

# A Review of Role of Landscape in Road's Strategic Plans

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**Abstract** | Population growth, urbanisation, changes in social structures and the important role of the road network in the economy and people's life in one hand, issues like sustainable development and climate change, on the other hand, has double a need for optimising road design. In the last few decades, the road as an engineering element has transformed to a feature with a multi -dimensional aspect which in turn has changed the approaches to road strategic planning. Review of four common approaches to transport network's design highlights a changing view to landscape in the recent road planning programmers. Over the last few decades, the role of the landscape (cultural and visual) in road design has increased and methods such as placemaking and community engagement have gained high interests. While these new ideas are seeking to improve users experience, yet design values for increasing human experience are in contrast with designing a road for movement of goods.

**Keywords** | Road design, Strategic Planning, Landscape, Placemaking.

**Introduction** | As a civilian, one often experiences war as loss, a deliWith economic development and the ability to trade in the global market, a need to expand transportation network is increasing. However, the social and ecological impact of the roads, has led to numerous opposition from the community or environmental activists. Population growth, urbanisation, changes in social structures and the important role of the road network in the economy and people's life in one hand, and issues like sustainable development and climate change, on the other hand, has double a need for optimising road design. From the early modernism, roads were only designed to be able to move a greater number of vehicles from one point to another in the shortest possible time. In contrast, today, road designers not only dealing with technical aspect but economic, social and environmental criteria should also be considered. Urbanisation, the complexity of the design and transformation of the road to a multi-variation element has had a great impact on design strategies. Presented paper reviews the role of landscape in the current road strategic planning and introduces challenges and new design approaches.

Although the approaches discussed below presents a changing and different view to road strategic planning, but depending on the situation and design team's policy, one or several approaches may be used simultaneously for one project.

### Technical approach

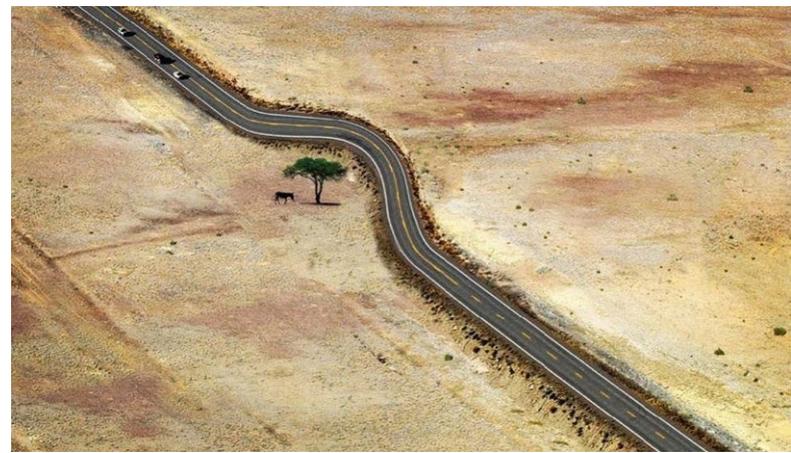
The engineering approach emphasised on standards and technical aspect of the road, and landscape has a minimum impact in defining those codes and standards. The standards are usually defined based on simple physics laws and include elements like width, speed, intersections, slopes, visual clearance. In this approach, planners categorise roads according to their functionality and prepare design guidelines and standards for each category. The location of the road and the character of the surrounding environment determine road category. For example, if a road is situated in a village with dominated urban character the standards for urban roads will be applied to that. Although the landscape is not playing a pivotal role in defining standards, it affects the design indirectly through its influence on the road character (New York State Department of Transport, 2015).

### Cost effective design using "Design Domain"

In 1999 the Design Domain concept was introduced into the Geometric Design Guide for Canadian Roads (TAC, 1999). It defines an approach which designer select design criteria from a range of values, considering cost and benefit. In this approach, the aim is to create cost- effective design instead of a design that simply meet the standards. Each domain has two regions and the area between lower and upper region is defined as Normal Design Domain. While the aim is to design all road network within the design domain, in sites with lots of constraints, like existing roads, or those with lowers

rate of accident or crashes, the design domain can be extended below the lower region of Normal Design Domain (Queensland Government Department of Transport and Main Road, 2013).

In this approach, landscape value will be considered similar to the other factors. However, its effect in design strategy depends on its impact on cost-benefit and decision of design's team. For example, when the construction cost increases due to changing a route to maintain an existing tree, the design team compare the additional cost with benefits like maintaining the identity or quicker agreement process with the environmental group, before making a final decision. The advantage of using this approach is providing defendable designs that will facilitate the approval process (Pic.1).



Pic1: Design with landscape

<https://au.pinterest.com/fResponsive/awesome-photography-first-look>

### Landscape approach

In the early 18th century, trees and plants were used along the roads to reduce the effect of industrial landuses which was an aesthetic focus. Later designers started to consider the economic, social and environmental value of the landscape too. Today, the aim goes beyond the creation of beautiful roads and designers should consider cost and benefit and the effects on resources, flora and fauna (Picture1). Although, landscape is one of the major principals in this approach, yet landscape approach is more common for touristy routes, or roads in historic or conservation areas (Clemens, Swaffield & Wilson, 2010).

### Design criteria

In this approach, character and function of each part of the route, visual sequences, identity and sense of place direct the design. Although design solution will differ from places to places but design criteria have lots of similarities.

- Use of organic form and line

Form and location of the road shape our visual experience. Organic forms following topography and landform create a different experience than straight lines (Agriculture Organisation of the United Nations, 1998; Danish Road Directorate, 2002).

- Considering speed

Road scale is dynamic, meaning speed determines observer's experience. Details of design elements should be designed considering different users speed. A road network is designed for cyclists should have more details, viewpoint, or place for rest, while road for cars and high speed transport have less detail and using larger scale elements to be visible for users with high speed (AOUN, 1998 & Danish Road Directorate, 2002).

- Diversity and unity

Diversity and unity are two important factor in designing road network. While roads need to provide diversity, the design should be simple to understand. When all parts belong to a whole, design is fit with the surrounding, while design with many detail or contrast fails to achieve the unity with the surrounding (AOUN, 1998; Danish Road Directorate, 2002).

- Maintaining identity

Often roads will be created in areas with established identity and character, where creating something new without changing the existing identity is not easy. Handrail's design, planting, and road's form and alignment help to re-create or strengthen the identity (AOUN, 1998 & DRD, 2002).

### Methods of control and evaluation

Road network usually fragments population of animals and affect natural habitats and cause animal death. Careful planning which fits within the ecological context, creating underpass and tunnels can mitigate the negative effect of road corridors. Social- cultural values along the corridors have established over decades and represent history. Many countries not only preserve the historic values but also create scenic roads for tourism to improve the local economy. Placement of road and its relation to the local community and type of lanuses along the corridor are effective ways to control the local economy (Clemens, Swaffield & Wilson, 2010).

Beside all these design considerations, there are two common methods to evaluate road landscape, including; landscape analysis and landscape assessment report. In many developed countries, providing these two reports is part of the legal approval process (DRD, 2002).

### Landscape analysis

At the beginning of the design process, site, surrounding landscape, view, vegetation, habitat, conservation areas and cultural and social values will be recorded and analysed carefully. The result of this report determines design constraint and solutions and suggests alternatives for road location and its geometry.

### Landscape assessment

At the end of the design process, landscape assessment report, review the impact of the road corridor on its context and introduces ways to mitigates its negative effects. Comparison between landscape analysis and landscape assessment report

allow evaluating the impact even before construction. Landscape assessment report usually includes; summary of the project, description of environmental, visual, historic, economic, and cultural values 3- methods of determining values, and method of mitigating or minimising negative impacts 4- description of advantages and benefit of the design on the ecosystem.

### Context sensitive design

From 1998, "Beyond the Pavement Workshop", the national movement of the use of context sensitive solution for design has promoted flexible design that provides a design that is in harmony with its social and economic situation. The meaning of landscape here is beyond a visual element and includes social- economic and physiological values. The assumption is that all project is embedded in a context which informs design solutions. The aim of this approach is to meet users need, thus understanding the cultural context and landscape is essential. The process of design starts with a comprehensive study of physical, visual, cultural, economic value along with user's behaviour. The emphasise is to create a balance between design and users need rather than dividing solutions to right or wrong.

The main difference between this approach and all traditional approach is the way they engage all stakeholders in the design process. This change has led to a shift in the structure of design team, from an engineering team to multidisciplinary team which includes landscape architects, economics, sociologist along with engineers. Typically, projects were presented to people and community after it is being designed by technical experts. However, with context sensitive approach people who are affected by the design are involved in the process from planning through to detailed design. Transport project using this approach aim to provide sustainable development rather than just simply create a road corridor. Designing with community and stakeholders create a strong social tie and increase the sense of place. (Washington state Department of Transport, 2005; U.S Department of Transportation Federal Highway Administration, 2014).

### Approaches and challenges

The World Road Association in their last strategic Plan for 2016-2019 noted the shift in design approaches and composition of the design teams. The report highlights that both management and design teams have fewer technicians and more generalists, or even politicians without any knowledge on transportation. Designers pay more attention to the relationship between road and society than technical issues. Placemaking and design with stakeholders and communities are getting more popular and streets are seen as social places rather than transport corridors (World Road Association, 2015). Slow speed, providing more amenities for pedestrian and cyclists and creating social spaces along the roads are main criteria for placemaking. In this view designing road for movement of goods is different with designing a road for people. While Increasing the speed,

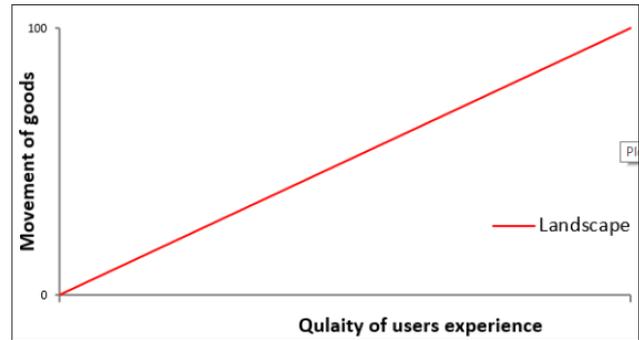
and reducing travel time is important for one, low speed and enhancing observers' experience is the main principle for the other. Thus, the role of the landscape is changing, based on the purpose of the design (Pic.2).

While the popularity of multidisciplinary approach to road design is increasing, yet, there are some challenges ahead. Changes in the team structure and design approach is not an easy task and convincing government and even engineers about this shift require times. Future more, at the beginning the cost of community engagement is high and designers and management team are reluctant to move toward stakeholder engagement. More importantly, the believe that designing road is still an engineering task, create obstacles for the involvement of landscape architects.

**Conclusion** | A road is one element of a transport system, which operates in the natural and built environment to meet a range of expectations of stakeholders thus cannot be carried out in an isolation. Previously the complexity of design and the intention for simplicity, created tables and standards for design. Toady this approach is not acceptable anymore. The design is a complex issue and never should be limited to numbers and pictures. Road design is depended on the context more than anything

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Pic2: comparison between the intervention and the importance of Landscape in design of transition facilities

else. In last few decades' road design has shifted from a single engineering task to a multidimensional task that should meet social and economic needs. Improving methods of community engagement and minimising the environmental impact of the road is the main challenges facing future of the transport network design. This highlights the necessity of differentiating between design for people and goods and emphasises the need for a fundamental change in strategic planning.

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