required. An example would be where an edge is used as a barrier fence, preventing access and detracting human activity.



Figure A4-6: Improved legibility reinforced by clear edges that define different spaces and functions

Edges can be further classified into hard edges and soft edges.

#### 4.5.2.1 Hard Edges

These types of edges are not as dominant as paths, yet still provide strong directional qualities. They often support pedestrian activity also by providing a transitional space adjacent to paths. Examples of these types of edges include buildings, bridges, tunnels, noise barriers, light poles (Figure A4-7) retaining walls, fences and drainage infrastructure.



Figure A4-7: Improved legibility reinforced by hard edge elements such as light poles

#### 4.5.2.2 Soft Edges

These types of edges most often form subtle relationships between (Figure A4-8). Examples of these types of edges include planted medians, roadside buffers, open space, parkland, water bodies (where planted at margins) or boulevard planting and avenues of street trees.



Figure A4-8: Improved legibility reinforced by soft edge planting

When designing edges within a road landscape, there are opportunities to design them as permeable or impermeable, complex or subtle, active or passive, depending on what function they need to serve. Edges can also act as interfaces between public, private and semi-private areas, defining boundaries of ownership. These are often passive edges, that is, edges which do not provide scope for activity. Passive edges are often designed to provide visual relief or transition to another area within the road landscape.

The success of a public space will often be defined by the arrangement of, and around its edges. This is where active edges tend to occur, supporting diverse human activities, experiences and meanings. Well designed edges can stimulate visual interest, and contribute to landscape design quality and liveability. In publicly accessible areas, edges should aim to be active rather than passive, to ensure dynamic, vibrant and interesting spaces.

#### 4.5.3 Precincts

Precincts are areas which are able to be entered, and are often places of high activity. Although their boundaries are subtle, they define and display an identifying character (Figure A4-9). These boundaries can either be defined by soft or hard edges (Figure A4-10). Distinct character precincts may be developed in the road landscape through the theming of planting designs and urban design features, for example; developing unique colour palettes.



Figure A4-9: Improved legibility reinforced by subtle precinct boundaries



Figure A4-10: Improved legibility reinforced by soft and hard edges

#### 4.5.3.1 Nodes

Nodes are placed reference points that are able to be entered, assist in providing directional guidance (Figure A4-11) and can become a key focus place along journeys travelled. Nodes can be small and simple, or more complex systems which contain a concentration of or junction of various uses or physical forms. However complex, nodes make a statement of differentiation; clearly defining an area, and are a significant feature within a road landscape. Roundabouts, junctions and interchanges are examples of common nodes within transport and road design. These are important stopping, or directional change locations within the corridor, as well as, decision-making points.



A junction is a more complex **node** bringing together various uses and connections.

Figure A4-11: Improved legibility reinforced by nodes

#### 4.5.3.2 Landmarks

Landmarks are not dissimilar to nodes; they are also a type of reference point, distinguishing a location along a journey for travellers. However unlike nodes, they cannot be entered and are only experienced from the outside. Landmarks are also usually more simply defined as a singular physical object or a simplified group of elements, rather than a concentration of differing structures. They provide a strong individual symbol or focal point within a road landscape, often providing identity, visual structure, character and a sense of place. Landmarks can also be hard structures, such as a building or artwork, and soft vegetation such as distinctive individual tree specimens, masses, stands or groves of trees (Figure A4-12).



Figure A4-12: Improved legibility reinforced through hard elements, landmarks and distinctive tree planting

Public artwork or sculptures (Figure A4-13) can act as a key focal and orientation point within the road landscape. Often landmarks are designed to be largely vertical forms allowing them to be visually dominant from a long distance away.



Figure A4-13: Improved legibility reinforced by landmarks in the form of public art.

Legibility (including the visual cues of paths, edges, precincts, nodes, landmarks) in the road landscape (Figure A4-14) provides:

- ease of understanding for users;
- ability to be read or interpreted;
- structure and order;
- definition of boundaries;
- focal and strategic reference points;
- a sense of arrival or departure (through gateways and entry statements); and
- reinforcement (of direction, place and journey to travel).



Figure A4-14: Legibility maintained by views to mountain landmark

### 4.6 Form

Form refers to the various visible elements which make up the structure of a road landscape. It is a broad term used to define the particular shape, appearance or configuration of an object or space. Light and shadow also contribute to adding volume to objects, and define the appearances of surfaces.

Form, along with colour, is often one of the most obvious and identifiable features within a design component. This is particularly apparent when travelling through a high speed transit area where there is less time available to view and fully comprehend forms. In this situation, forms need to be simple, bold and strong enough to assist in interpretation and ongoing remembrance by the traveller (Figure A4-15). In comparison, when travelling through slower speed areas, there is more time available to identify and remember detail in the surrounding forms. Form is one of the most fundamental parts to design effectively within a road landscape.



Use of particular planting species with distinct, individual appearances can define spaces and their **form**; making them more easily remembered and responded to by people.

Figure A4-15: Improved space recognition through distinctive tree planting

**Form** can be achieved through either or both **soft** and **hard** landscape treatments. **Soft form** can include structured planting layouts or the individual use of particular planting species with distinct appearances and/ or unique growth habits (Figure A4-16). **Hard form** can include the structural/ architectural design of urban design components such as bridges, or the individual detailing to particular parts of tunnels (Figure A4-17), retaining walls and noise barriers.



Figure A4-16: Soft landscape form through structure planting layouts



Figure A4-17: Hard landscape form through a tunnel entrance

*Form* in the road landscape provides:

- differentiation (for example; physical or structural);
- memory (identifiable regularities and consistency);
- variety in detailing (simplicity versus complexity); and
- enhancement of built structures (through effects of sunlight and shadows).

### 4.7 Function

Function describes the organisation of spaces to support the variety of intended uses of a space or particular area. Several functions can be operating simultaneously at the same time within a road landscape (Figure A4-18). One function may be more dominant than another and sit higher within the hierarchy of functional requirements. The concept that **form follows function** within the road landscape is based on the design theory that the **function** of a space directly stems from the physical **form** and makeup of the road and transport system (Figure A4-19).

Different forms.



A **functional** design meets different users' expectations and needs.

Figure A4-18: Different forms (above) and functions (below) can be arranged to operate together within a road landscape





Figure A4-19: Different forms and functions arranged to operate together within a road landscape

*Function* in the road landscape provides:

- the outcomes of form;
- well functioning and utilised spaces;
- spaces and/ or design components that fit in with context (physically and visually);

- spaces and/ or design components that meet a specific purpose or have a universal use (Figure A4-20); and
- provision for meeting user expectations (for example, vehicular drivers, pedestrians, cyclists) (Figure A4-21).



Figure A4-20: Universal design components, like noise barriers that fit together to achieve a road function



Figure A4-21: Universal design components like paths, seating and shade structures that fit together to meeting user needs

# 4.8 Connectivity

Connectivity is the direct linkage created between places, areas destinations. Connections can be either or both visual and physical. The more connective links provided, the greater the access points and choices available for movement and greater permeability of a space or region.

Connectivity can be further enhanced by implementing a variety of different transport methods between destinations. These transport routes may provide a direct connection or involve a series of inter-connections. Connectivity is the key to successful transport systems as they move people more efficiently, reliably, comfortably, safely and ultimately faster.

Connectivity is also linked to the concept of permeability; which relates to the ease with which one can move through a space and get to other locations. The sequencing of spaces as well as clear circulation routes (both within a space and outside of) improves connectivity (Figure A4-22).



Figure A4-22: Connectivity provides permeability through spaces via clear routes critical for channelling movement, providing linkages and promoting interconnectivity

Connectivity in the road landscape provides:

- transport interconnection and interfaces (Figure A4-23).
- permeability (ease of movement through spaces and from one place to another);
- clear circulation routes;
- defined channels of movement;
- linkages and interfaces (Figure A3-24); and
- inter-connection (Figure A4-25).



Figure A4-23: Connectivity within the road landscape utilising multiple transport modes



Figure A4-24: Improved connectivity through the provision of overhead footbridges

# 4.9 Wayfinding

Wayfinding incorporates various design principles including **legibility** and **connectivity** to assist in orienting the user, and guiding them through a space; in particular guiding them from one specific place to another. Specific elements such as signage, lighting, and vegetation arrangements aid in achieving wayfinding (Figure A4-25).



Figure A4-25: Wayfinding incorporates design components like signs, lighting, landmarks and vegetation

Wayfinding in the road landscape provides (Figure A4-26):

- orientation;
- direction;
- navigational ability;
- coherence;
- consistency;
- reference elements; and
- focus points.



Figure A4-26: Wayfinding signage assists users in navigation and direction

### 4.10 Accessibility and Mobility

A balance between accessibility and mobility is important in reinforcing the design principles of **legibility**, **connectivity** and **wayfinding**. It plays a significant role in urban spaces by promoting social inclusion for all users. Social inclusion ensures that transport and road environments are physically accessible, allowing access to, from and around an area. Places of movement such as

paths and cycleways, should consider the sequential experience of the user moving from one place to another.

#### Accessibility

Accessibility is the degree to which a space allows as many users as possible to safely enter a space and reach destinations. Well designed spaces should be all inclusive; ensuring equal accessibility by all members of the community and allowing equal access rights by all. Road landscapes should be able to embrace, integrate and balance the needs and concerns of all users. The design of public urban spaces must allow fair access for the physically and mentally challenged, particularly ensuring that dignified and equitable access is maintained.

#### Mobility

Mobility relates to the ease of free movement that people experience within a space, or when moving from place to place (Figure A4-27).



Figure A4-27: Increased mobility through a variety of connections enables safe access to all users

Accessibility and mobility in the road landscape provides:

- equitable access (Figure A4-28);
- user comfort;
- effective circulation patterns; and
- clearly defined destinations.



Figure A4-28: Accessibility caters for all users.

### 4.11 Robustness

Robustness relates to the ability of a space to be adapted and used successfully by a wide range of people for a variety of different purposes. Robust places have flexible qualities and can accommodate changing uses over time. In this way they are all inclusive, and become mixed use spaces. These mixed uses should be complementary to one other in terms of being conducive to interaction, irrespective of differing activities. Robust spaces are effective when a diversity of uses and experiences can be operating simultaneously.

Robust road landscapes offer a variety of experiences where varied forms, uses and meanings are encountered. Robust spaces are versatile to accommodate a wide range of uses, activities and purposes, and adapt to changing daily cycles as well as seasonal patterns. Adaptability and variety is a key requirement in creating successful road landscapes, as well as the ability to reconcile different uses.

Robustness in the road landscape provides:

- flexibility;
- variety and diversity in uses;
- changeable experiences (within the space and for the user);
- adaptability of spaces;
- choice and decision making;
- a sense of either enclosure or openness; and
- transparency.

# 4.12 Place-making

Place-making generates, preserves or respects the existing landscape character and sense of place within a locality. Creating a sense of place within a road landscape involves recognising both the shared role and common identity of the people who make up the area; their needs, aspirations and spirit. It enhances the sense of community, fosters social interaction and generates a positive self-image. Community engagement and information exchange, in conjunction with research and analysis, is a key requirement for place-making to be successful.

Place-making strengthens the distinct qualities characterising both the immediate and the surrounding physical environment. It contributes to forming an immediate impression on outsiders and tourists travelling into or within spaces, and from one journey to another (Figure A4-29). It can define both the character and culture of a place, generating unique memories and experiences (Figure A4-30). Place-making recognises and values the inherent differences between one place to another, contributing to a sense of journey which can be experienced by the wider public.



Curved patterning on retaining wall reflects and connects to the local beach surroundings. This contributes to forming an immediate impression in outsiders travelling into the area, of the **sense of place**.

Figure A4-29: Place-making expresses context.



**Soft** landscape treatment - using local plant species and theming in planting schemes provides identity; defining the sense of place and characterising the area.

Figure A4-30: Place-making expresses local landscape character

Place-making in the road landscape provides:

- character and identity (individual, local or regional) (Figure A4-31);
- authenticity;
- distinction;
- meaning and memories;
- symbolism;
- richness of place and experiences;
- liveability and livelihood; and
- defined/ signature theming (based on individuality and uniqueness).



Local vegetation values are expressed through urban design finishes on the noise barrier. The patterning expresses the distinct landscape character within the area, distinguishing it from other places along a journey. This treatment also forms an impression and appreciation of the place by external visitors.

Figure A4-31: Place-making artwork derived from local context

# 4.13 Imaging

Imaging relates to imagination as well as to **legibility**. It is the quality within a physical object or place that conveys strong imagery or an immediate response in the observer.

Simple design measures as well as more complex detailing can achieve imaging. The clear visibility of significant images within the road landscape is also important as it enables users to clearly visualise the road imagery, improving user safety within the corridor. The clarity and sharpness of images within places can also stimulate attention and awareness by the user when travelling through a space (Figure A4-32). Strengthening the imaging of the road landscape through the incorporation of symbolic devices can generate a long term unique identity for a place.

A variety of images sequenced through spaces provides changing points of interest and choices for visual stimulation (Figure A4-33). The use of transitory and random images can be successful in achieving this within the road landscape (Figure A4-32). It is a balance of both structured and shifting images which provide variety, meaning to the traveller and a sequencing of visual interest.



Symbolic patterns which link to the surrounding landscape context can strengthen the visual image of the area and generate a unique identity for a place. Variety in detailing and sequencing of images stimulates viewer interest, and provides meaning and memory.

Figure A4-32: Artwork reflects local images

*Imaging* (including variety of imaging and sequencing of space) in the road landscape provides:

- clear and visible images;
- clarity to user observations;
- variety and diversity;
- visual interest and stimulation;
- engaging, vibrant experiences;
- striking and memorable physical qualities; and
- endurance (timeless design).



Median and road side planting design provides drivers with clear **images** or views of road ahead, whilst also stimulating a directional response in the user. The planting layout and changes in landscape themes assist in providing **visual sequencing** and variety in user experiences.

Figure A4-33: Image reinforced through theme planting