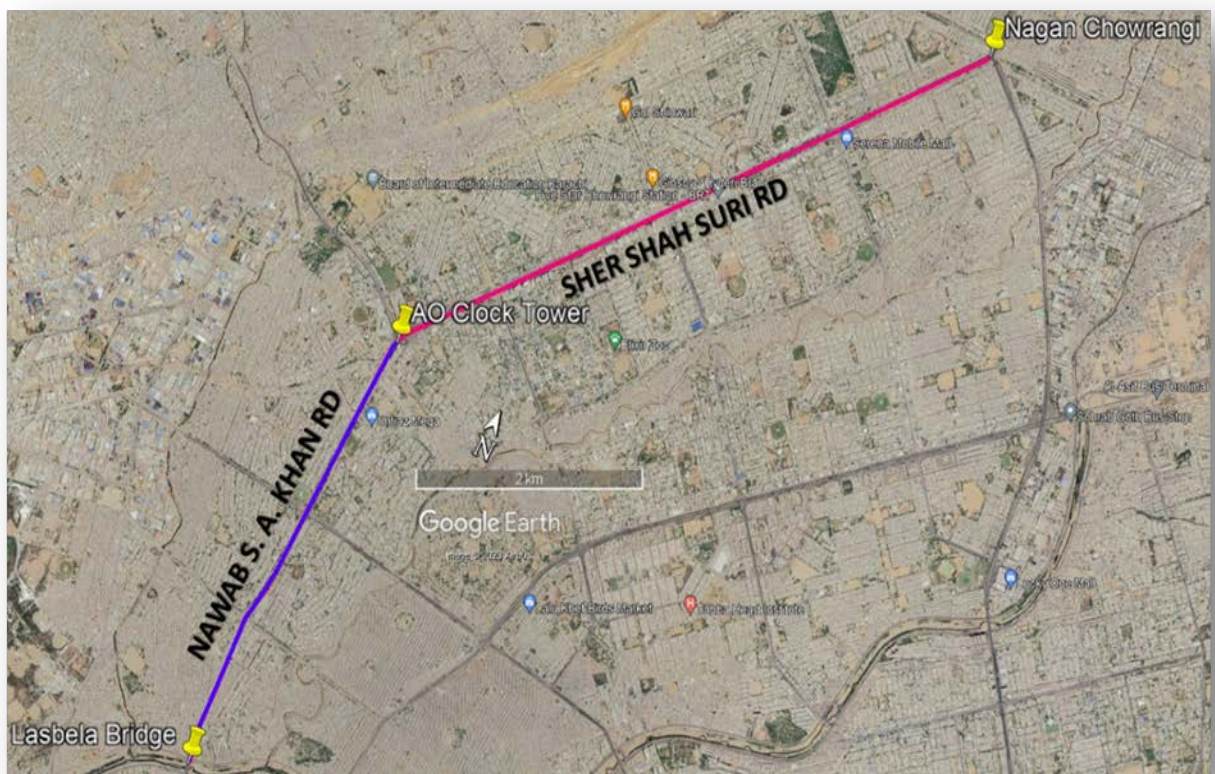


TOYOTA ROAD IMPROVEMENT PROJECT (TRIP)

Sher Shah Suri Road and Nawab S. A. Khan Road



TOYOTA



Table of Contents

List of Figures	4
List of Tables.....	5
Executive Summary.....	6
Chapter 1: Introduction.....	9
1.1 Study Area	9
1.2 Surrounding Landuse.....	9
1.3 Traffic Mix	10
1.4 Elements Affecting Safety.....	10
1.5 Types of Solutions	11
1.5.1 Short term.....	11
1.5.2 Medium Term.....	11
1.5.3 Long Term.....	12
Chapter 2: Critical Sites and their Solution.....	13
2.1 Pole of Sign board in Fast lane.....	13
2.1.1 Action Plan:	13
Short term:.....	13
Medium term:.....	13
Long term:.....	13
2.2 Open Nala.....	14
2.2.1 Action Plan:	14
Short term:.....	14
Medium term:.....	14
Long term:.....	14
2.3 Nagan Chowrangi BRT Station:.....	14
2.3.1 Action Plan:	15
Short Term:	15
Medium Term:.....	15
Long Term:	15
2.4 Victory Park:.....	18



2.4.1	Action Plan:	18
	Short Term:	18
	Medium Term:.....	18
	Long Term:	18
2.5	Five star Chowrangi:-	21
2.5.1	Action Plan:	21
	Short Term:	21
	Medium Term:.....	21
	Long Term:	21
Chapter 3: Road Safety Audit.....		24
3.1	Road Defects per Kilometer.....	24
3.1.1	Nagan to Lasbela.....	24
3.1.1.1	Chainage 0+000 to 1+000:.....	24
3.1.1.2	Chainage 1+000 to 2+000:.....	26
3.1.1.3	Chainage 2+000 to 3+000:.....	30
3.1.1.4	Chainage 3+000 to 4+000:.....	32
3.1.1.5	Chainage 4+000 to 7+000:.....	32
3.1.1.6	Chainage 7+000 to 8+000.....	33
3.1.1.7	Chainage 8+000 to 9+550.....	34
3.1.2	Lasbela to Nagan.....	35
3.1.2.1	Chainage 0+000 to 1+000.....	35
3.1.2.2	Chainage 1+000 to 2+000.....	36
3.1.2.3	Chainage 2+000 to 3+000.....	37
3.1.2.4	Chainage 3+000 to 4+000.....	38
3.1.2.5	Chainage 4+000 to 5+000.....	40
3.1.2.6	Chainage 5+000 to 6+000.....	40
3.1.2.7	Chainage 6+000 to 8+000.....	41
3.1.2.8	Chainage 8+000 to 9+550.....	42
3.2	Road Defect Table.....	43
3.3	Road Defect Map	46



3.3.1	Major defects:	46
3.3.2	Minor defects:.....	46
3.3.3	Critical defects:	46
Chapter 4 Traffic Analysis		48
4.1	Classified Volume Count:.....	48
4.2	Traffic Modelling:	49
4.2.1	Existing Travel Time:	49
4.2.2	Improved Travel Time:.....	50
Chapter 5: Conclusions and Recommendations.....		51
5.1	Most Critical Safety Issues.....	51
5.2	Benefits Of Implementing Solutions:	52
5.3	Post Crash Response:	52



List of Figures

Figure 1 Selected Segment of Sher Shah Suri and Nawab Siddique Ali Khan Road	9
Figure 2 Open Nala	14
Figure 3 Nagan Chowrangi BRT Station (Proposed).....	17
Figure 4 Victory Park (Proposed).....	20
Figure 5 Proposed Roundabout at Five Star Chowrangi.....	23
Figure 6 Detailed Defects of Sher Shah Suri and Nawab SAK Road with respect to chainage.....	45
Figure 7 Road Defect Map.....	47
Figure 8 Sher Shah Suri and Nawab S.A.K Road 3D traffic model.....	50



List of Tables

Table 1 Road features and elements.....	10
Table 2 Traffic Count.....	48
Table 3 Existing Travel Time obtained from Traffic Modelling.....	50
Table 4 Proposed Traffic Modelling (Travel Time Reduction).....	51

Executive Summary

Sher Shah Suri and Nawab S.A.K Road are two significant arterial roads in Karachi, Pakistan. The Sher Shah Suri Road is 5.6 kilometers long and Nawab S.A.K Road is 3.8 kilometers long which makes the whole section 9.4 kilometers in length. The whole section connects the city's center with Surjani Town.

For the Toyota Road Improvement Project, two arterials of approximately 9.4 km are selected. The first arterial, “Sher Shah Suri Road”, initiates from Nagan Chowrangi to A.O Clock Tower covering a distance of 5.6 km. While the second arterial, “Nawab S.A.K Road”, starts from A.O Clock Tower to Lasbela covering a distance of 3.8 km. The presence of Green Line Service and the arterial’s ability to connect North Karachi to CBD via M.A Jinaah Road, makes the chosen road very critical for evaluation. Because of the residential, commercial, and recreational land use on a substantial stretch of the route, the vehicle mix observed in this segment consists primarily of motorbikes, cars, and pick-up vans.

Various data collection methods were employed to identify the road defects and arising road safety concerns on the Sher Shah Suri and Nawab S.A.K Road. These included travel time surveys, traffic count surveys, road inventory surveys, and collecting accident data from the Sindh traffic police and RTIPC. The free flow travel time observed on the arterial is found to be approximately 11 minutes through the survey. Furthermore, it also provided the critical points where significant traffic congestion was observed which includes the segments present on Nazimabad Number 2, Golimar, and Lasbela. It depicts that the traffic generated for these locations is creating a contributing factor for congestion on the arterial. The primary objectives of the traffic count survey were to determine the current traffic volume of through traffic on the selected road segment. For this purpose, four locations were selected for traffic video count survey, including Baqai Station, Hyderi Station, Five Star Chowrangi and Erum Shopping Mall. The maximum volume for both directions was obtained at Baqai Station.

Problems including Pothole/Ditch, wrong-way movements, debris, and encroachment have been identified by going onsite and by using mosaic images from Google Earth as well. Two open nala have been observed in the section. First one was present between

Nagan Chowrangi and Erum Shopping Mall and the second one was near KDA Roundabout. These open nala have walls around them but they are damaged in different sections, which is too dangerous for the residents as well as the road users. Some amount of wrong-way movements are generated on U-Turns at Five Star Chowrangi and near Nazimabad Gymkhana. Sand debris is found on the left side of the road, next to Five Star Chowrangi. Parking and encroachment have been observed near Sakhi Hassan Road, Rizvia Chowrangi and Nadra Mega Centre. The major encroachments and parkings were observed from Golimar to Lasbela. The entire data was used to perform traffic modeling for evaluating existing travel time which was obtained as 20.87 minutes from Nagan Chowrangi to Lasbela while 21.5 minutes for opposite direction. After conducting a detailed analysis, we evaluated the road defects and proposed solutions for both geometric and traffic improvements to reduce existing travel time delays. Therefore, such issues must be dealt with proper road maintenance, adequate lane markings and movements to ensure smooth flow of traffic. One suggestion is to provide proper lane management and take anti-encroachment actions to increase the number of functional lanes

Some significant issues that were observed on the arterial was inadequate lane utilization due to road damage, unplanned infrastructure and encroachments. It has been deduced that the left most lane at Nazimabad Number 2 was primarily unutilized due to presence of uneven manholes and potholes as well as rutting on the road. It is also observed that the carriageway present at Nagan Chowrangi BRT Station shows severely narrowed width due to poorly planned placement of BRT pedestrian bridge and the dysfunctional service road. Furthermore, the bulging out of the Victory Park section near Nazimabad Gymkhana has significantly reduced the road width and has rendered the carriageway insufficient to accommodate through traffic, leading to congestion.

These traffic problems on Sher Shah Suri and Nawab S.A.K Road are crucial areas of attention. The rise in traffic volume, land encroachments, on-street parking, geometric design defects, and lack of effective traffic management measures have led to traffic congestion and safety concerns for all road users. Furthermore, some comprehensive solutions are required to address these issues, which involve modification and fixing of the roadway and pavements, relocating of BRT bridge, removal of service road from Nagan Chowrangi BRT Station, proper infrastructure planning, amending existing road

facilities, repairing walls of open nala, fixing of potholes and removing encroachments. By implementing these measures, it is possible to alleviate the traffic problem on Sher Shah Suri and Nawab S.A.K Road and improve the safety and efficiency of this critical arterial road that connects Shahrah-e- Usman to Nishtar Road, as shown in the table below.

LOCATIONS	COORDINATES	PROBLEMS IDENTIFIED	SOLUTIONS PROPOSED
Nagan Chowrangi BRT Station	24°57'56"N 67°04'01"E	<ul style="list-style-type: none"> •narrow carriageway •BRT pedestrian bridge obstruction •protruding mosque entrance •dysfunctional service road 	<ul style="list-style-type: none"> •removal of service road from side •BRT bridge endpoint extension
Sakhi Hasan Flyover Point of Commencement	24°57'21"N 67°03'32"E	<ul style="list-style-type: none"> •narrow width of adjacent road •protruding footpath •open nala 	<ul style="list-style-type: none"> •removal of footpath •redesigning of pedestrian bridge •construction of lane over nala •traffic lights
Sakhi Hasan Flyover Point of Termination	24°57'05"N 67°03'19"E	<ul style="list-style-type: none"> •narrow roadways •flared out flyover design 	<ul style="list-style-type: none"> •alignment of flyover •footpath reduction •traffic lights
Five Star Flyover Point of Commencement	24°56'41"N 67°02'57"E	<ul style="list-style-type: none"> •flared out flyover •narrow roadway •damaged pavement •debris accumulation 	<ul style="list-style-type: none"> •alignment of flyover kerb design •traffic lights •cleanup operation •footpath modification
Five Star Chowrangi	24°56'33.73"N, 67° 2'51.19"E	<ul style="list-style-type: none"> •redundant amount of islands •uneven intersection 	<ul style="list-style-type: none"> •proposed roundabout of 61.6 meters diameter
Victory Park	24°54'51"N 67°01'53"E	<ul style="list-style-type: none"> •wide gutter/ditches •narrow roadways 	<ul style="list-style-type: none"> •road leveling •relocating of building line •reduction of green belt

Chapter 1: Introduction

1.1 Study Area

Shahrah-e-Sher Shah Suri Road is a major arterial road located in the city of Karachi, Pakistan. The road is approximately 5.6 kilometers long and runs between Nagan and AO Clock Tower. Furthermore, the scope for this study is extended and 3.8-kilometer section of Nawab Siddique Ali Khan Road is also included as part of this report. Therefore, the total road length evaluated is 9.4 kilometers as shown in Figure 1.

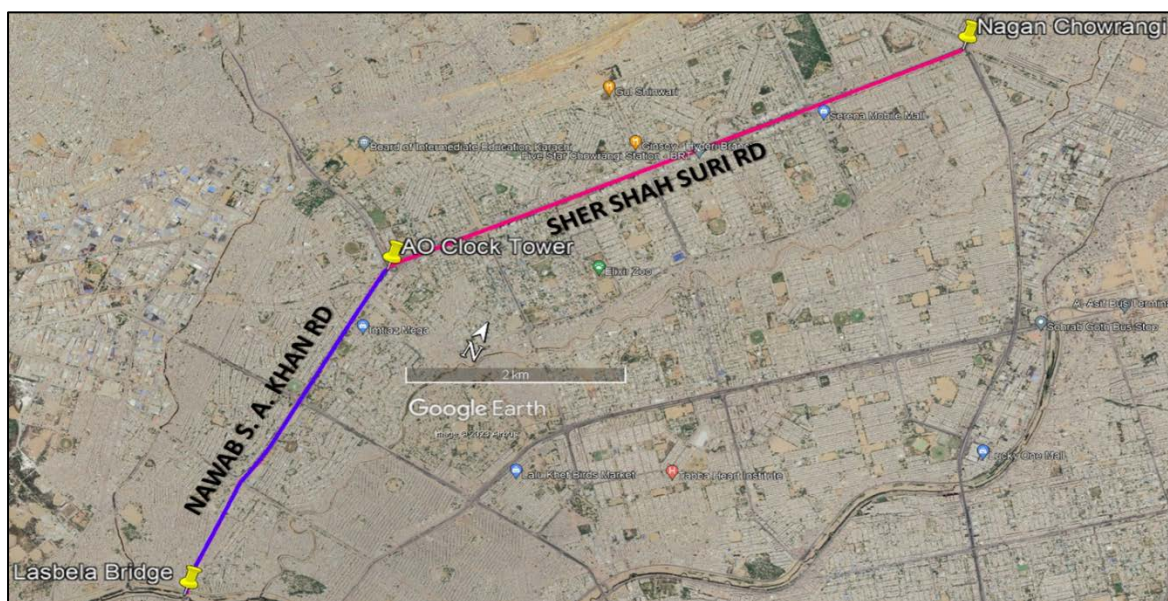


Figure 1 Selected Segment of Sher Shah Suri and Nawab Siddique Ali Khan Road

1.2 Surrounding Landuse

Shahrah-e-Sher Shah Suri and Nawab SAK Road is a significant route for commuters travelling to and from various parts of the city, including North Nazimabad, Surjani Town, and North Karachi. Karachi’s first Bus Rapid Transit service ‘Green Line BRT’ is also served on the route of this road. The selected segment of the road is lined with commercial and residential areas, including shopping centers, restaurants, and hospitals making it a vibrant and bustling area. Some significant landmarks present on this road are as follows:

1. Jamia Masjid Bahar-e-Madina
2. Erum Shopping Mall
3. Adnan Shopping Mall
4. Darbar Banquet
5. Lavish Banquet
6. NADRA Mega Center

- | | |
|---|--------------------------------|
| 7. Haleem Hospital | 15. Remedial Hospital |
| 8. Star City Shopping Mall | 16. Jamia Masjid Farooq-e-Azam |
| 9. Hyderi Market | 17. Crown Shopping Center |
| 10. Saifee Hospital | 18. Midway General Hospital |
| 11. Lifeline Hospital | 19. Baqai Hospital |
| 12. Euro Continental Tower | 20. Sindh Sports Board Complex |
| 13. National Institute of Dental Sciences | 21. Model Park |
| 14. Virtual University of Pakistan | 22. Jama Masjid Yousufi |
| | 23. Madina Masjid |

The above-mentioned landmarks on the Sher Shah Suri and Nawab SAK Road show that a significant proportion of motorcycle and cars would be observed in this segment. Many flyovers are also present on the road to cater the capacity of the high number of vehicles.

1.3 Traffic Mix

The traffic mix on this road predominantly includes motorcycles, cars, and rickshaws, categorized as light vehicles, along with public buses. The presence of the BRT Green Line further highlights its importance as a vital transportation corridor in Karachi's urban landscape, serving as a critical artery for both private and public commuters.

1.4 Elements Affecting Safety

The detailed characteristics and features of the N5 highway which are affecting road safety are presented in Table 1.

Table 1 Road features and elements

Parameters	Details
Road Carriageway	The number of lanes maximum is 6. But the amount of traffic lanes varies throughout the road. But due to parking/encroachment on some sections of the road the actual number of lanes have been reduced.
Geometry	There is no median present on the whole section because Green Line BRT is constructed on the medians of the entire road.
Parking Spaces	Most of the service road as well as a few sections of roads is used for parking vehicles.

Bridge	Lasbela Bridge.
Flyovers	Four Flyovers near Eidgah, KDA, Five-star Chowrangi, Sakhi Hassan.
Pedestrian Bridges	Normal: ten; BRT: seven
U-Turns	Ten U-turns as shown in Error! Reference source not found..
Intersections	Five Major and No Minor Intersections as shown in Error! Reference source not found..
Roundabout	Two roundabouts of Sakhi Hassan, and K.D.A,
Road Markings	Faded Lane Markings.
Traffic Signage	Less amount of traffic signage.
Signals	None.
Land use Type	Mixed land use type includes a significant amount of residential and commercial areas as well as recreational areas.

1.5 Types of Solutions

1.5.1 Short term

The term "short term" is used in this context to emphasize actions that can be implemented quickly to address immediate concerns. In the case of road defects, such as potholes, cracks, or damaged signs, prompt repairs are necessary to prevent accidents, injuries, and further deterioration of the infrastructure. These short-term solutions focus on addressing the most pressing issues to ensure the continued safety and usability of the road network in the immediate future. They are typically temporary fixes meant to provide immediate relief while more extensive repairs or long-term solutions are planned and executed.

1.5.2 Medium Term

In the context of road maintenance and infrastructure management, "medium term" refers to solutions and actions that are implemented over a somewhat longer timeframe compared to short-term measures but are still relatively prompt and actionable. Medium-term solutions typically involve more comprehensive repairs and upgrades that address underlying issues and contribute to the overall improvement and sustainability of the road network. This may include activities such as resurfacing worn-

out pavement, repairing or reconstructing damaged sections of the road, upgrading drainage systems, or replacing outdated infrastructure components. While medium-term solutions may require more time, resources, and planning compared to short-term fixes, they are essential for addressing persistent issues, improving road conditions, and extending the lifespan of the infrastructure. These measures are crucial for ensuring the continued functionality, safety, and efficiency of the road network over an intermediate period.

1.5.3 Long Term

In the context of road maintenance and infrastructure management, "long term" refers to solutions and strategies that are implemented over an extended period, typically spanning years or even decades. Long-term solutions focus on addressing fundamental challenges and improving the overall resilience, sustainability, and efficiency of the road network. These solutions often involve significant investments in infrastructure upgrades, comprehensive planning, and the implementation of proactive maintenance programs. Long-term measures may include activities such as redesigning road layouts for better traffic flow, implementing advanced materials and construction techniques for enhanced durability, integrating smart technologies for real-time monitoring and management, and establishing sustainable funding mechanisms for ongoing maintenance and improvements. While long-term solutions require substantial resources, coordination, and commitment, they are essential for ensuring the long-term viability and effectiveness of the road network, enhancing safety, reducing environmental impacts, and supporting economic growth and development.

Chapter 2: Critical Sites and their Solution

2.1 Pole of Sign board in Fast lane

The Pole of the Sign board is being erected in the middle of the fast lane while moving from Sakhi Hassan to Nagan Chowrangi. While many accident are being occurred because of a unexpected sign board at the fast lane because the users are expecting to increase the speed of the vehicle to move upwards at the Nagan Flyover.



Figure 4 Pole in the fast lane before Nagan Chowrangi flyover.

2.1.1 Action Plan:

Short term: Utilization of reflectors, Proper signage of this pole at least 100 meter before.

Medium term: Not applicable

Long term: Remove this pole and proper design of the signage shall be done than this kind of pole doesn't come in between of lanes.

2.2 Open Nala

Open Nala has been observed In between Nagan Chowrangi to Sakhi Hassan Flyover. The serious hazard in footpath of service road with the main road which cause difficulty for it's users due to which they have to walk on main road. Furthermore, some more parts of footpath on the service road present from Nagan Chowrangi to Lasebela bridge Nala are not properly covered and no street lightning is provided therefore it causing potential of accident.

2.2.1 Action Plan:

Short term: Not applicable.

Medium term: The medium-term solution for broken wall of Nala is to pace NJ barriers to cover the opening.

Long term: The long-term solution is to construct a protective wall.

Figure 2 Open Nala

2.3 Nagan Chowrangi BRT Station:

The Nagan Chowrangi BRT station there are two unequal carriageway widths i.e. 60 ft and 30 ft. The carriageway leading towards Nagan Chowrangi is visibly and severely narrowed which poses a great challenge for the road users due to its reduced width of mere 30.0 ft leading to potential traffic problems.



2.3.1 Action Plan:

The action plan has been divided into short-, medium-, and long-term solutions.

Short Term: Not applicable.

Medium Term: Not applicable.

Long Term: Increase the width of carriageway by taking the portion of service road and also relocate the pedestrian bridge of BRT

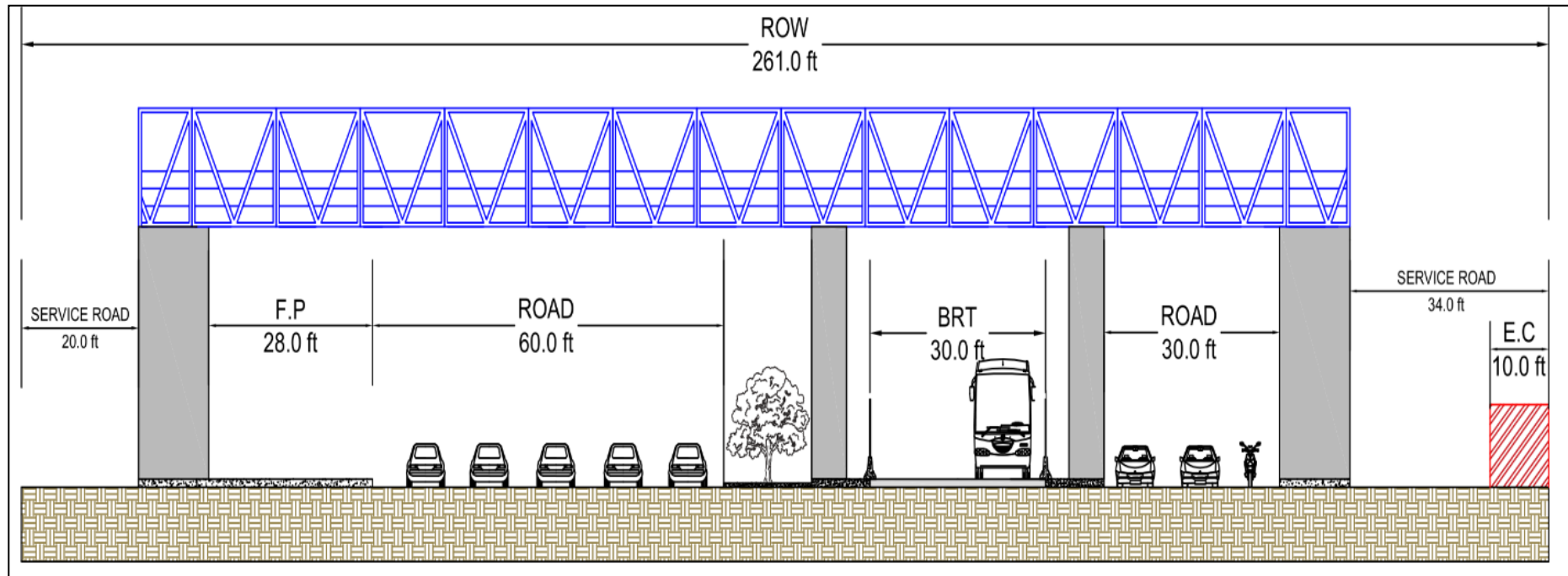


Figure 8 Cross-section of Nagan Chowranghi BRT Station

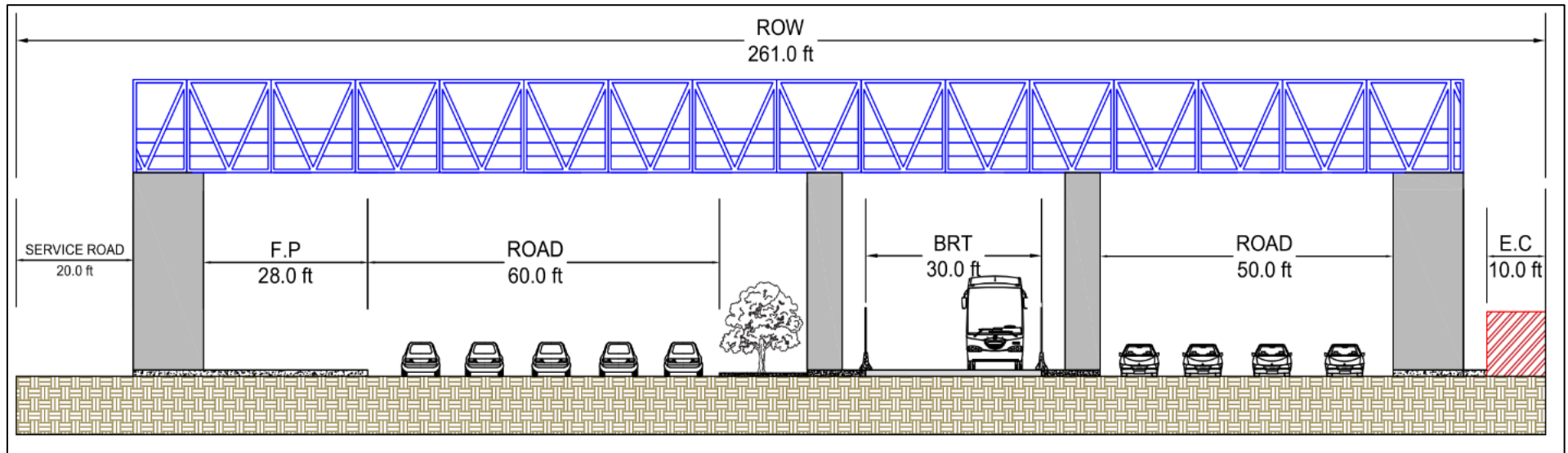


Figure 3 Nagan Chowranghi BRT Station (Proposed)

2.4 Victory Park:

The carriageway has a narrow width of 32 feet on the way towards Lasbela caused by a section of victory park bulging out into this stretch of the road. This reduces the effective width of the carriageway to 25 feet. Similarly, the opposite direction i.e, towards Nagan is only 35 ft and is not wide enough to serve the growing needs of vehicular traffic in the area, such it requires warranting immediate action.

2.4.1 Action Plan:

The action plan has been divided into short-, medium-, and long-term solutions.

Short Term: Not applicable.

Medium Term: Not applicable.

Long Term: Widen the carriageway width by cutting the footpath

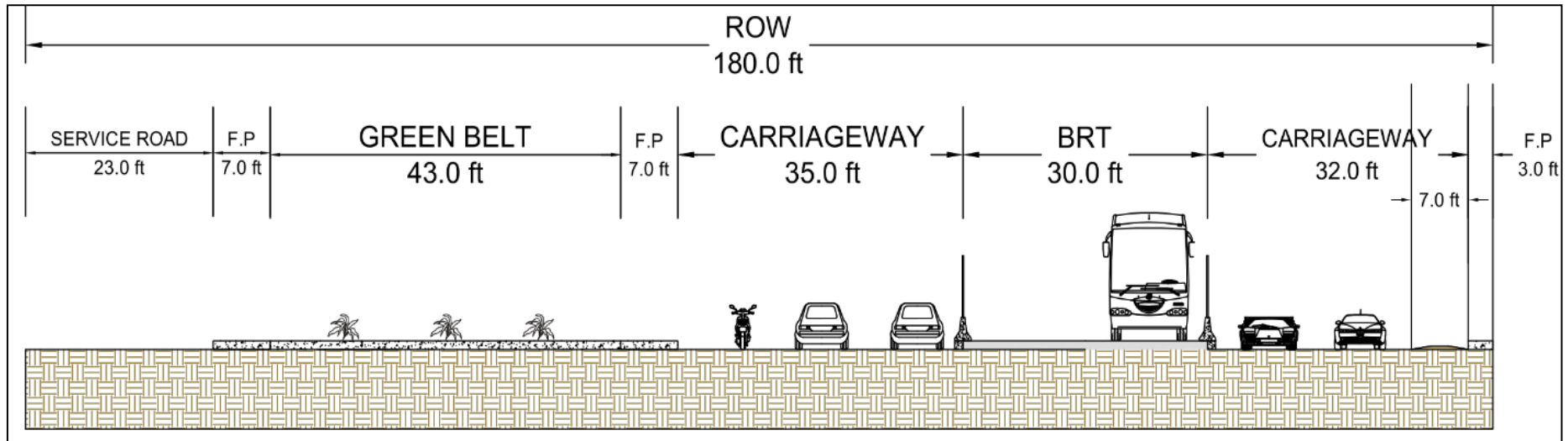


Figure 9. Cross-section of existing Victory Park Road

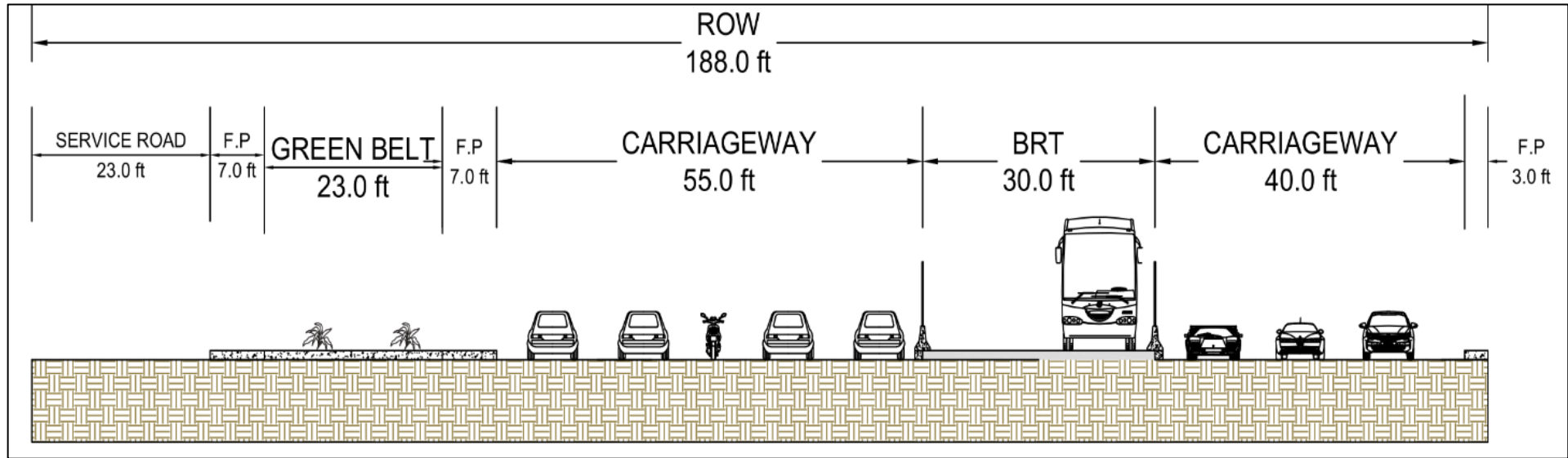


Figure 4 Victory Park (Proposed)

2.5 Five star Chowrangi:-

The intersection located beneath the flyover at Five-star Chowrangi has too many improper and redundant islands, along with a circular rotary of inadequate or no proper diameter. This situation causes a significant number of vehicles to halt at the intersection, resulting in congestion and ultimately reducing the speed of traffic.

2.5.1 Action Plan:

The action plan has been divided into short-, medium-, and long-term solutions.

Short Term: Not applicable.

Medium Term: Not applicable.

Long Term: Proper Channelization of Intersection/ Roundabout Design

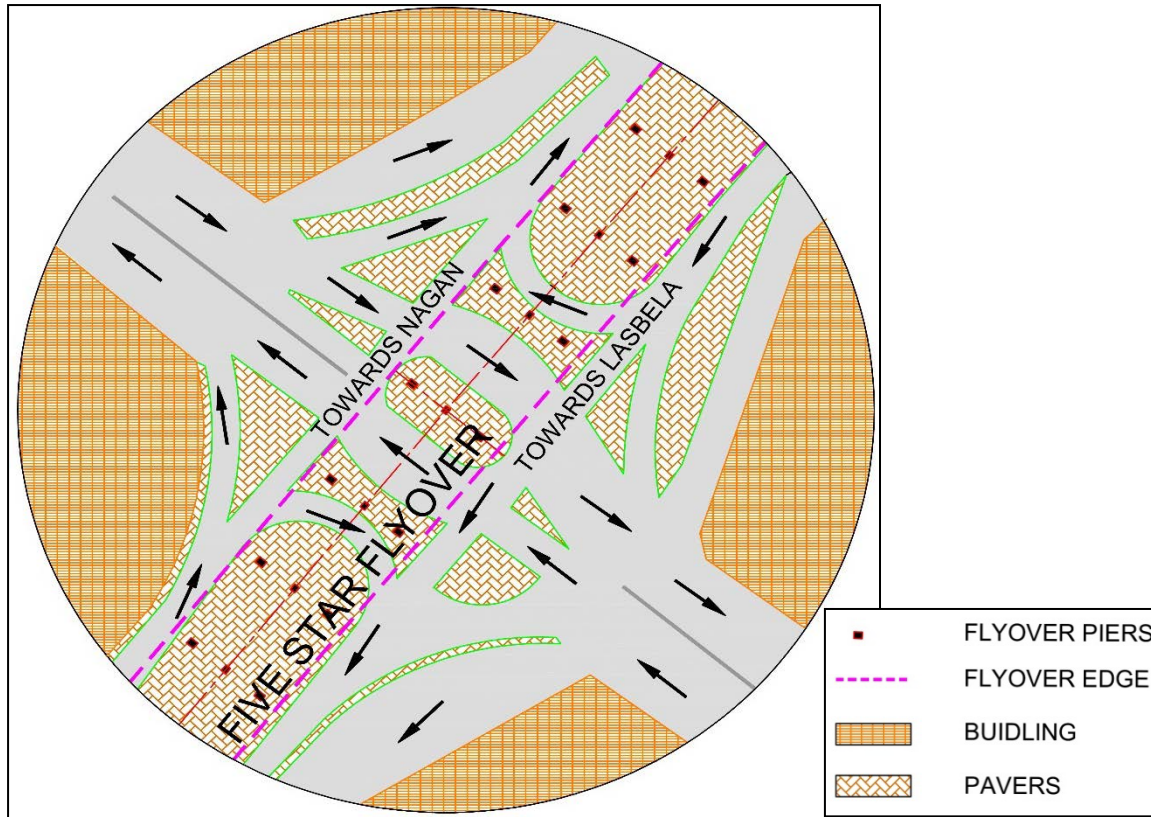


Figure 10. Existing Five Star Chowrangi.

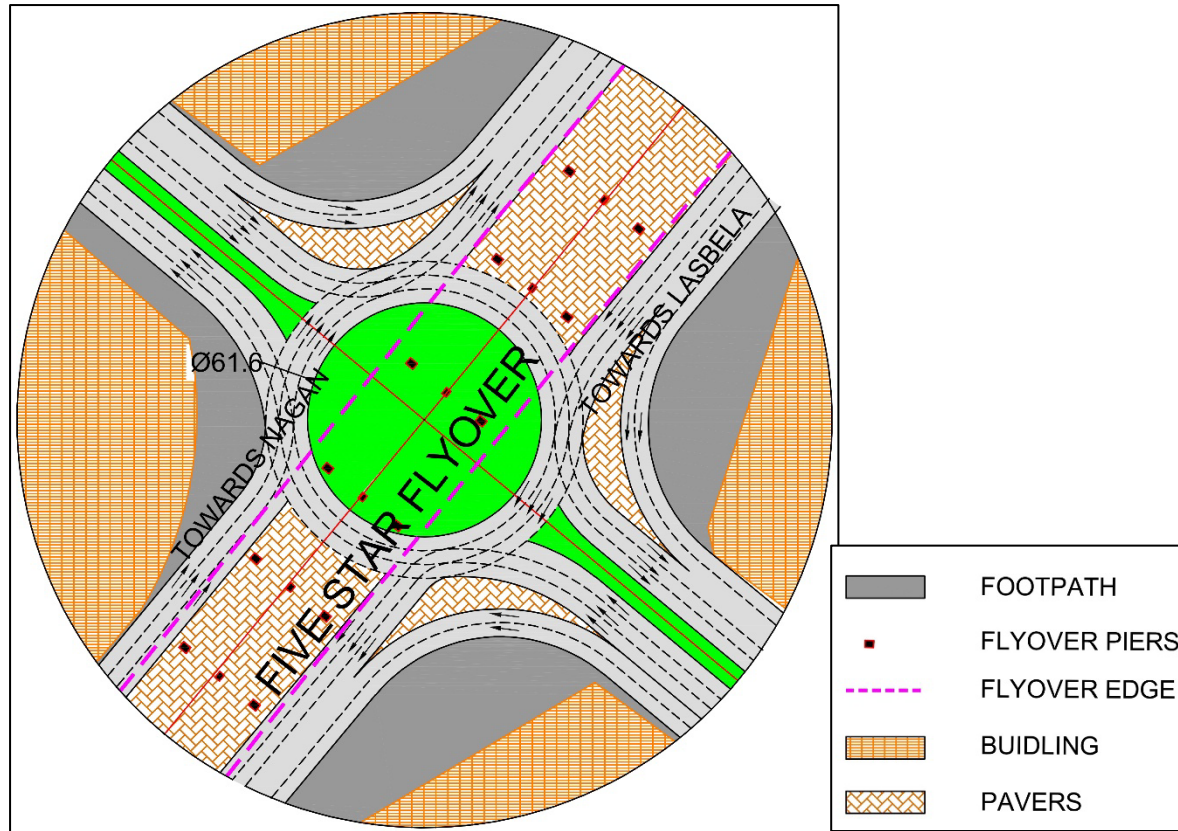


Figure 5 Proposed Roundabout at Five Star Chowrangi

Chapter 3: Road Safety Audit

3.1 Road Defects per Kilometer

3.1.1 Nagan to Lasbela

3.1.1.1 Chainage 0+000 to 1+000:

Defect	Number of Defect
Pothole/Ditces	7
Pedestrian Bridge extruding on fast lane	1

Defect Identified: Pothole/Ditches





Action Plan:

The action plan has been divided based on short-term, medium-term, and long-term solutions.

Short term: The short-term solution for potholes is to fill them.

Medium term: Not applicable

Long term: The long-term solution for potholes is to perform surfacing or overlay of the road surface.

Defect Identified: Pedestrian Bridge extruding on fast lane



Action Plan:

Short term: The short-term solution for the pedestrian bridge extruding onto the fast lane involves installing proper cat eyes and yellow markings for the road edge, along with fluorescent paint or sheeting, as well as road narrow ahead signage.

Medium term: Not applicable

Long term: The long-term solution for the pedestrian bridge extruding onto the fast lane is to implement chamfered medians.

3.1.1.2 Chainage 1+000 to 2+000:

Defect	Number of Defect
Pothole/Ditces	4
Pedestrian Bridge extruding on fast lane	1
Open Nala	1

Defect Identified: Pothole/Ditches





Action Plan:

The action plan has been divided based on short-term, medium-term, and long-term solutions.

Short term: The short-term solution for potholes is to fill them.

Medium term: Not applicable

Long term: The long-term solution for potholes is to perform surfacing or overlay of the road surface.

Defect Identified: Pedestrian Bridge extruding



Action Plan:

Short term: The short-term solution for the pedestrian bridge extruding onto the fast lane involves installing proper cat eyes and yellow markings for the road edge, along with fluorescent paint or sheeting, as well as road narrow ahead signage.

Medium term: Not applicable

Long term: The long-term solution for the pedestrian bridge extruding onto the fast lane is to implement chamfered medians.

Defect Identified: Open Nala



Action Plan:

Short term: Not applicable.

Medium term: The medium-term solution for broken wall of Nala is to place NJ barriers to cover the opening.

Long term: The long-term solution is to construct a protective wall.

3.1.1.3 Chainage 2+000 to 3+000:

Defect	Number of Defect
Illegal Parking	1
Pothole	3
Debris	1

Defect Identified: Illegal Parking



Action Plan:

Short term: Police challan.

Medium term: Not applicable

Long term: Providing proper parking for vehicle.

Defect Identified: Debris on Service Road



Action Plan:

Short term: Increase frequency of road cleaning operations, deploy street sweepers regularly.

Medium term: Not applicable

Long term: Not applicable.

Defect Identified: Pothole/Ditches



Action Plan:

The action plan has been divided based on short-term, medium-term, and long-term solutions.

Short term: The short-term solution for potholes is to fill them.

Medium term: Not applicable

Long term: The long-term solution for potholes is to perform surfacing or overlay of the road surface.

3.1.1.4 Chainage 3+000 to 4+000:

No Defect Found

3.1.1.5 Chainage 4+000 to 7+000:

Defect	Number of Defect
Pothole	3

Defect Identified: Pothole/Ditches



Action Plan:

The action plan has been divided based on short-term, medium-term, and long-term solutions.

Short term: The short-term solution for potholes is to fill them.

Medium term: Not applicable

Long term: The long-term solution for potholes is to perform surfacing or overlay of the road surface.

3.1.1.6 Chainage 7+000 to 8+000

Defect	Number of Defect
Pothole	4

Defect Identified: Pothole/Ditches



Action Plan:

The action plan has been divided based on short-term, medium-term, and long-term solutions.

Short term: The short-term solution for potholes is to fill them.

Medium term: Not applicable

Long term: The long-term solution for potholes is to perform surfacing or overlay of the road surface.

3.1.1.7 Chainage 8+000 to 9+550

Defect	Number of Defect
Pothole	1

Defect Identified: Pothole/Ditches



Action Plan:

The action plan has been divided based on short-term, medium-term, and long-term solutions.

Short term: The short-term solution for potholes is to fill them.

Medium term: Not applicable

Long term: The long-term solution for potholes is to perform surfacing or overlay of the road surface.

3.1.2 Lasbela to Nagan

3.1.2.1 Chainage 0+000 to 1+000

Defect	Number of Defect
Illegal Parking	2

Defect Identified: Illegal Parking





Action Plan:

Short term: Police challan.

Medium term: Not applicable

Long term: Providing proper parking for vehicle.

3.1.2.2 Chainage 1+000 to 2+000

Defect	Number of Defect
Illegal Parking	2

Defect Identified: Illegal Parking





Action Plan:

Short term: Police challan.

Medium term: Not applicable

Long term: Providing proper parking for vehicle.

3.1.2.3 Chainage 2+000 to 3+000

Defect	Number of Defect
Debris	2

Defect Identified: Debris





Action Plan:

Short term: Increase frequency of road cleaning operations, deploy street sweepers regularly.

Medium term: Not applicable

Long term: Not applicable.

3.1.2.4 Chainage 3+000 to 4+000

Defect	Number of Defect
Pothole/Ditches	1
Illegal Parking	1

Defect Identified: Pothole/Ditches



Action Plan:

The action plan has been divided based on short-term, medium-term, and long-term solutions.

Short term: The short-term solution for potholes is to fill them.

Medium term: Not applicable

Long term: The long-term solution for potholes is to perform surfacing or overlay of the road surface.

Defect Identified: Illegal Parking



3.1.2.5 Chainage 4+000 to 5+000



Action Plan:

Short term: Police challan.

Medium term: Not applicable

Long term: Providing proper parking for vehicle.

3.1.2.6 Chainage 5+000 to 6+000

Defect	Number of Defect
Pothole/Ditches	1

Defect Identified: Pothole/Ditches



Action Plan:

The action plan has been divided based on short-term, medium-term, and long-term solutions.

Short term: The short-term solution for potholes is to fill them.

Medium term: Not applicable

Long term: The long-term solution for potholes is to perform surfacing or overlay of the road surface.

3.1.2.7 Chainage 6+000 to 8+000

Defect	Number of Defect
Pothole/Ditches	1

Defect Identified: Pothole/Ditches



Five Star Chowrangi

Action Plan:

The action plan has been divided based on short-term, medium-term, and long-term solutions.

Short term: The short-term solution for potholes is to fill them.

Medium term: Not applicable

Long term: The long-term solution for potholes is to perform surfacing or overlay of the road surface.

3.1.2.8 Chainage 8+000 to 9+550

Defect	Number of Defect
Pole in fast Lane	1

Defect Identified: Pole in fast lane



Action Plan:

Short term: Utilization of reflectors, Proper signage of this pole at least 100 meter before.

Medium term: Not applicable

Long term: Remove this pole and proper design of the signage shall be done than this kind of pole doesn't come in between of lanes.

3.2 Road Defect Table

Figure 6 shows the detailed faults of Sher Shah Suri and Nawab SAK Road with respect to their chainage. For the entire route journey in both directions from Lasbela to Nagan Chowrangi, the road is divided into 20 stations. Not all sections had proper lane markings. Pavement markings help drivers and pedestrians to be aware of their lane and direction of travel, which reduces the likelihood of accidents and traffic jams. Footpaths and other pavement markings can provide important landmarks that help pedestrians navigate the road more safely and confidently. In the remaining 50% of locations, corner tracks/lanes are either encroached or in poor conditions due to uneven manholes and potholes, reducing the capacity of the section, which in turn creates traffic congestion. Most sections have no signs along the entire route. Signages provide important safety information such as road condition warning signs, speed limit signs, U-turn signs and stop signs. This helps ensure that drivers are aware of potential hazards on the road and can take the necessary measures to avoid accidents. More than



half of the entire section of the route has holes and open ditches, and some potholes are badly damaged and turned into ditches. These potholes and ditches are dangerous for drivers as they can cause them to lose control of their vehicle, especially at high speeds. Punctures in roads can damage a vehicle's tires, wheels and suspension, causing expensive repairs and potentially dangerous accidents. They can also cause drivers to swerve suddenly and potentially hit other vehicles or pedestrians.

S.NO	Location	Station	Lanes		Geometry/Alignment	Signage	Marking	Calming	Pedestrian Crossing	Road Defects					
			Functional	Actual						Pothole	Ditch	Manhole	Encroachmen	Rut	Other
NAGAN CHOWRANGI TO LASBELA BRIDGE															
1	Nagan Chowrangi	0+000	3	4	Straight	Signage	FADED	N/A	✓	✗	✓	✓	✓	✓	N/A
2	Erum Shopping Mall Station	0+800	2	3	Straight	Signage	N/A	N/A	✓	✓	✗	✗	✗	✗	N/A
3	Sakhi Hasan Flyover	1+148.91	4	4	Point Of Commencement Of Bridge	✗	N/A	N/A	✗	✓	✓	✗	✗	✗	N/A
4	Sakhi Hasan Roundabout	1+436.04	5	5	Roundabout	Signage	N/A	N/A	✓	✓	✓	✗	✓	✗	N/A
5	Sakhi Hasan Flyover	1+734.82	4	4	Point Of Termination Of Bridge	N/A	FADED	N/A	✗	✓	✓	✗	✗	✗	N/A
6	Five Star Chowrangi Station	2+593.12	3	3	Straight	N/A	N/A	N/A	✓	✓	✓	✗	✓	✓	N/A
7	Five Star Chowrangi Flyover	2+807.79	3	4	Point Of Commencement Of Bridge	N/A	FADED	N/A	✗	✓	✓	✗	✓	✗	DEBRIS
8	Five Star Chowrangi	3+061.21	4	5	Intersection	Signage	FADED	N/A	✗	✓	✗	✗	✗	✗	N/A
9	Five Star Chowrangi Flyover	3+421.7	4	4	Point Of Termination Of Bridge	Signage	FADED	N/A	✓	✗	✗	✗	✗	✗	N/A
10	Hyderi Station	3+915.19	4	4	Straight	N/A	N/A	N/A	✓	✗	✗	✗	✗	✗	N/A
11	KDA Flyover	4+389.64	4	4	Point Of Commencement Of Bridge	N/A	FADED	N/A	✗	✓	✓	✗	✗	✓	N/A
12	KDA Roundabout	4+676.18	4	5	Roundabout	N/A	N/A	N/A		✓	✗	✗	✗	✓	N/A
13	KDA Flyover	4+962.93	3	4	Point Of Termination Of Bridge	N/A	N/A	N/A	✗	✗	✗	✗	✗	✗	N/A
14	Abdul Sattar Edhi Station	5+597.56	3	3	Straight	Signage	FADED	N/A	✓	✓	✗	✗	✗	✗	N/A
15	Nazimabad Gymkhana Cricket Ground	6+504.78	3	4	Straight	N/A	N/A	N/A	✓	✓	✓	✗	✓	✗	N/A
16	Eidgah Flyover	6+858.69	4	4	Point Of Commencement Of Bridge	N/A	N/A	N/A	✗	✓	✗	✗	✗	✗	N/A
17	Nazimabad No 2 Intersection	7+156.61	3	4	Intersection	Signage	N/A	N/A	✗	✓	✓	✗	✗	✗	N/A
18	Eidgah Flyover	7+502.79	2	3	Point Of Termination Of Bridge	N/A	N/A	N/A	✓	✓	✗	✗	✓	✗	N/A
19	Rizvia Chowrangi	8+352.79	2	3	Intersection	N/A	N/A	N/A	✓	✓	✗	✗	✗	✗	N/A
20	Lasbela Bridge	9+550.58	1.5	3	Straight	N/A	N/A	N/A	✗	✓	✗	✗	✗	✓	N/A
LASBELA BRIDGE TO NAGAN CHOWRANGI															
1	Lasbela Bridge	0+00	1.5	3	Straight	N/A	N/A	N/A	✗	✓	✗	✗	✗	✗	N/A
2	Rizvia Chowrangi	1+197.79	2	3	Intersection	N/A	N/A	N/A	✓	✓	✗	✗	✓	✗	N/A
3	Eidgah Flyover	2+047.79	2	3	Point Of Commencement Of Bridge	N/A	FADED	N/A	✓	✗		✗	✓	✗	N/A
4	Nazimabad No 2 Intersection	2+393.97	3	4	Intersection	Signage	FADED	N/A	✗	✓	✓	✗	✗	✗	N/A
5	Eidgah Flyover	2+691.89	2	4	Point Of Termination Of Bridge	N/A	N/A	N/A	✓	✗	✗	✗	✗	✗	N/A
6	Nazimabad Gymkhana Cricket Ground	3+045.8	3	3	Straight	N/A	N/A	N/A	✓	✓	✗	✗	✗	✗	N/A
7	Abdul Sattar Edhi Station	3+953.8	4	4	Straight	N/A	FADED	N/A	✓	✗	✗	✗	✓	✗	N/A
8	KDA Flyover	4+587.65	4	4	Point Of Commencement Of Bridge	N/A	FADED	N/A	✗	✗	✗	✗	✗	✗	N/A
9	KDA Roundabout	4+874.4	4	5	Roundabout	N/A	N/A	N/A	✗	✓	✗	✗	✗	✓	DEBRIS
10	KDA Flyover	5+160.94	4	4	Point Of Termination Of Bridge	N/A	N/A	N/A	✓	✗	✗	✗	✗	✗	N/A
11	Hyderi Station	5+635.39	4	4	Straight	N/A	N/A	N/A	✓	✓	✗	✗	✗	✓	N/A
12	Five Star Chowrangi Flyover	6+128.88	4	4	Point Of Commencement Of Bridge	N/A	FADED	N/A	✓	✗	✗	✗	✗	✗	N/A
13	Five Star Chowrangi	6+489.37	4	4	Intersection	Signage	FADED	N/A	✗	✓	✓	✗	✗	✗	N/A
14	Five Star Chowrangi Flyover	6+742.79	3	4	Point Of Termination Of Bridge	Signage	FADED	N/A	✓	✗	✗	✗	✗	✗	N/A
15	Five Star Chowrangi Station	6+957.46	4	4	Straight	Signage	N/A	N/A	✓	✗	✗	✗	✗	✓	N/A
16	Sakhi Hasan Flyover	7+815.69	4	4	Point Of Termination Of Bridge	N/A	FADED	N/A	✓	✗	✗	✗	✗	✗	N/A
17	Sakhi Hasan Roundabout	8+114.47	5	5	Roundabout	Signage	FADED	N/A	✗	✗	✗	✗	✓	✗	N/A
18	Sakhi Hasan Flyover	8+401.6	4	4	Point Of Commencement Of Bridge	✗	N/A	N/A	✗	✓	✗	✗	✗	✓	N/A
19	Erum Shopping Mall Station	8+750.51	2	3	Straight	Signage	N/A	N/A	✓	✓	✗	✗	✗	✗	POLE ON ROAD
20	Nagan Chowrangi	9+550.51	3	4	Straight	✗	N/A	N/A	✓	✗	✓	✓	✓	✓	N/A

Figure 6 Detailed Defects of Sher Shah Suri and Nawab SAK Road with respect to chainage

3.3 Road Defect Map

A "Road Defect Map" is a visual representation of road conditions, highlighting areas with various types of defects such as potholes, cracks, pavement deterioration, and other issues. This map provides valuable information for transportation authorities, road maintenance teams, and the general public to identify areas in need of repair or improvement. By pinpointing specific locations and types of defects, the Road Defect Map helps prioritize maintenance efforts and allocate resources efficiently to address road infrastructure challenges. It is characterized with respect to the number of defects found on the road segment which is divided into one kilometer of road section.

3.3.1 Major defects:

Major defective sections have been observed on Sher Shah and Nawab SA, indicating the presence of road defects along segments divided into 1.0 kilometers. Several sections are affected, including the segment from the Erum Shopping Mall BRT Station to the Five Star Chowrangi.

3.3.2 Minor defects:

Minor defective sections have been observed on Sher Shah and Nawab SA, indicating the presence of road defects along segments divided into 1.0 kilometers. Several sections are affected, including the segment from the Five Star to Lasbela Bridge.

3.3.3 Critical defects:

Critically defective sections have been observed on Sher Shah and Nawab SA, indicating the presence of road defects along segments divided into 1.0 kilometers. Several sections are affected, including the segment from the Nagan Chowrangi to Erum Shopping Mall BRT Station.

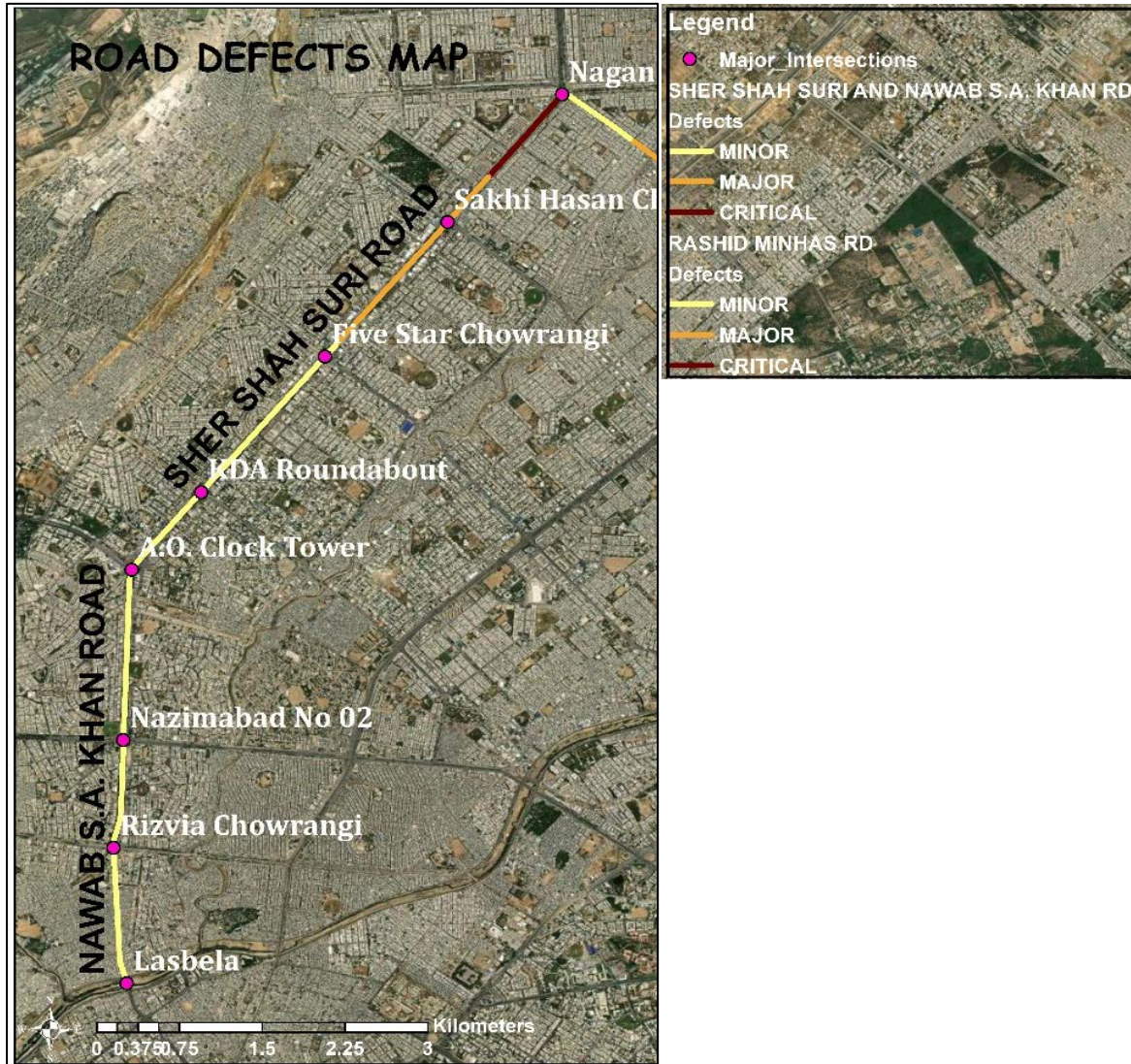


Figure 7 Road Defect Map

Chapter 4 Traffic Analysis

4.1 Classified Volume Count:

Traffic count survey is conducted on major corridors which provides the midblock or through traffic volumes at intersections; it provides the delays and capacity. The main objectives of the traffic count survey are to obtain the existing traffic volume on the major corridors, to analyze the existing traffic condition, to calibrate the existing Origin Destination matrices, and to obtain the turning movement of vehicles at major intersections and squares.

This survey was conducted from 7:00 am in the morning to 8:00 pm in the evening. The obtained data was analyzed for two peak periods with each having 3 hours of traffic data i.e. morning period (7:00 am to 10:00 am) and the evening period (5:00 pm to 8:00 pm). For this project, traffic cameras were used to obtain the data for traffic volumes, and speed of the road. Only through movement was critically observed to determine the congestion points, volume, and speed of the road. Four pedestrian bridges near Green Line Stations were selected to mount the camera including Baqai Station, Hyderi Station, Five Star Chowrangi Station, and Erum Shopping Mall Station. These locations were selected based on the analysis performed in the travel time survey. The vehicles are divided into seven categories including cars, motorcycles, rickshaws, pickup vans, buses, minibuses, and trucks. Table 2 represents the data of Traffic volume count of 4 different locations during morning and evening peaks towards Nagan and away from Nagan, respectively.

Table 2 Traffic Count

Location	Direction	Motorcycle	Car	Rickshaw	Pickup	Minibuses	Bus	Truck	Total
BAQI STATION	Morning Peak	26827	4699	796	2405	105	56	165	35064
	Evening Peak	24400	7908	2137	3485	735	82	328	39071
HYDERI STATION	Morning Peak	24400	7908	2137	3485	735	82	328	35947
	Evening Peak	29157	2987	306	2229	579	219	446	45826

FIVE STAR CHOWRANGI	Morning Peak	21215	5997	1251	2984	363	138	203	32154
	Evening Peak	25283	7446	2704	5264	207	257	240	41414
ERUM SHOPPING MALL	Morning Peak	16520	5365	976	3137	919	101	149	27180
	Evening Peak	30682	4703	4554	4184	592	267	185	45181

4.2 Traffic Modelling:

Traffic modelling is performed to evaluate and predict the existing and proposed scenarios for the road of Sher Shah Suri and Nawab S.A.K Road. 3D models of traffic flow are used to evaluate the existing travel time and compare it with the travel time after implementation of proposed solutions. This process of traffic modelling is a highly effective method for evaluating the impact of various transportation infrastructure options and identifying the transportation system's expected future performance.

4.2.1 Existing Travel Time:

Table 3 illustrates the travel time from Lasbela to Nagan Chowrangi, for a detailed analysis of travel time. Initially, the travel time under free flow conditions was calculated, and then the current travel time was determined using VISSIM software. The difference between the current travel time is 9.87 min more towards Lasbela. For the direction towards Nagan the current travel time is 10.5 mins more than the free flow travel time.



Figure 8 Sher Shah Suri and Nawab S.A.K Road 3D traffic model

Table 3 Existing Travel Time obtained from Traffic Modelling

Distance (km)	Posted Speed Limit (kmph)	Free Flow Travel Time (min)	Current Travel Time (min)
NAGAN TO LASBELA			
9.4	60	11	20.87
LASBELA TO NAGAN			
9.4	60	11	21.5

4.2.2 Improved Travel Time:

Table 4 presents the results of traffic modelling after implementing the proposed solution. It compares the current and travel times after implementing the proposed solution. The results indicate an overall reduction of 22.7% in travel time in the route of Nagan to Lasbela. For the segment of Lasbela to Nagan, the reduction in travel time is observed 21.62%. The table provides quantitative evidence that the proposed solution effectively reduces travel time and improves traffic flow along the route. Further analysis and evaluation may be necessary to determine the proposed solution's long-term impact and identify any potential limitations or challenges that may arise.

Table 4 Proposed Traffic Modelling (Travel Time Reduction)

Distance (km)	Current Travel Time (min)	Travel Time After Proposed Solutions (min)	Percentage of Travel Time Reduced
NAGAN TO LASBELA			
9.4	20.87	16.13	22.7%
LASBELA TO NAGAN			
9.4	21.5	16.85	21.62%

Chapter 5: Conclusions and Recommendations

5.1 Most Critical Safety Issues

The Sher Shah Suri and Nawab S.A.K Road, serving as a vital artery connecting North Karachi to the CBD via M.A Jinnah Road, grapple with a plethora of critical safety issues that warrant urgent attention. One pressing concern is the encroachment of land, which diminishes available road space, impedes traffic flow, and creates hazards for motorists and pedestrians alike. Moreover, unauthorized on-street parking exacerbates congestion, obstructs visibility, and heightens accident risks. The presence of open nalas along the roadway poses a significant danger, especially during heavy rainfall, threatening the safety of pedestrians and two-wheeler riders. Additionally, deteriorating road conditions, characterized by potholes, uneven surfaces, and inadequate road markings, contribute to discomfort for commuters and increase accident probabilities, particularly for motorcyclists and cyclists. Geometric design defects further compound safety risks, with sharp curves, inadequate lane widths, and poorly designed intersections posing hazards for all road users. Addressing these multifaceted safety challenges necessitates a comprehensive approach, encompassing infrastructure improvements, rigorous enforcement of regulations, public awareness

campaigns, and community engagement initiatives to ensure the safety and functionality of Sher Shah Suri and Nawab S.A.K Road for all.

5.2 Benefits Of Implementing Solutions:

Implementing comprehensive solutions to address the myriad safety issues on Sher Shah Suri and Nawab S.A.K Road promises a multitude of benefits for both road users and the broader community. Firstly, resolving issues such as encroached land, on-street parking, and open nalas will alleviate traffic congestion, enhancing the efficiency of travel and reducing commute times for motorists and pedestrians alike. This improved traffic flow not only reduces frustration among commuters but also lowers the risk of accidents and collisions, thus enhancing overall safety. Additionally, addressing deteriorating road conditions through infrastructure upgrades will result in smoother and safer travel, reducing vehicle wear and tear and minimizing the likelihood of accidents caused by road defects. Moreover, rectifying geometric design defects will enhance the road's safety profile, reducing the occurrence of accidents at intersections and points of conflict. Beyond safety improvements, these interventions will also have positive socio-economic impacts, such as boosting local businesses by facilitating easier access for customers and enhancing the overall quality of life for residents in the vicinity. Furthermore, by promoting sustainable transportation modes and reducing environmental pollution, these solutions contribute to a greener and more sustainable urban environment. Overall, the implementation of comprehensive solutions on Sher Shah Suri and Nawab S.A.K Road will not only enhance safety and efficiency but also foster economic growth and environmental sustainability, benefitting both present and future generations.

5.3 Post Crash Response:

Abbasi Shaheed Hospital is situated on Sher Shah Suri Road. It has been observed that the Abbasi Shaheed Trauma Centre is not handling serious accidents adequately or providing first aid to patients. Instead, it refers such cases to Jinnah Hospital, which is located quite far away (15.9 km) from Sher Shah Suri Road. This delay in treatment could potentially worsen the patient's condition.

Recommendation:



It's essential for Abbasi Shaheed Trauma Centre to be effective in handling all serious cases promptly and efficiently. Timely and appropriate medical care can significantly impact patient outcomes, especially in critical situations