

Conceptualizing Redefined Perspective for the Efficient Transport System Respecting Contextual Responsiveness and Urbanscape of Hilly Topographic Cities

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Abstract: While critically studying scenic paradigms, the cities of organic significance with natural topographical terrain is of great significance. In the present situational perspectives, population density, vehicular and motorized traffic scenario the rapid growth and surprising sprawls have successfully trying to enchant the green covered hilly topographic landscapes with concrete masses of residences and townships. The anomaly and catastrophe of land use allocation for the existing areas within cities of natural landforms, and the dogmatic mannerism of the public towards the issue of urban planning often inflames the existing mushroom growth and uncontrollable sprawl within cities. Due to the expanding commercialization and ferocious encroachment over the residential periphery's hovers over the main arteries of city such as main highways and other peripheral secondary and tertiary routes since years. In addition to the serious violation of right of ways allocated for natural drains and sewers facilitating the public become land grabbers of public property that results in enormous blockage of rainwater. This facilitates the water to intrude into the residences and other public property such as main transit routes and secondary and tertiary roads. In addition, the emergence of megacities and uncontrolled mushroom growth processes has made urbanization an inevitable reality. This study focuses on the critical question of unplanned urbanization and transportation. It further argues that the

prevailing issue creates an alarming vehicular transit flux through a very small town as Abbottabad, which has Karakorum Highway (KKH) or Mansehra road as the only artery which is catering the load of both intercity and intra city diversified traffic burden through decades? To reduce these issue different projects such as mass transit system, BRT (bus rapid transit), train transit or some indigenously generated solution such as tram systems, cable car systems have been lunched, however; it is important to investigate how this transportation solution would impact the architectural building skyline of the city.

Keywords: Urban Sprawl, Transport Infrastructure, Mass Transit, Building Skyline, Urban planning

Introduction

This paper encapsulates the study of urban growth procedures which may be termed as dual faceted due to their simultaneous development in horizontal as well as vertical direction. The important, however, is the evolutionary pattern of arterial connections which programmatically derived the flow within the cityscape and in turn formulate the urban form in z axis. Therefore, decisions pertinent to the control and flow of traffic flux through urban road network systems act as driving force for generating cities geometry and design aesthetics.

A traditional approach towards urban transport system's focuses on the concepts of efficiency in terms of user friendliness, technological advancement, and eco-friendliness. But it does not portray the whole image of a city's circulation pattern and its impacts. There is a huge void yet to be filled by such systematic procedures of study which may very clearly lead towards understanding the urban scape as a three-dimensional system (Flaherty, 1997). Hence, urban infrastructure systems and transport scape can never be conceptualized isolation. Because in its nature is part of horizontal growth system that should be evolved from the overall master plan of the city. It shall be treated as an important triggering factor in re-shaping master plan of a city and must be conceptualized with greater care due to its highly responsive role to the city's skyline (Holmes, 2003).

The growth process of the physical fabric of city and utilities of its adjunctive infrastructure should be in proximity and response to the overall transport scape of the urban environment. In this context, adeep understanding of the dynamics of inter and intra city transportation is necessary in urban setting which remains an important technique in avoiding haphazardly formulated short-term developmental projects including as flyovers, underpasses, and unnecessary road widening. In the developing world short-term projects are usually framed and implemented for satisfying political will and vested interests of a specific group, while ignoring the long-term strategic benefit of the city's urban domain (UNSD, 1997).

The city skyline being an important component of urban visual aesthetic and that should be a primary focus of urban beautification efforts/projects. In this regard, concerted steps and efforts help in multiplying city skyline with natural landscape and enhanced urban settings. It is pertinent to mention here that urban landscape is broader and deeper concept than planting trees and providing green spaces especially in case of cities with surreal organic nature setting as built-in feature of their growth and development sequence (Bammeke, 2013). In certain scenario, a very small-scale intervention may culminate in enhancement or degradation of the entire urban skyline, architectural vocabulary, and the overall visual aesthetic scene of

the city. In addition, cities like Abbottabad with highly sensitive organic character, having a huge influx of tourists and in-migrants, encountering severe circulatory challenges and require extremely careful amalgamation of inter as well as intra-city traffic plans which may in turn enhance the overall urban skyline and magnificence of the city (Karlson, Karlsson, Mörtberg, Olofsson & Balfors, 2016).

This study focuses on the scenario that how the urban design systems are conceptualized as physical fabric and covers engineering, technical and spatial planning procedures, aesthetic considerations, efficient transportation systems and traffic management solutions. This study argues that devising and conceptualizing a proper mechanism is required for encapsulating urban system as an integral, wherein every entity of urban setup shall be highly reflexive and in proximity and shall correspond to the overall urban design strategy of that cityscape. Further, this shall be strategically pin out for organically driven cities with immense natural landscape and that building skyline and transportation infrastructure would respond to this system. In this regard, a scientific and integrated framework for context responsive transport system for cities of organic significance is required.

Objectives of the Study

To conceptualize an integral mechanism idealizing contextual responsive paradigm of transport scape for organically signified urban setups.

Significance of the Study

This research would be an attempt to make a positive contribution to urban planning and would serve as a guideline for urban planners and designers. In addition, this study would act as a stimulant and source of information for the interested researchers as well as students. It will also open new avenues for relevant research in the area and would contribute in development perspective. It would also prove a revolutionary step towards formulating a policy about architecture, urban planning and urban design and would thus, help in achieving broader and strategic depth in urban architecture. The study would help to modify and culminate the concept of integrated strategic traffic and transportation management plans and its implementation mechanisms. Finally, this research would help in providing broader guidelines for enhancement of local area development plans for cities and urban scape, of similar nature all over the globe.

Research Questions:

- What can be an approach towards formulation of mechanism which shall integrate urban scape systems, its infrastructural attributes, physical fabric and building skyline and natural landscape of city?
- What is a context responsive transport infrastructure system for organically signified urban setup? How it can be an approach towards redefining the concept of efficient transport system?

Research Design

Taking Retrospective/prospective system as the prime engine the research framework was formulated. the main objective was to analyze and study the existing impact of transportation systems on the cityscape and forecasting the impact assessment on the urban landscape of organically significant cities primarily focusing on Hazara region and Abbottabad. The futuristic dichotomy towards ideal transport scape analyzing the

impacts on the overall urban transportation infrastructure including road networks and traffic studies addresses multiple vehicular data sets. The literature review carried out, inculcated the understanding of urban design, Urban sprawl and urban growth, Urban Transportation system, building skyline and city elevation, Urban scape systems for organically significant cities and studying the connection having urban design and planning attributes within perspective of urban scape which was elaborated through international case studies having relevant research scope and perimeters. Review of the international relevance of the case were undertaken to shore up the study's inspirational quality. The compilation of data involved both primary as well as secondary data sets which were obtained using the methods of quantitative and qualitative data collection. Collected data was analyzed, interpreted, summarized, and presented guiding our way towards establishing hypotheses and furthering suggestions for our research and eventually helping to establish step-by-step protocols for conceptualizing a concrete system of receptive transport scape for cities with an organic character. Ultimately a finalized developed framework for context responsive transport scape for organically significant cities was determined (Kumar, 2018). When the data was collected and analyzed, several diversified and unique attributes of that data were sorted out. They were then amalgamated and synchronized in an intelligent manner and smart approach which ultimately derived the conclusions and recommendations for futuristic idea development regarding transport infrastructure systems (Faisal, 2015).

Understanding Urban Sprawl and Urban Growth

Urban growth is a well thought, planned and controlled process of city expansion whereby economic and ecological improvements are achieved. Urban sprawl, on the other hand, is an unplanned and uncontrolled process, resulting in economic, social, and environmental degradation of the community (Bekele, 2005). Usually, urban sprawl is the result of different factors including, population growth, rise in household income, subsidization of infrastructure investments like roads, ineffective land-use excessive growth, social problems in central cities and poor land policies (Bekele, 2005, p. 1). The constant urban sprawl has led to the emergence of a significant concept of smart growth in urban planning and architectural design. The idea of smart growth is concerned with the effective urban land management and “channels development to areas with existing infrastructure” and “consumes less land for roads, houses, and commercial buildings” (Bekele, 2005, p. 17). Further, smart growth is significantly focusing on, limiting outward expansion, encouraging higher density development, encouraging mixed-use zoning, reducing travel by private vehicles, re-vitalizing older areas, and preserving open spaces (Gillham, 2002).

Urban Sprawl in Pakistan and an Overview of Abbottabad City

In Pakistan, people have been moving from the rural areas towards mega cities of the country in search of jobs and better living standards. This movement has posed not only physical problems to the structure of urban settlements, but also resulted in the administrative disputes among various authorities. The contiguous built-up areas of towns have extended into that of a rival rural Union Council. The Union Council is unwilling to surrender its territory and allow extension of the boundaries of the municipality, leading to many problems such as waste disposal in the built-up area.

Abbottabad is one of the cantonment towns in Pakistan which was designed exclusively for administrative and strategic purposes. This city comprises of a narrow valley having only one major transportation route

running in approximately north-south direction. The city underwent a ribbon sprawl during its expansion. Later on engulfed certain villages situated at its periphery. While its growth however, the city has seen considerable expansion and added commercial, educational, and residential land uses. The growth has been particularly rapid since the earthquake of 2005, after which many people affected by earthquake in the mountainous areas of Hazara migrated to Abbottabad. The major problems & issues encountered by Abbottabad city's urban scape includes traffic and transportation systems, intercity traffic and row, parking facilities in parallel to highways and within city downtown centers, intra-city secondary and tertiary route definitions, and its management. Similarly, quality housing and its alarming growth, evolution of slums and squatter settlements, mushroom growth in commercial sector and architectural character and skyline.

Solutions to These Urban Situations

Standardized land use plans defining zone wise positioning of diverse building typologies. Also, structure plan for devising the strategies of urban and architecture designing of Abbottabad city for next 50 years (it needs constant monitoring and evaluation every 15 years). Consolidated master plan defining the city's development for next 15 years (it needs constant monitoring and evaluation every 5 years). Traffic and transportation strategic and management plans and water supply and sanitation system plans.

Solution finding Approach for Urban Sprawl and Mushroom growth of Abbottabad



Figure: The growth pattern of Abbottabad since 1950 developed by self

Analysis and Investigation of Vehicular Traffic Within Abbottabad Main Downtown City Center

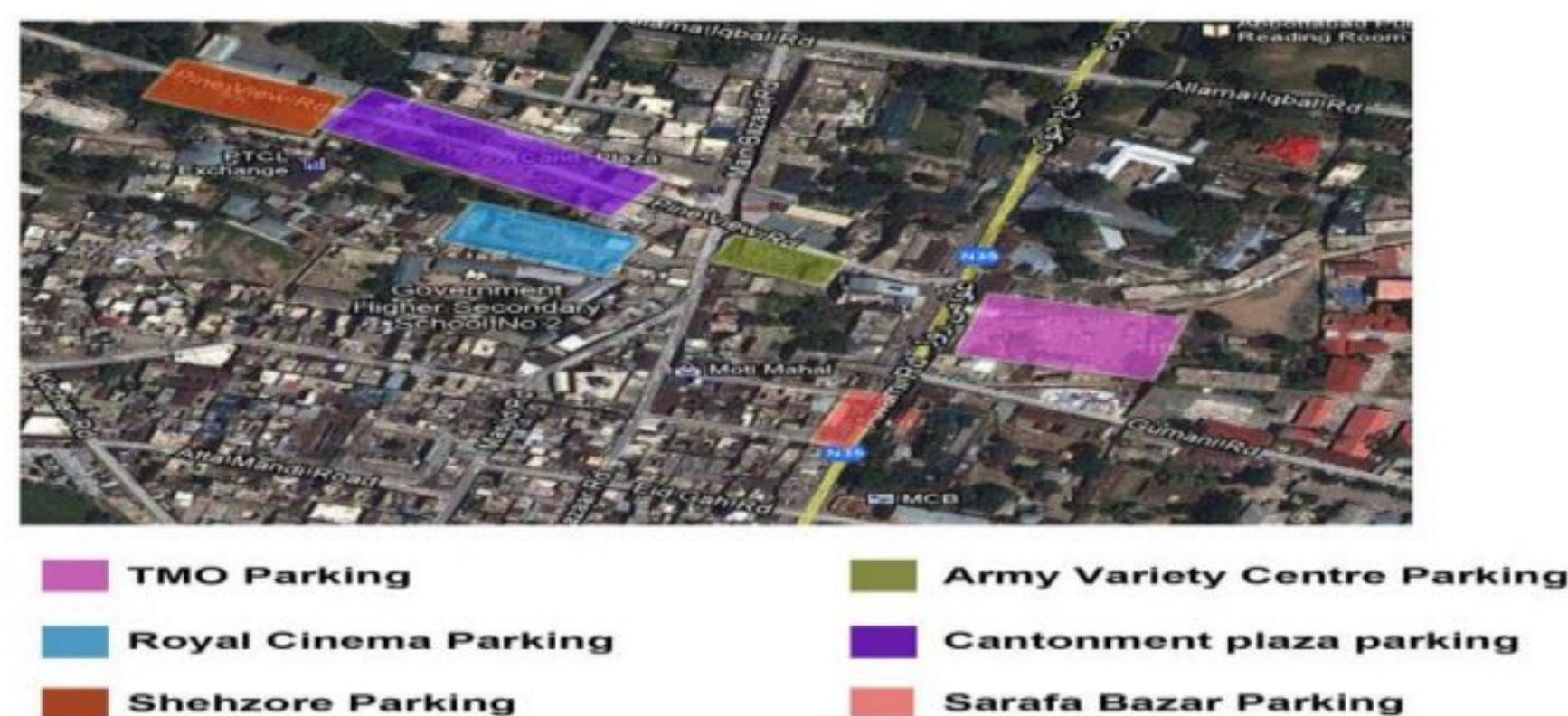


Figure: Parking Analysis Zones Determination within Cantonment Bazar Abbottabad

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Existing Situation of Abbottabad Urban Scape and Traffic Congestion



Figure: Situation of Abbottabad Urban Scape & Traffic Congestion and Road Network Analysis. Source: www.earth.google.com/

Analysis and Investigation of Diversified Vehicular Traffic System on Main KKH Abbottabad

VEHICLE ANALYSIS IN ABBOTTABAD									
S #	Location	Day	Weather	Time: Off Peak public holiday	Total vehicles in 1 min	Type of vehicles	Inter-city transport: 4:56 pm /5min	Intra-city transport 5:07 pm /5min	
1	College road chowk Mandian Atd.	WED	Snowy / rainy	4:45pm 5:51pm	72 80	1. Trucks	5	0	
						2. Buses	2	0	
						3. Hiace	14	0	
						4. Suzuki Carry	28	44	
						5. Suzuki Pickup	0	56	
						6. private	61	55	
						7. Goods Transport	0	3	
						8. Bikes	0	1	
						Total	110	159	
						Total		269	
						Transportation of Vehicles within 5min		269	
						Total Vehicles within 5min		80 X 5 = 400	
						Average per 5min		340	
						Per min transportation on Average		68	

Figure: Vehicular Transit Assessment Analysis at College Chowk Mandiaan Abbottabad

Sarban chowk Main Abbottabad City Centre:									
S #	Location	Day	Weather	Time: Off Peak	Total vehicles in 1 min	Type of vehicles	Inter-city transport: 12:07 pm /10min	Intra-city transport 11:05 pm /5-min	
1	Sarban chowk at Main Atd. City Centre	THU	Heavy rainy	11:40 am	140	1. Trucks	32	0	
						2. Buses	10	0	
						3. Hiace Van	55	0	
						4. Suzuki Carry	0	122	
						5. Suzuki Pickup	0	158	
						6. private	122	83	
						7. Bikes	0	0	
						8. Army	0	13	
						9. Ambulance	0	1	
						10. Bank	1	0	
						Total	220	377	
						Total		597	
						Transportation of Vehicles within 5 – 10 min		597	
						Total Vehicles within 5min		140 X 5 = 700	
						Average per 5min		648	
						Per min transportation on the Average		130	

Figure: Vehicular Transit Assessment Analysis at Sarban Chowk Main City Center Abbottabad

Faowara Chowk:									
S #	Location	Day	Weather	Timing	Total vehicles in 1 min		Type of vehicles	Inter-city transport: 02:27 pm /5min	Intra-city transport: 02:35 pm /5-min
1	Faowara Chowk	Saturday	clear	02:23 pm	138	1.	Trucks	10	
						2.	Buses	04	
						3.	Hiace	40	
						4.	Suzuki Carry		96
						5.	Suzuki Pickup		151
						6.	private	99	108
						7.	Goods Transport		02
						8.	Bikes		19
						9.	Army		02
						10.	Police		03
						11.	Bank		01
						Total		153	382
						Total		535	
Transportation of Vehicles within 5 min							535		
Total Vehicles within 5min							138 X 5 = 639		
Average per 5min							613		
Per min transportation from the Average							123		

Fig: Vehicular Transit Assessment Analysis at Fawara Chowk Abbottabad

Investigations & Solution finding Strategies



Fig: analysis of transit variety options all over the world in contextual similarity to Abbottabad city

Source:

www.google.com.pk/search?q=curitiba+bus+system&tbm=isch&tbo=u&source=univ&sa=X&ei=1_chU-6-K6m2yAGKp4DgBg&sqi=2&ved=0CCQQsAQ&biw=1280&bih=699

Revolutionary Idealistic Approach Towards Smart Green Transport System

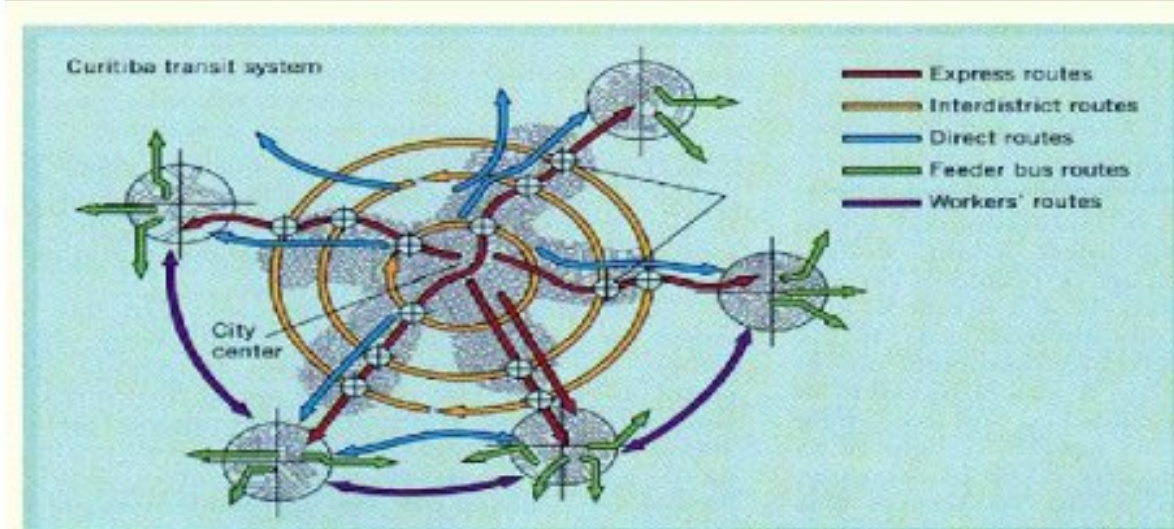
A Case of Curitiba Brazil BRT System

Curitiba, the city of Brazil, is the birthplace of bus rapid transit. In this city the high-capacity urban public transportation system developed under the leadership of former city mayor Jaime Lerner. The ensuing transit-oriented development (TOD) underscored the importance of organizing urban areas around transport corridors and led Curitiba to be hallmarked as the most successful example of TOD. In support of his traffic management and planning Jaime Lerner stated that "Our city is a city for people, not for cars" (Kozievitch, Gadda, Fonseca, Rosa, Gomes & Abkar, 2016).



Fig: Integrated Public Transit Network of Curitiba

Curitiba Transit System



tipo de linha	Capacidade
Circular Centro	30
Convencional	80
Convencional Articulado	160
Alimentador	80
Alimentador Articulado	160
Interbairros Padron	110
Interbairros Articulado	160
Linha Direta	110
Expresso Biarticulado	270

Curitiba, Brazil's Transportation Routes

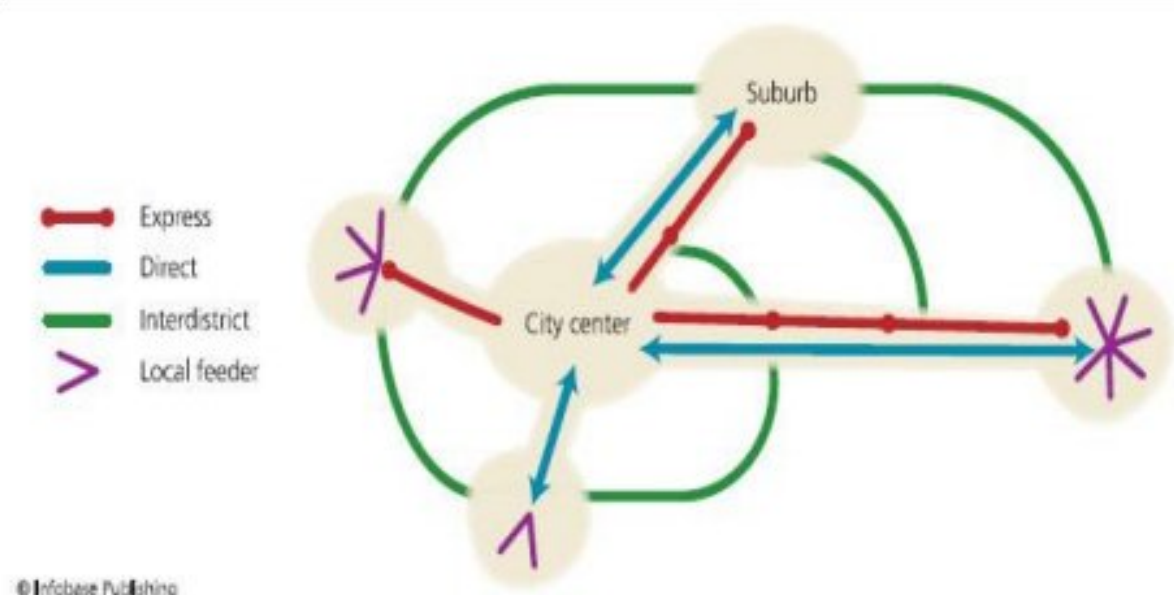


Fig: Curitiba' BRT system elaborated typology illustration



Fig: Transit System of Curitiba simple

Source:

www.google.com.pk/search?q=curitiba+bus+system&tbm=isch&tbo=u&source=univ&sa=X&ei=1_chU-6-K6m2yAGKp4DgBg&sqi=2&ved=0CCQQsAQ&biw=1280&bih=699

Curitiba model has been widely quoted as a significant traffic congestion control model around the world. This city has the highest recycling rate in the world i.e., 70%. Curitiba has bus system that is so good that car traffic decreased by 30% while the population trebled in a twenty-year period. Curitiba has the largest downtown pedestrianized shopping area in the world. Curitiba has built large numbers of beautiful parks to control floods rather than concrete canals. So many that they use sheep to cut the grass as it's cheaper than lawnmowers. Curitiba is a city where 99% of inhabitants want to live. In comparison, 70% of Sao Paulo's residents want to live in Curitiba. Curitiba's average income per person has gone from less than the Brazilian average in the 1970's to 66% greater than the Brazilian average (Rabinovitch, & Hoehn, 1995).

Establishing our Essence of the Green Transport Systems

Frankfurt: From Downtown to Northern City Boundary

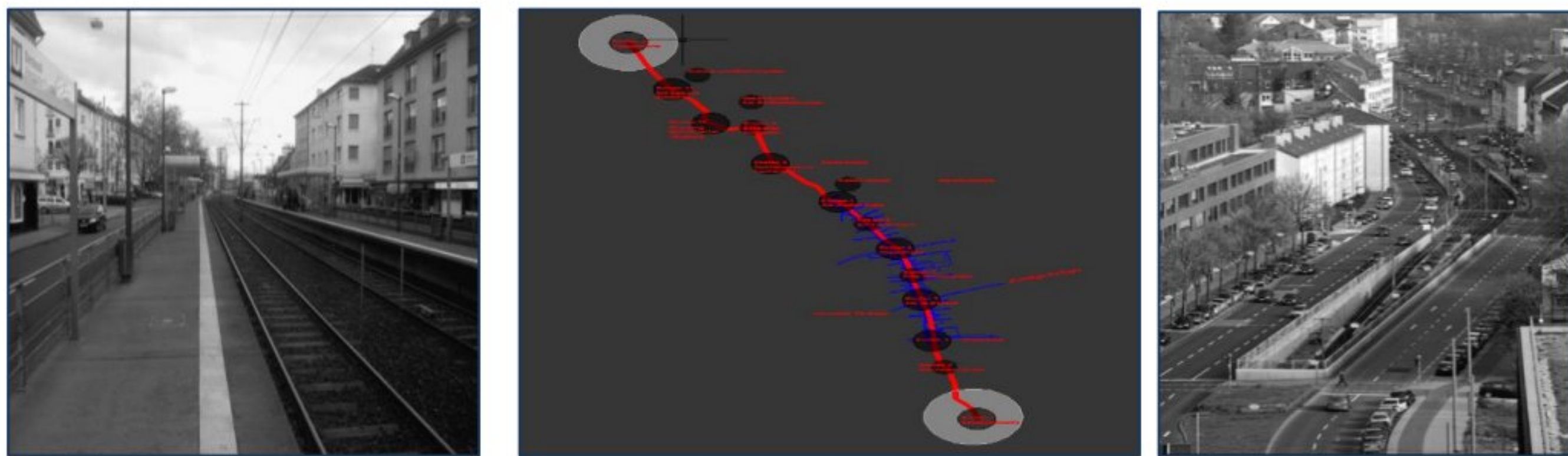


Fig: Frankfurt: From downtown to northern city route study and conceptual suggestions

Source: AHK conference on energy efficient construction and refurbishment (green city - sustainable urban planning) Frankfurt: From downtown to northern city boundary.

AHK Conference on Energy Efficient Construction and Refurbishment (Green city-Sustainable Urban Planning)

Subway stations could become more attractive by using daylight redirection systems, planting vegetation and creating rainwater fed objects. Vertical vegetation on high rise buildings creates some kind of artificially grown mammoth trees. Humans start to live again in naturally determined spaces.

Nature Trail: Camille March and study and conceptual suggestions

Stuttgart Academy of Arts Summer Semester 2012

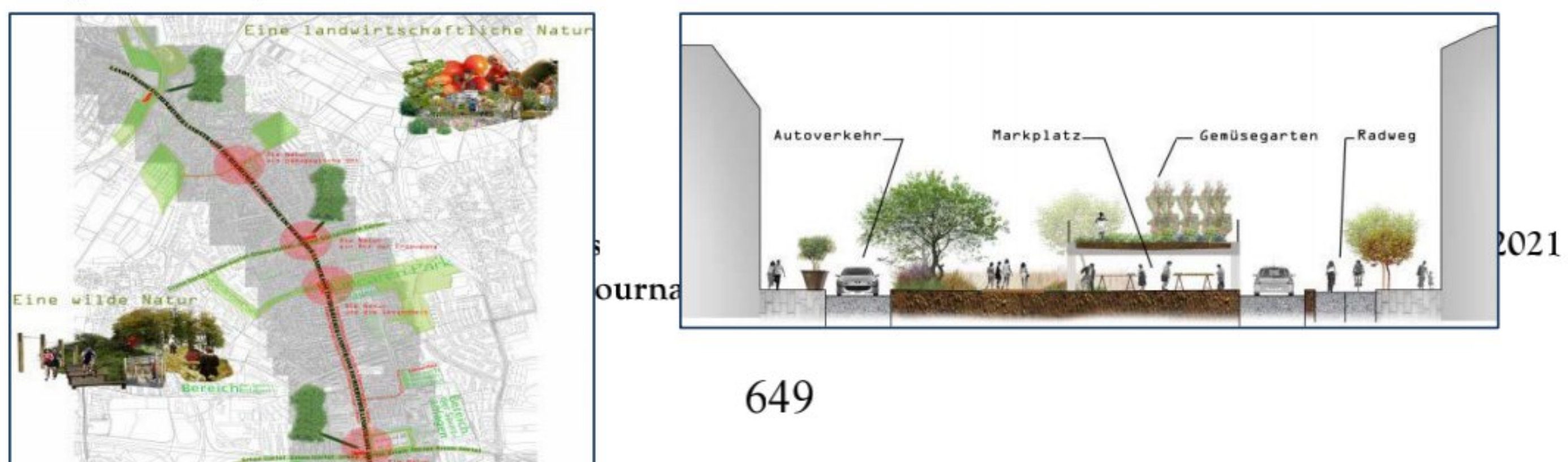




Fig: Nature Trail: Camille March and study and conceptual suggestions

“Green” does not just mean planting trees and shrubs but the requirement of overall concepts that support the improvement of city centers.

Source: AHK conference on energy efficient construction and refurbishment (green city - sustainable urban planning) Nature Trail: Camille Marchand Stuttgart Academy of Arts Summer Semester 2012

'The new green line of Frankfurt ': Janis Rozkalns. Stuttgart Academy of Arts Summer Semester 2012:



Fig: 'The new green line of Frankfurt ': Janis Rozkalns. Stuttgart Academy of Arts Summer Semester 2012:

Source: AHK conference on energy efficient construction and refurbishment (green city - sustainable urban planning) 'The new green line of Frankfurt ': Janis Rozkalns. Stuttgart Academy of Arts Summer Semester 2012

Recommendations and Suggestions

Efficient transportation system leading ideal city conceptualization would primarily depend on some of these attributes, Land Use patterns, (MLU) Mixed land use, that defines Urban structure or evolution of the city's shape and urban scape. Provision and facilitation of non-motorized and bicycle transit options for achieving green transportation concept, Sustainable transportation shall encompass within the framework of Sustainable Urban Transport Policy planning and development of the urban transport as green.

Transport systems management encompasses Road widening/ Traffic free zones and (TDR), transferable development rights, Flexible planning, Traffic signals management, comprehensive Parking policy, Park and Ride facilities, Peak hour congestion, Gordon Pricing system for (CBD) central business districts improvement prospects for an urban development.

Among several infrastructure facilities, transportation system is most vital, to which all the development sectors are linked. Country's progression is determined based on its communication service systems infrastructure. The best transportation communication system results a well-developed and progressive country. This fact is evident after studying the statistics that all the developed countries of the world have developed the best transportation system for themselves. Improved state of the art transport infrastructure guarantees nation's developmental prospects.

While considering special case of Abbottabad city, the recommendations would be primarily culminating short term strategy and long-term strategy for catering the catastrophic dilemma of transportation system within the city. In the first instant I would suggest the redefinition of the existing KKH road, The right of ways shall be respected, the illegal encroachments shall be removed, following the NHA (National Highway Authority) latest rules which says that this road which is catering both intra city vehicular transit and intercity flux inclusive of diversified traffic flux ranging from trucks and buses to private vehicular traffic, it shall be widened 65 feet from the central median.

After this stage a proper standardized transport management plan shall be designed this can include opportunities for both intra city and intercity traffic fluxes. In the central area a corridor shall be created, with the options of tram systems, cable car system or an efficient BRT (Bus Rapid Transit) system. This will be a strategically sustainable option for intra city traffic flow. Adjacent to this both ways freeways shall be developed which will cater fast flowing inter city traffic system through Abbottabad city. At the far edges of this there shall be service roads for catering the maximum inflow and outflow intra city traffic. These service roads shall be connected to the opposite side edge corridor through efficiently designed underpass systems and over heads. At some points and nodes (interchanges), to maintain the fast lanes of free ways of inter-city transit flux proper underpasses shall be designed; this option would act to be very sustainable, cost efficient and long term beneficial as the undulating topographical character of the Abbottabad city roads would help the underpass to function more efficiently.

This was a short-term option. For the long-term strategy there must be an expressway which shall bypass Abbottabad city urban population and shall connect to the main Karakorum Highway going straight to the China's border. The express way is proposed to initiate from Burhan Interchange at Hassanabdal, shall move through Paniaan village passing outskirts and suburbs of Haripur and Havelian regions. Right at the back of Shimla Hills it shall move towards Mansehra city. Abbottabad shall have two primary interchanges for that expressway system. One at Shimla Hills, and the other at "Siaan da Katha", at the suburb of Abbottabad touching the Mansehra villages. At the Mansehra city there shall be one interchange which would be primarily located in outskirts of Mansehra Suburbs. In this mannerism it shall connect to Main KKH going straight to China's border by passing the whole of Kaghan, Balakot and adjoining areas.

Expressway is inevitably of prime importance for Hazara region's transport system to work. But the most important aspect is that through the interchanges specifically for Abbottabad and Mansehra there shall be

efficient Mass Transit systems which must be designed throughout the city considering the contextual responsive behavior of the city scape and sustainable factors of the system proposed. If that point of consideration is not addressed to the highest esteemed levels the survival of the transport infrastructure and road systems would be in ultimate danger and the city's fast growing urban character would start resulting in dooms paradise.

A very important point of concern is the Architectural vocabulary with reference to the urban fabric and hovering commercial based concrete encroachments which is turning the torsos of city's beautiful green character into concrete jungle of mushroom character. So, to enchant this beautiful city's lost perspectives, the paradigm for redefining the building skyline of Abbottabad city specifically focusing on the commercial buildings Alien symphony at present time. Real translations of the old and original Architectural character of Abbottabad city shall be redefined, through redesigning the frontal facades and building elevations along the main KKH or Mansehra road catering the rejuvenation of real Architectural and urban character of the city.

This is exemplified in the form of a proposal, providing the strategy, procedural mechanism, and framework optimization for the whole conceptual synergy applicable for the cities with organic significance and naturally driven undulating topographical sequences. Abbottabad city is taken as a case of reference which can be primarily translated to cities at a global perspective, with slight modifications and development in the existing research.

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Appendices

Appendix1:

Detailed figures of the study analysis can be found in this Appendix part at the end of the paper.

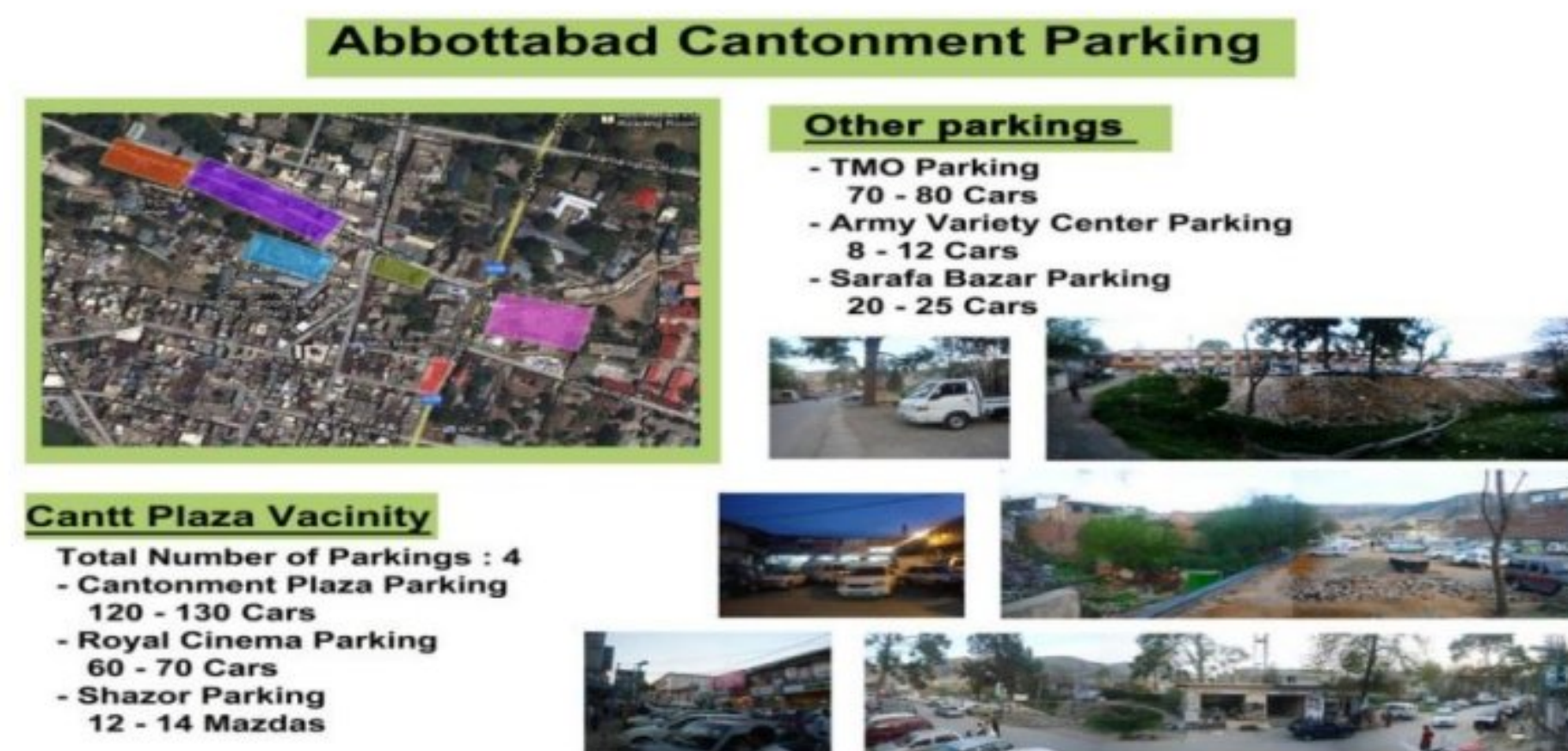


Fig: overall parking system analysis within Cantonment area of bazar Abbottabad



Fig: Cantonment Plaza parking analysis



Fig: Sarafa Bazar parking system analysis

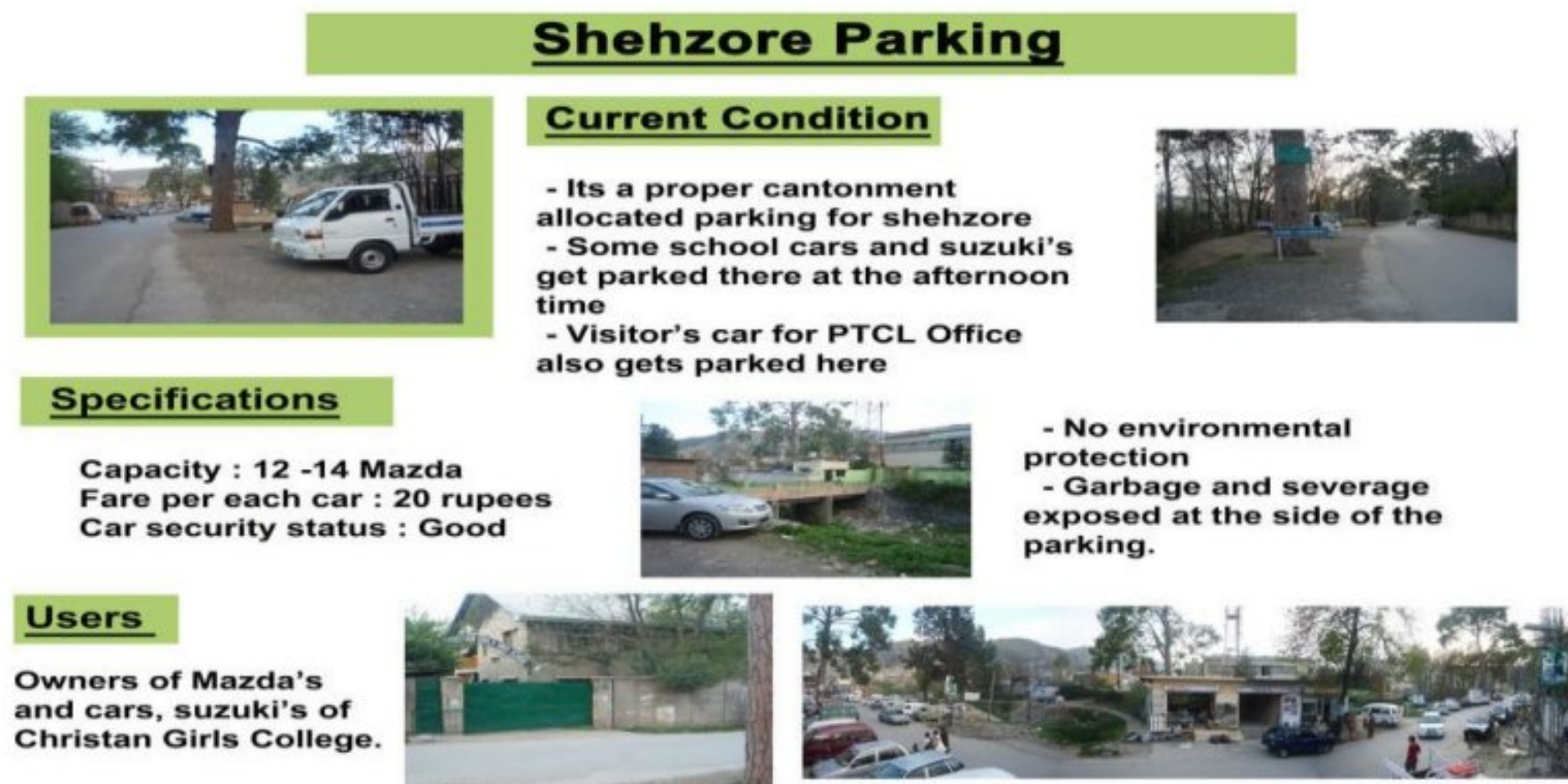


Fig: shehzore vehicular yard parking system analysis

Proposing an Appropriate Design Solution
Introducing Parking Plaza System

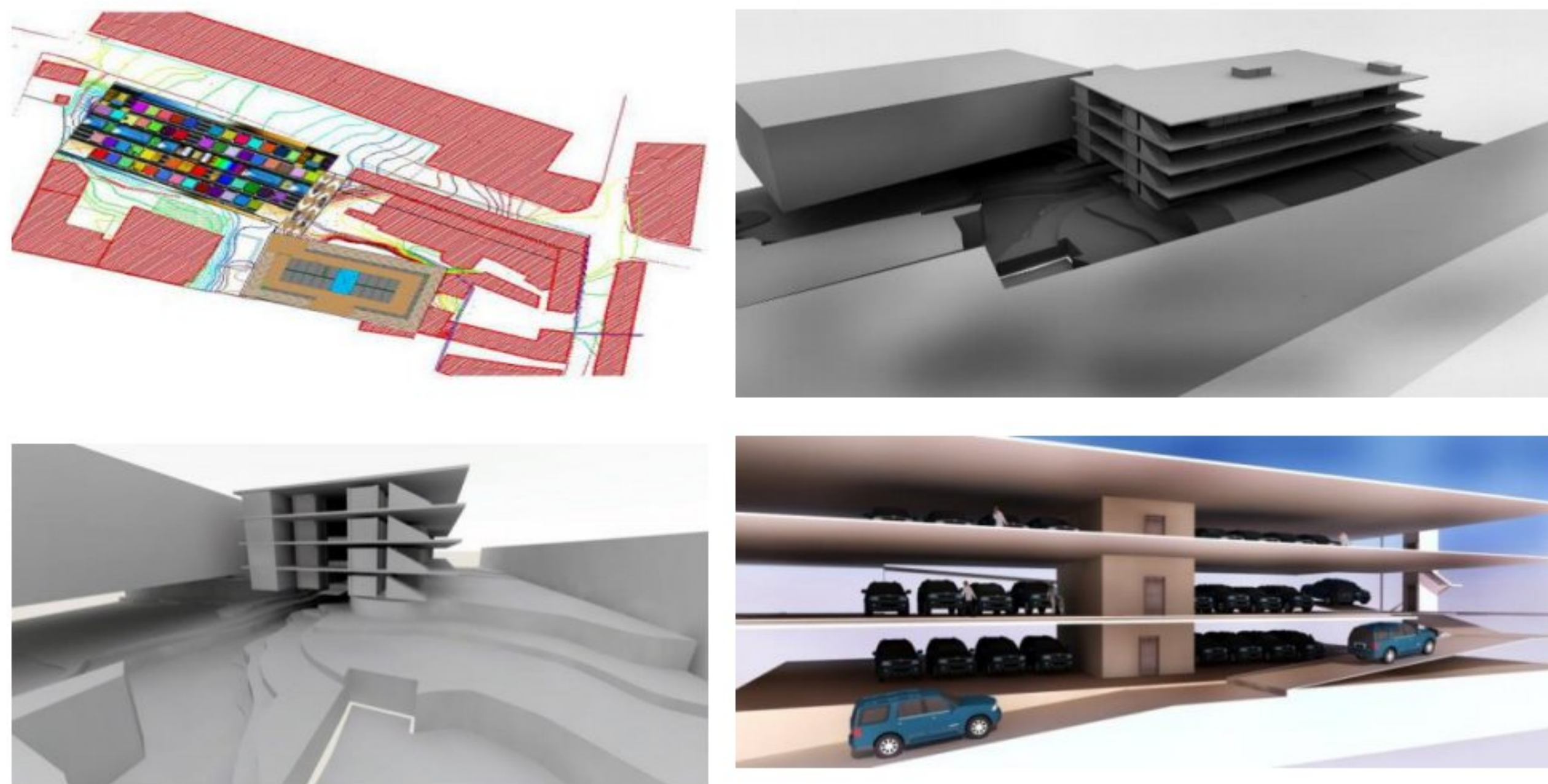


Fig: Architectural proposal development for an ideal parking plaza standardized program for the area

Appendix-

2:



Fig: Curitiba's ideal BRT service view for passenger facilitation



Fig: Curitiba's road scape scenario top view



Fig: Curitiba's BRT scenario with reference to road

Source:

www.google.com.pk/search?q=curitiba+bus+system&tbm=isch&tbo=u&source=univ&sa=X&ei=1_chU-6-K6m2yAGKp4DgBg&sqi=2&ved=0CCQQsAQ&biw=1280&bih=699