

An application of landscape design for ensuring vibrant and travel-friendly roads for commercial place: a case study of Shaheb Bazar, Rajshahi

M. A. Arnob¹, S. M. Ayan², L. Intisar³, T. T. Orthy⁴, S. Roy⁵, M. W. H. Nipun⁶

¹Department of Urban & Regional Planning, RUET, Bangladesh (arnobmashfiq7@gmail.com)

²Department of Urban & Regional Planning, RUET, Bangladesh (shahedmahmud.ayon18ruet@gmail.com)

³Department of Urban & Regional Planning, RUET, Bangladesh (labib.intishar@gmail.com)

⁴Department of Urban & Regional Planning, RUET, Bangladesh (tayabaorthy@gmail.com)

⁵Department of Urban & Regional Planning, RUET, Bangladesh (sumitaroy@urp.ruet.ac.bd)

⁶Department of Urban & Regional Planning, RUET, Bangladesh (waresulhassan@urp.ruet.ac.bd)

Abstract

Urban transportation networks often face challenges such as traffic congestion and route time delays, which can lead to difficulties for people and undermine the sustainability of these networks. An efficient traffic management system requires adequate traffic laws, traffic lights, proper alignment, markings, and legitimate traffic rules and regulations. Numerous approaches have been offered by researchers throughout the globe, such as urban redevelopment, urban upgrading, and environmental protection. Many experts and urban planners agree that landscape planning is a contemporary, cost-effective, and quicker solution to the issue of traffic congestion and creating pedestrian-friendly pathways. In the context of Rajshahi City which is also known as a significant urban, commercial, and educational hub in Bangladesh, the recent increase in traffic problems and haphazard parking by street vendors has led to reduced comfort levels for pedestrians in the CBD of the city. The study's main objective is to ensure a vibrant and pedestrian-friendly environment in commercial areas by combining hardscape and softscape. The study is done by following landscape design methodology which involves analyzing the site, developing a conceptual design, creating construction documents, overseeing construction, and providing post-construction maintenance. Both primary and secondary data, including a questionnaire survey, helped to gather public opinions and necessary information. Moreover, various literature reviews done to understand the design and its different landscape elements. The proposed solution has the potential to improve the aesthetics, functionality, and usage of the pedestrian pathway in Shaheb Bazar, Rajshahi.

Keywords: *Landscape Planning; Travel-friendly Road; Vibrant environment; Commercial Space; CBD.*

1 Introduction

The rapid growth of cities in Bangladesh necessitates a well-organized traffic management system to ensure social, economic, and environmental success (de Souza et al., 2017). Inadequate traffic facilities have resulted in traffic congestion and associated issues such as time loss, resource wastage, and limited job opportunities (Bauza & Gonzalez, 2013; Traffic Management Strategies and Best Practices - Google Scholar, n.d.). Traffic congestion and delays pose significant challenges to urban transportation networks globally, driven by population growth and increased vehicle ownership (Bottino et al., 2016; Labib et al., 2018; Ma et al., 2014; Pop, 2018). Numerous studies have been conducted in various urban settings across the world on the effects of traffic congestion, such as increases in delays, traffic safety hazards, and traffic-related air pollution (Bottino et al., 2016; Kwak et al., 2012). To reduce people's suffering and insecurity, an efficient traffic management system must have a sufficient number of traffic laws, traffic lights, proper alignment and markings, and legitimate traffic rules and regulations (Kim et al., n.d.; Mahmood et al., n.d.; of & 2005, n.d.) Landscape design can contribute to reducing the problems associated with traffic congestion. Well-designed landscapes can help improve traffic flow and create a more efficient transportation system. Rajshahi City is experiencing rapid growth and has become a significant urban, commercial, and educational center in Bangladesh. It's situated on the north bank of the Padma River, near the Bangladesh-India border, the city is home to approximately 763,580 people (Rajshahi (Bangladesh): City Districts and Subdistricts – Population Statistics in Maps and Charts, n.d.). The central point of Rajshahi is

Shaheb Bazar's zero point, which is the busiest area in the city. However, with the increasing traffic, congestion has become a problem. Therefore, the main objective of this study is to create a vibrant and pedestrian-friendly environment in commercial areas, using landscape features to minimize transportation issues. By incorporating aesthetically pleasing elements such as furniture and trees, the landscape design aims to provide an enjoyable and safe experience for pedestrians, allowing them to walk freely on the sidewalks. This study can help to create user-friendly roadways for commercial areas, promoting walking over driving. It focuses on organizing street stores, incorporating green spaces, clear signage, and improving traffic flow with ample parking and lighting, resulting in a traffic-free crossroads with an appealing landscape.

2 Literature Review

The literature review has provided valuable insights into urban and landscape design concepts for addressing traffic congestion and creating a vibrant, pedestrian-friendly CBD. Various research papers, websites, projects, and case studies have been used as guidelines in the proposed design. Before the application of landscape design, several case studies are conducted to gain a deeper understanding of the design process and methodology. Architect Ahmet Aksoy's landscape project in Tashkent City, Uzbekistan is one of the case studies, that showcases a successful blend of functionality and aesthetics, creating a pedestrian-friendly street. The project demonstrates that aesthetically pleasing footpaths can increase walkability and reduce vehicle congestion. By incorporating enhanced facilities and implementing traffic regulations, the project promotes non-motorized transport and ensures a sustainable environment. Another case study named Mexican Architects to Create a public park in the Center of a Busy Mexico City Road shows a public park with tree-lined plazas, cafes, and a raised walkway built on Mexico City's Avenida Chapultepec by Fernando Romero and two other Mexican architects can help to turn the busy CBD in a Recreational Hub. The project was proposed in 2015 and aimed to create a recreational space on a busy CBD road to offer people relaxation. This type of park helps to reduce the mechanized form of CBD and brings people close to nature and as a result the place will become more vibrant and ensure the highest and best use of land. In the last case study, which focuses on Auckland City Council's ten-year upgrade program to create a shared space in their CBD, valuable insights are gained regarding the concept. The program involved converting certain streets into pedestrian-friendly zones, enabling shopping, dining, and relaxation activities. By eliminating the traditional distinction between footpaths and roads through color texture, signage, and slope, the shared space approach prioritizes pedestrians and enhances the overall pedestrian experience. This case study is a valuable resource for understanding the implementation and benefits of shared spaces in urban environments.

4 Materials and Methods

The methodology employed for the study on ensuring vibrant and travel-friendly roads through landscape design in Shaheb Bazar, Rajshahi, involved several key steps. The study area was selected as Shaheb Bazar, known as the Center Business District (CBD) of Rajshahi. A reconnaissance survey was conducted to understand the area's details and identify major problems. The needs of the study area were determined by considering the challenges faced by pedestrians and vehicles. The aim was to create vibrant and travel-friendly roads, along with the relocation of street shops. A questionnaire survey gathered insights from 68 participants including local residents, pedestrians, shop owners, and commuters in the study area. The survey aimed to understand preferences, concerns, and suggestions about road conditions. It covered topics like traffic congestion, pedestrian safety, aesthetics, and overall road usability, ensuring a 90% confidence level. A functional diagram was created using 2D software, such as AutoCAD, to propose design solutions that address the identified needs. A conceptual design plan was developed by considering the study area's climate and user requirements. The design focused on aesthetics, functionality, efficient road networks, and the provision of parking spaces. Plant characteristics and focal points were considered while existing resources were preserved. Design visualization was carried out using software like SketchUp and Lumion to create 3D models and provide a realistic view of the proposed design. The final design was prepared, incorporating all the elements of the methodology and specific design components. A comprehensive report was then generated, documenting the study and its findings.

5 Site Design Proposal

The majority of feedback points to significant traffic congestion in Shaheb Bazar, with 90.9% attributing it primarily to auto rickshaws. The pedestrian pathway needs improvement, as 42% rate it poorly. A majority (88.5%) demand designated vehicle stoppages, while 96.2% suggest relocating street shops. Additionally, 73.1%

support an elevated pedestrian pathway for safer road crossing. The Kumarpara to MoniChattar whole CBD or Zero-point area are divided into 4 Subzone. Such as Elevated Pedestrian Pathway, Road, Pedestrian Footpath and Shared Zone.

5.1 Elevated Pedestrian Pathway

The elevated pedestrian pathway, measuring 150m x 6.5m x 7m, integrates vine forms for shade and beauty. It controls the temperature and adds aesthetic appeal. It features 4 access points, designated shop spaces, and sitting areas also allowing pedestrians to shop while walking without overcrowding. The walkway offers shaded facilities for both pedestrians and shopkeepers, with sitting areas for rest. Textured with Carpet Grass, ground covers, and vines, it includes street lighting, decorative elements, and 20 concrete street shops (4'x5' each). Organic edges and stone fragments mimic natural materials, guiding pedestrian paths and adding innovation to the design. Additionally, blue lights and streetlamp posts provide proper lighting during nighttime. Overall, the elevated pedestrian pathway combines functionality with aesthetics to create a unique and enjoyable experience for pedestrians.

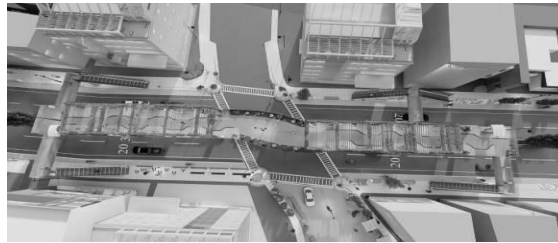


Figure 1 Proposed Elevated Pathway

5.2 Proposed Road Design

The CBD of Rajshahi is characterized as a congested and busy area due to the influx of people for various purposes. The existing roads in the CBD are poorly maintained, leading to traffic congestion and pedestrian crowding. The main causes of this congestion are public auto vehicles and unauthorized car parking, compounded by the absence of traffic signals. Additionally, public auto vehicles lack a designated stoppage area in the CBD. The proposed design for the CBD aims to address these issues by improving road conditions, constructing medians, providing shoulder and cycle lanes, establishing a specific public auto stoppage, and creating designated car parking spaces.

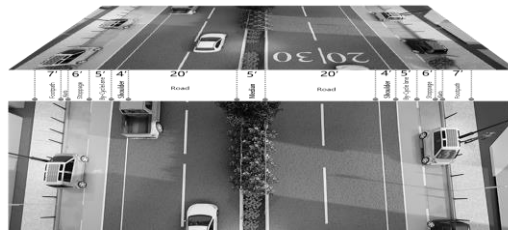


Figure 2 Proposed Road Cross section.

5.3 Auto Stoppage

In the proposed design for Zero Point in Rajshahi, the issue of auto and auto-rickshaws causing traffic congestion is addressed. Six auto stoppages are planned to accommodate these vehicles, allowing people to easily board them for their desired destinations. Each auto stoppage has a capacity of 6 to 8 autos. The stoppages are designed with yellow pavement areas on both sides, providing waiting spaces for pedestrians. Additionally, there are seating areas for pedestrians to rest. Bollards are installed to separate the footpath from the auto stoppage area. Drainage facilities are also provided, ensuring proper water management. Stoppage signage is installed to guide people effectively.

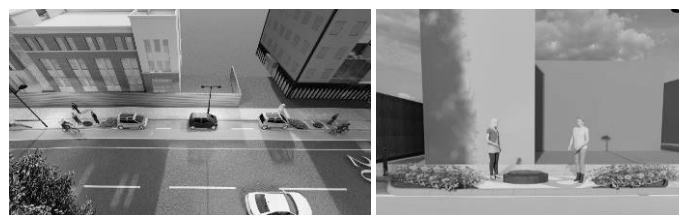


Figure 3 Proposed Auto Stoppage

5.4 Footpath

Footpaths provide an integral component of our urban environments and have the potential to act as safe places for people and the focus of community life. Despite this, the approach to designing safe footpaths while providing this sense of place. There is usually very little consideration given to how developing for the site's purpose impacts safety and vice versa. Just like that, the footpath of the zero point of Rajshahi has a moderate pathway at the CBD zone, but due to the lack of management of the authority and unorganized street shops create a hardship for pedestrians to walk freely on the footpath. So, the main objectives of our study are to make vibrant and travel-friendly roads for a commercial place by using landscape.

Table 1 Overall design concept summary

Present Conditions	Unorganized street shops and lack of maintenance
Proposed Design	Organized streets shops with sitting places and enough signage
Reasons	To create vibrantly and travel-friendly
Focus	To make pedestrian friendly
Orientation	East to west
The overall scale of landscaping elements	Relative comparison to human scale

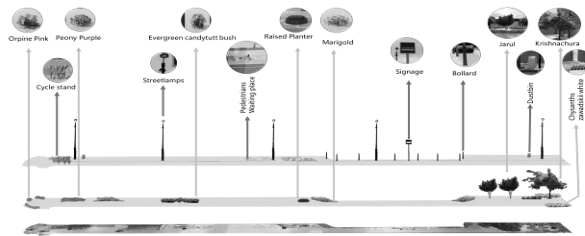


Figure 4 Layout View of a portion of the Footpath

5.5 Features on Footpath

The congested footpath at the zero-point area was redesigned with organized street shops, controlled pedestrian flow, and shrub barriers. (Figure-6) Yellow markings delineate pedestrian paths, ensuring a calm walking experience. Signage, both for pedestrians and vehicles, is strategically placed for crowd management. The junction features yellow signage for pedestrian crossings and slopes for disabled individuals. Wooden seating areas adorned with herbs and flowers offer peaceful resting spots along the footpath, enhancing pedestrian comfort.



Figure 5 Various features on Footpath

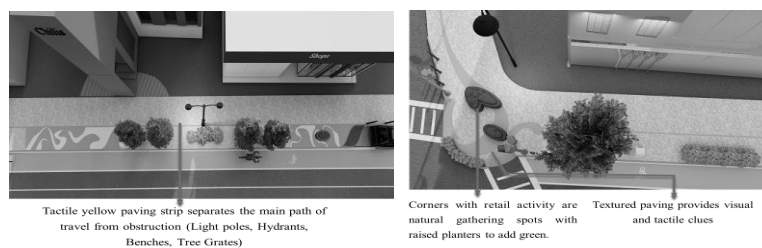


Figure 6 Justification of the Design

5.6 Justification of Design

The design proposal was developed considering user recommendations and expectations. Stakeholder engagement and focus group discussions were conducted to gather input and ensure the design met their needs. Landscape and architectural principles were then applied to create a pleasant and visually appealing environment. The footpath is divided into two zones: one zone includes street furniture, while the other is designed for disabled individuals without barriers. (Figure-7) Clear visual clues and slopes are provided to identify the different zones from a distance. Tactile surfaces are also incorporated to assist visually impaired individuals.

5.7 Shared Space

The plan to turn the Shaheb Bazar Boro Mosque area into a shared space aims to improve pedestrian and vehicle flow, utilizing landscaping and design principles. Dividing the area, adding texture, color, signage, and slopes. Street shops will enhance aesthetics and convenience, creating a lively CBD while preserving the mosque's charm. This transformation provides safety for pedestrians and vehicles (HDS Australia, n.d.).

Table 2 Overall Design Concept of Shared Space

Zone	Functions	Characteristics
A (For Pedestrian)	Provide a more pedestrian-friendly environment	<ul style="list-style-type: none"> • Increase NMT (Non-motorized Traffic) • Increase pedestrians' number in CBD and vibrant the commercial place. • Easily accessible for disabled people. • Division is made with two different color textures rather than regular curbs in the road.
B (For vehicle)	Ensure vehicular movement	<ul style="list-style-type: none"> • Low-speed environment • Average speed is 10Km/h • Vehicle parking is not permitted. • Vehicle loading is restricted to 6 am-10 am daily. • Parking information is signposted at the entry and exit.



Figure 7 Proposed Design of Shared Space

6 Conclusion

Incorporating landscape design in urban planning to reduce city traffic is a new and often overlooked concept. However, research shows that well-planned features such as over-bridges, pedestrian-friendly pathways, and shared zones can effectively address traffic issues. This study serves as a comprehensive model for creating a traffic-free city through landscape design, emphasizing the importance of considering factors like land use and user acceptability. The findings highlight the significant impact that even the smallest details in landscape design can have on traffic reduction and creating pedestrian-friendly environments. Overall, landscape design offers promising potential for achieving a comfortable and traffic-free urban environment.

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